

**UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLUMBIA**

HISTORY ASSOCIATES INCORPORATED,

Plaintiff,

v.

U.S. SECURITIES AND EXCHANGE
COMMISSION,

Defendant.

Case No. 1:24-cv-1858-ACR

JOINT STATUS REPORT

Pursuant to this Court’s May 19, 2025 minute order, Plaintiff History Associates and Defendant the U.S. Securities and Exchange Commission hereby submit this joint status report.

On February 11, 2025, this Court ordered the SEC to produce all documents responsive to prioritized Subparts 3 and 4 of History Associates’ Ethereum FOIA request by April 11, 2025. On April 11, the SEC made its production. The parties subsequently disagreed on the adequacy of the SEC’s production and filed status reports explaining their disagreement. *See* ECF 31, 32. On May 1, this Court ordered the parties to meet and confer by May 15 and to file a joint status report by May 22 “updating the Court on any resolution reached.” May 1, 2025, Minute Order.

On May 14, the parties submitted a joint status report agreeing to resolve their dispute. ECF 33. For a subset of documents responsive to Subparts 3 and 4 that History Associates identified, the SEC agreed that, by June 6, it would: (1) definitively determine whether it can produce any additional responsive documents (or segregable portions of documents), and produce any such documents or portions not already produced; and (2) definitively determine whether it intends to rely on any additional FOIA exemptions for the subset of documents, and produce revised *Vaughn* indices for the subset of documents identifying all FOIA exemptions the SEC intends to assert.

The SEC also stated that it would provide an additional response to Subpart 2 of the Ethereum FOIA request by June 6. History Associates maintained the right to pursue full disclosure of all documents responsive to the Ethereum FOIA request at summary judgment.

On June 6, the SEC provided a supplemental response to Subparts 3 and 4 along with two updated preliminary *Vaughn* indices. *See* Ex. A-C. The SEC also provided a supplemental response to Subpart 2 and a preliminary *Vaughn* index. *See* Ex. D-F.

History Associates is reviewing the SEC's most recent productions in combination with the SEC's prior productions and assessing what, if any, additional documents to request and whether further litigation is necessary. The parties propose to provide the Court with a status report on July 18, 2025.

Date: June 20, 2025

/s/ Jonathan C. Bond
Eugene Scalia
Jonathan C. Bond
Nick Harper
GIBSON, DUNN & CRUTCHER LLP
1700 M Street, N.W.
Washington, D.C. 20036
Telephone: 202.955.8500
Facsimile: 202.467.0539
escalia@gibsondunn.com
jbond@gibsondunn.com
nharper@gibsondunn.com

Attorneys for Plaintiff

Respectfully submitted,

/s/ Alexandra Verdi
Alexandra Verdi
U.S. Securities and Exchange Commission
Boston Regional Office
33 Arch Street, 24th Floor
Boston, Massachusetts 02110
Telephone: 202.551.5057
verdim@sec.gov

Attorney for Defendant

EXHIBIT A



UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
STATION PLACE
100 F STREET, NE
WASHINGTON, DC 20549-2465

Office of FOIA Services

June 6, 2025

Ms. Jessica Albert and Ms. Eva Laverty-Wilson
History Associates Incorporated
300 N. Stonestreet Avenue
Rockville, MD 20850

Re: Freedom of Information Act (FOIA), 5 U.S.C. § 552
Request No. **24-00020-LITG (23-03120-FOIA, 23-03128-
FOIA, and 23-03269-FOIA)**

Dear Ms. Albert and Ms. Laverty-Wilson:

This letter is a partial response to your FOIA Request Nos. 23-03128-FOIA, 23-03120-FOIA, and 23-03269-FOIA. FOIA Request Nos. 23-03128-FOIA and 23-03120-FOIA, dated and received in this office on August 8, 2023, seek "all investigative files and any other factual documents received by the Commission, any Commissioner, and/or any Commission Staff or otherwise in the Commission Staff's custody or control, or any internal or external communications reflecting or concerning any investigations by the Commission or Commission Staff, of" Enigma MPC (Request No. 23-03120-FOIA) and Zachary Coburn (Request No. 23-03128-FOIA). FOIA Request No. 23-03269-FOIA, dated and received in this office on July 28, 2023, seeks "all records concerning Ethereum's shift to a proof-of-stake consensus mechanism that have been created since January 1, 2018."

Reference is made to our interim responses to these requests dated January 7, 2025, January 28, 2025, April 11, 2025, and May 9, 2025. Additional reference is made to our letter dated October 5, 2023, regarding FOIA Request No. 23-03120-FOIA in which we granted your request in part and released to you three pages of records, in part, and informed you that we are withholding additional records that may be responsive to the request pursuant to FOIA Exemption 7(A). Additional reference is made to our letter dated August 11, 2023, regarding FOIA Request No. 23-03128-FOIA in which we informed you that we are withholding responsive records pursuant to FOIA Exemption 7(A).

Ms. Jessica Albert
Ms. Eva Laverty-Wilson
June 6, 2025
Page Two

24-00020-LITG

Additional reference is made to our letter dated October 10, 2023, regarding FOIA Request No. 23-03269-FOIA in which we informed you that we could not locate any responsive records, as well as the Office of the General Counsel's subsequent appeal decision dated February 6, 2024, that responsive records are protected from disclosure pursuant to FOIA Exemption 7(A).

Your counsel and the SEC's counsel agreed that the SEC will process four narrowed subparts of FOIA Request No. 23-03269-FOIA. This letter addresses subparts 3 and 4. Subpart 3 seeks all documents and communications sent to or by all former SEC Commissioners, their counsels, the Director of the Division of Enforcement, the Director of the Crypto Asset and Cyber Unit, the Director of the Office of the Strategic Hub for Innovation and Financial Technology, and the Director of the Division of Corporation Finance that discuss or analyze whether Ether (or "ETH" or "Ethereum") is a security or whether transactions in Ether (or "ETH" or "Ethereum") are securities transactions, and that contain the words "proof-of-stake" (or "PoS," "the Merge," or "EIP-3675"). Subpart 4 seeks all documents or communications sent to or by all former SEC Commissioners, their counsels, the Director of the Division of Enforcement, and the Director of the Crypto Asset and Cyber Unit concerning the decision to close the ETH 2.0 investigation.

Upon additional review, we are re-releasing to you, with modified redactions, the enclosed 12 pages of records in response to subpart 3, with the exception of certain information that has been withheld pursuant to 5 U.S.C. §§ 552 (b) (5), (b) (6), and (b) (7) (C) for the following reasons:

- FOIA Exemption 5 protects certain information prepared in anticipation of litigation, forms an integral part of the pre-decisional process, and/or contains advice given to the Commission or senior staff by the SEC's attorneys. Therefore, it is protected from release by the attorney work-product doctrine and/or the deliberative process and/or attorney-client privileges embodied in Exemption 5;

Ms. Jessica Albert
Ms. Eva Laverty-Wilson
June 6, 2025
Page Three

24-00020-LITG

- FOIA Exemption 6 protects certain information the release of which would constitute a clearly unwarranted invasion of personal privacy; and
- FOIA Exemption (7)(C) protects information the release of which could reasonably be expected to constitute an unwarranted invasion of personal privacy. Release of this information could subject the employees and third-party individuals named in the documents to harassment from the public in the performance of their official duties.

Further, upon additional review, we are re-releasing, with modified redactions, the enclosed 6 pages of records in response to subpart 4, with the exception of certain information that has been withheld pursuant to 5 U.S.C. §§ 552 (b)(5) and (b)(6) for the following reasons:

- FOIA Exemption 5 protects certain information prepared in anticipation of litigation, forms an integral part of the pre-decisional process, and/or contains advice given to the Commission or senior staff by the SEC's attorneys. Therefore, it is protected from release by the attorney work-product doctrine and/or the deliberative process and/or attorney-client privileges embodied in Exemption 5; and
- FOIA Exemption 6 protects certain information the release of which would constitute a clearly unwarranted invasion of personal privacy.

Please be advised that we have considered the foreseeable harm standard when reviewing records and applying FOIA exemptions.

Ms. Jessica Albert
Ms. Eva Laverty-Wilson
June 6, 2025
Page Four

24-00020-LITG

I am the deciding official with regard to this adverse determination. You have the right to appeal my decision to the SEC's General Counsel under 5 U.S.C. § 552(a)(6), 17 CFR § 200.80(f)(1). The appeal must be received within ninety (90) calendar days of the date of this adverse decision. Your appeal must be in writing, clearly marked "Freedom of Information Act Appeal," and should identify the requested records. The appeal may include facts and authorities you consider appropriate.

You may file your appeal by completing the online Appeal form located at https://www.sec.gov/forms/request_appeal, or mail your appeal to the Office of FOIA Services of the Securities and Exchange Commission located at Station Place, 100 F Street NE, Mail Stop 2465, Washington, D.C. 20549, or deliver it to Room 1120 at that address.

If you have any questions, please contact Alexandra Verdi at verdim@sec.gov. You may also contact me at foiapa@sec.gov or (202) 551-7900. You may also contact the SEC's FOIA Public Service Center at foiapa@sec.gov or (202) 551-7900. For more information about the FOIA Public Service Center and other options available to you please see the attached addendum.

Sincerely,

Matthew Hurd

Matthew Hurd
Attorney Advisor

Enclosure

ADDENDUM

For further assistance you can contact a SEC FOIA Public Liaison by calling (202) 551-7900 or visiting <https://www.sec.gov/oso/help/foia-contact.html>.

SEC FOIA Public Liaisons are supervisory staff within the Office of FOIA Services. They can assist FOIA requesters with general questions or concerns about the SEC's FOIA process or about the processing of their specific request.

In addition, you may also contact the Office of Government Information Services (OGIS) at the National Archives and Records Administration to inquire about the FOIA dispute resolution services it offers. OGIS can be reached at 1-877-684-6448 or via e-mail at ogis@nara.gov. Information concerning services offered by OGIS can be found at their website at [Archives.gov](https://www.archives.gov). Note that contacting the FOIA Public Liaison or OGIS does not stop the 90-day appeal clock and is not a substitute for filing an administrative appeal.

Cc: (b)(6); (b)(7)(C) @sec.gov; (b)(6); (b)(7)(C) @sec.gov; (b)(6); (b)(7)(C) @SEC.GOV]
To: Hirsch, David L. @SEC.GOV; Tenreiro, Jorge @SEC.GOV
From: Pauley, Kristin
Sent: 2024-02-01T23:03:05Z
Subject: Eth 2.0 (C-8950)
Received: 2024-02-01T23:03:05Z
[C-8950 Status Memo 1.29.24.docx](#)
[2024.2.1 C-8950 Talking Points.docx](#)

Dave, Jorge –

In advance of your meeting with the Chair’s office next week, please see the attached memos concerning the status of our investigation and (b)(5).

Let us know if you have questions or if any additional information would be helpful.

Thanks,
Kristin

Kristin M. Pauley
Assistant Director, Division of Enforcement
U.S. Securities and Exchange Commission
175 W. Jackson Blvd., Suite 1450
Chicago, IL 60604-2511
Direct: (b)(6)
Email: (b)(6) @sec.gov

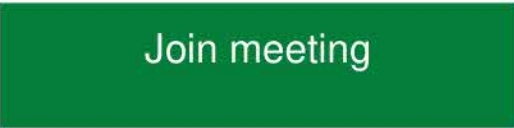
From: Pauley, Kristin
Required Attendees: Hirsch, David L; Tenreiro, Jorge; Ingram, Jonathan; Mumford, Jay; Vilardo, Mark; Reedich, Michael; Schoeffler, Andrew; Dattner, Ian; Brilliant, Todd S.; Brady, Nicholas A.
Location: (b)(6)
Importance: Normal
Subject: Eth 2.0 (C-8950)
Start Date/Time: 2024-01-31T17:30:00Z
End Date/Time: 2024-01-31T18:30:00Z
[2013.10.13.Voluntary.Submission.Galaxy.Digital--FOIA CONFIDENTIAL TREATMENT REQUESTED.pdf](#)

We'd like to touch base with you all about the status of this matter. This time looks like it hopefully works for most. Thanks in advance!

*Attached is a memo prepared by Davis Polk in connection with the Galaxy matter (NY-10522). (b)(5)
(b)(5)

-- Do not delete or change any of the following text. --

When it's time, join your Webex meeting here.



More ways to join:

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(b)(6)

Join by meeting number

Meeting number (access code): (b)(6)

Meeting password: (b)(6) from phones and video systems)

Tap to join from a mobile device (attendees only)

(b)(6) USA Toll 2
US Toll

Some mobile devices may ask attendees to enter a numeric password.

Join by phone

(b)(6)

USA Toll 2
US Toll

Global call-in numbers

Join from a video system or application

Dial (b)(6)

If you are a host, [click here](#) and login site to view host information.

Need help? Go to <https://help.webex.com>

To: Tenreiro, Jorge (b)(6)@SEC.GOV
From: Pauley, Kristin
Sent: 2024-07-19T15:54:54Z
Subject: C-8950: Draft Closing Narrative
Received: 2024-07-19T15:54:54Z
[Case Closing Narrative Eth 2.0 C-08950 7.18.24.docx](#)

Hi Jorge –

Please let me know if you have comments on the attached draft and if it'd be helpful to discuss.

Thanks,
Kristin

To: Lizarraga, Jaime (b)(6) @SEC.GOV
Cc: #CommLizarragaStaff (b)(6) @SEC.GOV
From: D'Allaird, Laura
Sent: 2023-04-13T13:58:41Z
Subject: CCM Notes
Received: 2023-04-13T13:58:41Z
[CCM Notes 04.13.23 \(Draft 04.13.23\).docx](#)

Jaime,
Please see attached the notes for today's CCM. The action memos are saved [here](#), and I have proposed comments in there highlighted for your consideration.
Kat – can you please add these to the notes?
Thank you,
Laura

To: Peirce, Hester (b)(6) SEC.GOV; Simon, Ammon (b)(6) SEC.GOV
From: Vetter, Benjamin
Sent: 2023-04-13T12:25:05Z
Subject: CCM Bullets
Received: 2023-04-13T12:25:05Z

[04.13.23 CCM Bullets.docx](#)

Attached. Including Ammon so he can review/add to (b)(5)

Benjamin Vetter
Counsel
Office of Commissioner Hester M. Peirce
Securities and Exchange Commission
100 F Street NE
Washington DC 20549

To: Peirce, Hester (b)(6)@SEC.GOV
Cc: Vetter, Benjamin (b)(6)@SEC.GOV
From: Simon, Ammon
Sent: 2023-04-13T15:04:21Z
Subject: RE: CCM Bullets
Received: 2023-04-13T15:04:21Z
[04.13.23 CCM Bullets.docx](#)

Hester -
Attached with additions to the (b)(5) discussion based on my conversation with you yesterday. (b)(5)

AMMON SIMON
Counsel to Commissioner Hester Peirce
U.S. Securities and Exchange Commission
(b)(6) m) | (b)(6)@sec.gov

From: Vetter, Benjamin <(b)(6)@SEC.GOV>
Sent: Thursday, April 13, 2023 8:25 AM
To: Peirce, Hester (b)(6)@SEC.GOV>; Simon, Ammon (b)(6)@SEC.GOV>
Subject: CCM Bullets

Attached. Including Ammon so he can review/add to (b)(5)
Benjamin Vetter
Counsel
Office of Commissioner Hester M. Peirce
Securities and Exchange Commission
100 F Street NE
Washington DC 20549

To: Tenreiro, Jorge (b)(6)@SEC.GOV
Cc: Hirsch, David L (b)(6)@SEC.GOV
From: Vivolo, Assunta
Sent: 2023-02-14T17:05:31Z
Subject: RE: Update
Received: 2023-02-14T17:05:32Z
[Copy of CACU Cases 2023 Timeline AV edits.xlsx](#)

Hi,
I updated some of the information in the chart, (b)(5)

(b)(5)

Also, apologies I could not turn on my camera yesterday for the call. As I mentioned, I was at DNJ and could only step out briefly to hear part of the call.
Thanks,
Assunta

From: Tenreiro, Jorge (b)(6)@SEC.GOV>
Sent: Monday, February 13, 2023 10:43 AM
To: #ENF Cyber Unit ADs (b)(6)@SEC.GOV>
Cc: Hirsch, David L (b)(6)@SEC.GOV>
Subject: Update

Hi all:
We hope everyone had a nice weekend. We look forward to seeing all of you at the Unit-wide address where Gurbir & Sanjay will address the Unit. If at all possible, please turn on your WebEx cameras, a request that Gurbir & Sanjay typically make of managers/supervisors.
We wanted to flag two issues for you.

(b)(5)

Second, attached is a long-advertised chart that reflects most (not all) of the crypto-related matters that we are working on and

(b)(5)

Dave & Jorge

To: Tenreiro, Jorge (b)(6)@SEC.GOV
Cc: Hirsch, David L (b)(6)@SEC.GOV
From: Tarasevich, Deborah
Sent: 2023-02-14T15:46:09Z
Subject: RE: Update
Received: 2023-02-14T15:46:09Z
[CACU Cases 2023 Timeline v2 \(DAT edits\).xlsx](#)

Jorge –
(b)(5)

(b)(5) Deb
From: Tenreiro, Jorge <(b)(6)@SEC.GOV>
Sent: Monday, February 13, 2023 10:43 AM
To: #ENF Cyber Unit ADs <(b)(6)@SEC.GOV>
Cc: Hirsch, David L <(b)(6)@SEC.GOV>
Subject: Update

Hi all:
We hope everyone had a nice weekend. We look forward to seeing all of you at the Unit-wide address where Gurbir & Sanjay will address the Unit. If at all possible, please turn on your WebEx cameras, a request that Gurbir & Sanjay typically make of managers/supervisors.
We wanted to flag two issues for you.

(b)(5)

Second, attached is a long-advertised chart that reflects most (not all) of the crypto-related matters that we are working on and
(b)(5)

Dave & Jorge

Subject: Fwd: Coinbase - draft Wells meeting prep memo and action memo update
Received: 2023-04-20T03:00:08Z
[2023-04-19 Coinbase Wells Submission.pdf](#)

Coinbase Wells, attached. Apparently they submitted a video as well but we can't access yet due to IT issues. I will circulate a parallel invite tomorrow.

(This is my first experience of someone taking us up on the video Wells. Have we had any others?)

From: Voorhees, Danielle (b)(6) @SEC.GOV>
Sent: Wednesday, April 19, 2023 10:09:12 PM
To: Smolar, Gregory (b)(6) @SEC.GOV>
Cc: Knowles, Kerry (b)(6) @SEC.GOV>; Buford, Charlotte L. (b)(6) @SEC.GOV>; Burt, Jason (b)(6) @sec.gov>; Heinke, Nicholas (b)(6) @SEC.GOV>; Buchholz, Steven (b)(6) @sec.gov>; Tenreiro, Jorge (b)(6) @SEC.GOV>
Subject: RE: Coinbase - draft Wells meeting prep memo and action memo update

Gregg,
The written Coinbase Wells submission is attached. Counsel also attempted to submit a video, but we cannot access it. We will pass it on once we receive it.
Thanks,
Danielle
(b)(6)

From: Voorhees, Danielle (b)(6) @SEC.GOV>
Sent: Wednesday, April 19, 2023 11:42 AM
To: Smolar, Gregory (b)(6) @SEC.GOV>
Cc: Knowles, Kerry (b)(6) @SEC.GOV>; Buford, Charlotte L. (b)(6) @SEC.GOV>; Burt, Jason (b)(6) @sec.gov>; Heinke, Nicholas (b)(6) @SEC.GOV>; Buchholz, Steven (b)(6) @sec.gov>; Tenreiro, Jorge (b)(6) @SEC.GOV>
Subject: RE: Coinbase - draft Wells meeting prep memo and action memo update

Thanks, Gregg. Yes, once we have a new version of the memo, I will send you a redline compared to the version that I sent on Monday.
Danielle

From: Smolar, Gregory (b)(6) @SEC.GOV>
Sent: Wednesday, April 19, 2023 11:26 AM
To: Voorhees, Danielle (b)(6) @SEC.GOV>
Cc: Knowles, Kerry (b)(6) @SEC.GOV>; Buford, Charlotte L. (b)(6) @SEC.GOV>; Burt, Jason (b)(6) @sec.gov>; Heinke, Nicholas (b)(6) @SEC.GOV>; Buchholz, Steven (b)(6) @sec.gov>; Tenreiro, Jorge (b)(6) @SEC.GOV>
Subject: RE: Coinbase - draft Wells meeting prep memo and action memo update

Thanks. Please send a clean and redline (compared to version approved by FO) for the A/M.

From: Voorhees, Danielle (b)(6) @SEC.GOV>
Sent: Wednesday, April 19, 2023 12:50 PM
To: Smolar, Gregory (b)(6) @SEC.GOV>
Cc: Knowles, Kerry (b)(6) @SEC.GOV>; Buford, Charlotte L. (b)(6) @SEC.GOV>; Burt, Jason (b)(6) @sec.gov>; Heinke, Nicholas (b)(6) @SEC.GOV>; Buchholz, Steven (b)(6) @sec.gov>; Tenreiro, Jorge (b)(6) @SEC.GOV>
Subject: Coinbase - draft Wells meeting prep memo and action memo update

Hi Gregg,
Attached is a draft Wells meeting prep memo, which is anticipation of our (internal) prep meeting on Friday, April 21 at 1 p.m. ET and the Wells meeting with Coinbase and counsel on Monday, April 24 at 12:30 p.m. ET. (b)(5)

(b)(5)

Thank you,
Danielle
(b)(6)

From: Voorhees, Danielle <(b)(6)@SEC.GOV>
Sent: Tuesday, April 18, 2023 8:50 AM
To: Smolar, Gregory <(b)(6)@SEC.GOV>
Cc: Knowles, Kerry <(b)(6)@SEC.GOV>; Buford, Charlotte L. <(b)(6)@SEC.GOV>; Burt, Jason <(b)(6)@sec.gov>; Heinke, Nicholas <(b)(6)@SEC.GOV>; Buchholz, Steven <(b)(6)@sec.gov>; Tenreiro, Jorge <(b)(6)@SEC.GOV>
Subject: RE: Coinbase - memo for Front Office and request to skip the To-Be

Hi Gregg –
(b)(5)

(b)(5) Happy to discuss.

Thank you,
Danielle

From: Voorhees, Danielle <(b)(6)@SEC.GOV>
Sent: Monday, April 17, 2023 9:50 AM
To: Smolar, Gregory <(b)(6)@SEC.GOV>
Cc: Knowles, Kerry <(b)(6)@SEC.GOV>; Buford, Charlotte L. <(b)(6)@SEC.GOV>; Burt, Jason <(b)(6)@sec.gov>; Heinke, Nicholas <(b)(6)@SEC.GOV>; Buchholz, Steven <(b)(6)@sec.gov>; Tenreiro, Jorge <(b)(6)@SEC.GOV>
Subject: Coinbase - memo for Front Office and request to skip the To-Be

Hi Gregg,
Attached for Front Office review is a draft action memo for the Coinbase recommendation, proposed Appendices (b)(5) and a counsel list. We would appreciate it if we would be permitted to skip the To-Be meeting (b)(5)

(b)(5)

Please feel free to give me or Steve a call if you have any questions or if you would like to discuss anything in more detail.
Thank you very much.

Danielle
(b)(6)
Danielle R. Voorhees
Assistant Regional Director
Division of Enforcement
(b)(6)@sec.gov
(b)(6) (direct)

To: Peirce, Hester (b)(6)@SEC.GOV
From: Smith, James

Sent: 2020-01-27T23:38:46Z

Subject: Law Review Articles Addressing Classification of Utility Tokens and Regulation of ICOs - 1 of 3

Received: 2020-01-27T23:38:47Z

- [\(1\) A REGULATORY CLASSIFICATION OF DIGITAL ASSETS TOWARD AN OPERATIONAL HOWEY TEST FOR CRYPTOCURRENCIES.pdf](#)
- [\(2\) BLOCKCHAIN-BASED TOKEN SALES INITIAL COIN OFFERINGS AND THE DEMOCRATIZATION OF PUBLIC CAPITAL MARKET.pdf](#)
- [\(3\) AINT MISBEHAVIN AN EXAMINATION OF BROADWAY TICKETS AND BLOCKCHAIN TOKENS.pdf](#)
- [\(4\) INITIAL COIN OFFERINGS - WHEN ARE TOKENS SECURITIES IN THE EU AND US.pdf](#)

Dear Commissioner Peirce,

Coy and I have selected a total of 11 law review articles which we believe are relevant to your interests regarding crypto-assets and ICOs. I have organized them first by topic and second, within each topic, by order of perceived importance and quality for your convenience. Coy suggested I send the articles to you in groups and so I will send the articles in a total of three emails. Articles 1-4 address the classification of whether or when a token is a security. Articles 5-8 focus on the regulation of ICOs. Articles 9-11 are more general, and explore the risks and benefits of crypto-assets and their implications for potential regulation. I hope you find these articles helpful.

Best regards,

James Larkin Smith
 Honors Intern | Office of Commissioner Hester M. Peirce
 U.S. Securities & Exchange Commission
 100 F Street NE | Washington DC 20549
 (b)(6)@sec.gov

To: Tenreiro, Jorge (b)(6) @SEC.GOV
From: Grewal, Gurbir (b)(6) @SEC.GOV
Sent: 2024-02-20T17:32:06Z
Subject: RE: Document
Received: 2024-02-20T17:32:06Z

(b)(5)

From: Tenreiro, Jorge (b)(6) @SEC.GOV>
Sent: Sunday, February 18, 2024 12:31 PM
To: Gerding, Erik (b)(6) @SEC.GOV>; Grewal, Gurbir (b)(6) @SEC.GOV>
Subject: RE: Document

Thanks Erik—I finally read this memo. (b)(5)

(b)(5)

We look forward to discussing this and other issues this week. (b)(5)

(b)(5)

Hope you're having a good weekend and sorry for the weekend email.

From: Gerding, Erik (b)(6) @SEC.GOV>
Sent: Wednesday, February 14, 2024 3:52 PM
To: Grewal, Gurbir (b)(6) @SEC.GOV>; Tenreiro, Jorge (b)(6) @SEC.GOV>
Subject: Fwd: Document

(b)(5)

From: Seaman, Michael P. (b)(6) @SEC.GOV>
Sent: Wednesday, February 14, 2024 1:49 PM
To: Gerding, Erik (b)(6) @SEC.GOV>
Subject: Document

From: Ingram, Jonathan (b)(6) @SEC.GOV>
Sent: Wednesday, February 14, 2024 3:48 PM
To: Seaman, Michael P. (b)(6) @SEC.GOV>
Subject: RE:

Please see password for (b)(5) Analysis

From: Seaman, Michael P. (b)(6) @SEC.GOV>
Sent: Wednesday, February 14, 2024 3:39 PM
To: Ingram, Jonathan (b)(6) @SEC.GOV>
Subject:

Can you send me the document we discussed?

To: Grewal, Gurbir <(b)(6)@SEC.GOV>
From: Tenreiro, Jorge
Sent: 2024-04-22T19:59:33Z
Subject: FW: paths forward
Received: 2024-04-22T19:59:33Z
[Paths v2.docx](#)

From: Tenreiro, Jorge <(b)(6)@SEC.GOV>
Sent: Wednesday, February 28, 2024 8:38 AM
To: Grewal, Gurbir <(b)(6)@SEC.GOV>
Cc: Wadhwa, Sanjay <(b)(6)@SEC.GOV>; Smolar, Gregory <(b)(6)@SEC.GOV>
Subject: Re: paths forward

Updated

From: Grewal, Gurbir <(b)(6)@SEC.GOV>
Sent: Wednesday, February 28, 2024 7:28:02 AM
To: Tenreiro, Jorge <(b)(6)@SEC.GOV>
Cc: Wadhwa, Sanjay <(b)(6)@SEC.GOV>; Smolar, Gregory <(b)(6)@SEC.GOV>
Subject: RE: paths forward

Another path forward is (b)(5)

From: Tenreiro, Jorge <(b)(6)@SEC.GOV>
Sent: Monday, February 26, 2024 1:21 PM
To: Grewal, Gurbir <(b)(6)@SEC.GOV>
Cc: Wadhwa, Sanjay <(b)(6)@SEC.GOV>; Smolar, Gregory <(b)(6)@SEC.GOV>
Subject: paths forward

Let me know if this is more or less what you had in mind.

(b)(5) but this should be a good start I hope

To: Grewal, Gurbir <(b)(6)@SEC.GOV>
Cc: Wadhwa, Sanjay <(b)(6)@SEC.GOV>; Smolar, Gregory <(b)(6)@SEC.GOV>
From: Tenreiro, Jorge
Sent: 2024-02-28T13:37:40Z
Subject: Re: paths forward
Received: 2024-02-28T13:37:40Z
[Paths v2.docx](#)

Updated

From: Grewal, Gurbir <(b)(6)@SEC.GOV>
Sent: Wednesday, February 28, 2024 7:28:02 AM
To: Tenreiro, Jorge <(b)(6)@SEC.GOV>
Cc: Wadhwa, Sanjay <(b)(6)@SEC.GOV>; Smolar, Gregory <(b)(6)@SEC.GOV>
Subject: RE: paths forward

Another path forward is (b)(5)

From: Tenreiro, Jorge <(b)(6)@SEC.GOV>
Sent: Monday, February 26, 2024 1:21 PM
To: Grewal, Gurbir <(b)(6)@SEC.GOV>
Cc: Wadhwa, Sanjay <(b)(6)@SEC.GOV>; Smolar, Gregory <(b)(6)@SEC.GOV>
Subject: paths forward

Let me know if this is more or less what you had in mind.

(b)(5) but this should be a good start I hope

To: Grewal, Gurbir (b)(6) @SEC.GOV
Cc: Wadhwa, Sanjay (b)(6) @SEC.GOV; Smolar, Gregory (b)(6) @SEC.GOV
From: Tenreiro, Jorge
Sent: 2024-02-26T18:20:47Z
Subject: paths forward
Received: 2024-02-26T18:20:48Z
[Paths.docx](#)

Let me know if this is more or less what you had in mind.

(b)(5)

but this should be a good start I hope

To: Grewal, Gurbir (b)(6) @SEC.GOV
Cc: Wadhwa, Sanjay (b)(6) @SEC.GOV
From: Smolar, Gregory
Sent: 2024-04-17T22:30:40Z
Subject: FW: Update on eth
Received: 2024-04-17T22:30:40Z

FYI from Jorge. Per below, Gary called an impromptu meeting on ETH ETP. I will add to TPs for tomorrow. Jorge is available after 8:30pm tonight and is around tomorrow if you want to discuss with him.

From: Tenreiro, Jorge (b)(6) @SEC.GOV>
Sent: Wednesday, April 17, 2024 5:56 PM
To: Smolar, Gregory (b)(6) @SEC.GOV>
Subject: Re: Update on eth
Importance: High

From: Tenreiro, Jorge
Sent: Wednesday, April 17, 2024 3:54:51 PM
To: Smolar, Gregory (b)(6) @SEC.GOV>
Subject: Update on eth

He called an impromptu meeting on eth etp

(b)(5)

Happy to discuss. (b)(6) but it may be worth connecting

EXHIBIT B

Doc ID	Family Date	Email To	Email From	Email CC	File Name / Subject	FOIA Exemption(s)/Privilege Tags	Basis for Withholding	File Extension	Is Attachment
GC-LIT-0470-0447844; GC-LIT-0470-0447845	04/05/2022 12:32:55 PM	Mark Sylvester; SEC staff	SEC staff	SEC staff	RE FOIA Requests for William Hinman's 63 emails.msg	Not responsive record	Upon further review of these records, we have determined that they are not responsive to subpart 3. At the time that this record was created, custodian Mark Sylvester was not in a position covered by subpart 3.	.msg; .pdf	
GC-LIT-0470-0572967	05/09/2022 06:50:55 PM	Mark Sylvester, SEC ENF staff	SEC ENF staff		RE Their hour is up.msg			.msg	False
GC-LIT-0470-0572969	05/09/2022 06:50:55 PM				SEC-LIT-EPROD-000738343.pdf	Not responsive record	Upon further review of these records, we have determined that they are not responsive to subpart 3. At the time that this record was created, custodian Mark Sylvester was not in a position covered by subpart 3.	.pdf	True
GC-LIT-0470-0490750	05/24/2022 07:49:29 PM	SEC ENF staff	SEC ENF staff	Mark Sylvester	RE ETH2.msg			.msg	False
GC-LIT-0470-0490752	05/24/2022 07:49:29 PM				Analysis of Ethereum 2.0 under Howey.pdf	Exemption 5 (deliberative process privilege; attorney work-product doctrine; attorney-client privilege) Exemption 6 Exemption 7(C)	<p>The email thread is intra-agency and reflects deliberations by SEC staff regarding the handling of a TCR. The withheld email thread is deliberative because it contains staff deliberations about how to handle the TCR. The withheld information is pre-decisional because a decision had not been made about the TCR.</p> <p>The withheld email thread and attachment were prepared by ENF attorneys in anticipation of litigation and contain legal analysis relating to Enforcement matters.</p> <p>The withheld attachment consists of a memo prepared by ENF staff providing legal analysis regarding Ethereum 2.0. The memo is deliberative because it raises issues for further consideration. The memo is predecisional because no decision had been made about issues raised in the memo.</p> <p>Additionally, the withheld attachment was prepared by an ENF attorney to provide legal advice to senior SEC staff regarding Ethereum 2.0.</p> <p>SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.</p> <p>ENF staff have a privacy interest in not being associated with a law enforcement investigation, and the public interest in knowing this personal information is not outweighed by their privacy interests.</p>	.pdf	True
GC-LIT-0470-0290819	06/08/2022 02:56:41 PM	SEC ENF staff	Mark Sylvester		FW ETH2.msg			.msg	False

Doc ID	Family Date	Email To	Email From	Email CC	File Name / Subject	FOIA Exemption(s)/Privilege Tags	Basis for Withholding	File Extension	Is Attachment
GC-LIT-0470-0290821	06/08/2022 02:56:41 PM				Analysis of Ethereum 2.0 under Howey.pdf	Exemption 5 (deliberative process privilege; attorney work-product doctrine; attorney-client privilege) Exemption 6 Exemption 7(C)	<p>The email thread is intra-agency and reflects deliberations by SEC staff regarding the handling of a TCR. The withheld email thread is deliberative because it contains staff deliberations about how to handle the TCR. The withheld information is pre-decisional because a decision had not been made about the TCR.</p> <p>The withheld email thread and attachment were prepared by ENF attorneys in anticipation of litigation and contain legal analysis relating to Enforcement matters.</p> <p>The withheld attachment consists of a memo prepared by ENF staff providing legal analysis regarding Ethereum 2.0. The memo is deliberative because it raises issues for further consideration. The memo is predecisional because no decision had been made about issues raised in the memo.</p> <p>Additionally, the withheld attachment was prepared by an ENF attorney to provide legal advice to senior SEC staff regarding Ethereum 2.0.</p> <p>SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.</p> <p>ENF staff have a privacy interest in not being associated with a law enforcement investigation, and the public interest in knowing this personal information is not outweighed by their privacy interests.</p>	.pdf	True
GC-LIT-0470-0492721	06/08/2022 04:29:19 PM	Mark Sylvester	SEC ENF staff		Eth 2.0.msg			.msg	False
GC-LIT-0470-0492724	06/08/2022 04:29:19 PM				Analysis of Ethereum 2.0 under Howey.pdf	Not responsive record	Upon further review of these records, we have determined that they are not responsive to subpart 3. At the time that this record was created, custodian Mark Sylvester was not in a position covered by subpart 3.	.pdf	True
GC-LIT-0470-0639961	09/20/2022 09:43:51 PM	SEC ENF staff	SEC ENF staff	SEC ENF staff, Jorge Tenreiro, Mark Sylvester, Davis Hirsch	RE [redacted] Meeting.msg			.msg	False

Doc ID	Family Date	Email To	Email From	Email CC	File Name / Subject	FOIA Exemption(s)/Privilege Tags	Basis for Withholding	File Extension	Is Attach-ment
GC-LIT-0470-0639962	09/20/2022 09:43:51 PM				2022.09.20 TPs for Mtg re [redacted] and the Merge v 3.docx	Exemption 5 (deliberative process privilege; attorney-client privilege; attorney work-product doctrine) Exemption 6 Exemption 7(C)	<p>The email thread is intra-agency and reflects deliberations by SEC staff about what to discuss at an internal SEC meeting regarding ongoing investigations. The withheld email thread is deliberative because it contains staff deliberations about the meeting as well as about matters in certain investigations, including possible questions and proposed answers about particular issues. The withheld information is pre-decisional because a decision had not been made about what to discuss at the meeting or about the investigations.</p> <p>The withheld attachment is also an intra-agency document, and it contains discussions about an ongoing investigation. The withheld attachment is deliberative because it contains staff deliberations about the handling of the investigation. The withheld attachment is pre-decisional because decisions had not been made about issues relating to the investigation.</p> <p>Additionally, the withheld email thread and attachment were prepared by ENF attorneys in anticipation of litigation and contain legal analysis relating to Enforcement matters.</p> <p>Finally, the withheld email thread and attachment were prepared by attorneys and contain legal advice for the Chair and senior ENF staff.</p> <p>SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.</p> <p>ENF staff have a privacy interest in not being associated with a law enforcement investigation, and the public interest in knowing this personal information is not outweighed by their privacy interests.</p>	.docx	True
GC-LIT-0470-0632417	09/28/2022 10:50:25 AM	David Hirsch, Jorge Tenreiro	SEC ENF staff	SEC ENF staff	RE [redacted] investigation.msg			.msg	False
GC-LIT-0470-0632418	09/28/2022 10:50:25 AM				[redacted] Memo v. 16.docx			.docx	True

Doc ID	Family Date	Email To	Email From	Email CC	File Name / Subject	FOIA Exemption(s)/Privilege Tags	Basis for Withholding	File Extension	Is Attachment
GC-LIT-0470-0632419	09/28/2022 10:50:25 AM				Appx A v.2 (token chart).docx	Exemption 5 (deliberative process privilege; attorney-client privilege; attorney work-product doctrine) Exemption 6 Exemption 7(C)	<p>The email is intra-agency and reflects deliberations by SEC staff about matters to discuss relating to an ongoing investigation. The withheld email is deliberative because it contains staff deliberations about the approach in the ongoing investigation and possible issues to handle. The withheld information is pre-decisional because a decision had not been made about issues raised in the ongoing investigation.</p> <p>The withheld attachments are also intra-agency and consist of a draft memoranda to the Commission about the ongoing investigation and a supporting appendix. The withheld attachments are deliberative because they contain staff deliberations and analysis about a possible enforcement action. The withheld attachments are pre-decisional because decisions had not been made about issues relating to the investigation.</p> <p>Additionally, the withheld email and attachments were prepared by ENF attorneys in anticipation of litigation and contain legal analysis relating to Enforcement matters.</p> <p>Finally, the withheld email and attachment were prepared by attorneys and contain legal advice for the Commission.</p> <p>SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.</p> <p>ENF staff have a privacy interest in not being associated with a law enforcement investigation, and the public interest in knowing this personal information is not outweighed by their privacy interests.</p>	.docx	True
GC-LIT-0470-0632414	09/28/2022 10:54:49 AM	David Hirsch	Jorge Tenreiro		FW [redacted] investigation.msg			.msg	False
GC-LIT-0470-0632415	09/28/2022 10:54:49 AM				[redacted] Memo v. 16.docx			.docx	True

Doc ID	Family Date	Email To	Email From	Email CC	File Name / Subject	FOIA Exemption(s)/Privilege Tags	Basis for Withholding	File Extension	Is Attachment
GC-LIT-0470-0632416	09/28/2022 10:54:49 AM				Appx A v.2 (token chart).docx	Exemption 5 (deliberative process privilege; attorney-client privilege; attorney work-product doctrine) Exemption 6	<p>The email thread is intra-agency and reflects deliberations by SEC staff about matters to discuss relating to an ongoing investigation. The withheld email thread is deliberative because it contains staff deliberations about the approach in the ongoing investigation and possible issues to handle. The withheld information is pre-decisional because a decision had not been made about issues raised in the ongoing investigation.</p> <p>The withheld attachments are also intra-agency and consist of a draft memoranda to the Commission about the ongoing investigation and a supporting appendix. The withheld attachments are deliberative because they contain staff deliberations and analysis about a possible enforcement action. The withheld attachments are pre-decisional because decisions had not been made about issues relating to the investigation.</p> <p>Additionally, the withheld email thread and attachments were prepared by ENF attorneys in anticipation of litigation and contain legal analysis relating to Enforcement matters.</p> <p>The withheld email thread and attachment were prepared by attorneys and contain legal advice for the Commission and senior ENF staff.</p> <p>SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.</p>	.docx	True
GC-LIT-0470-0485045	01/27/2023 12:18:58 PM	SEC staff	SEC staff	Hirsch, David L; SEC staff	FW [redacted] Update; [redacted].msg			.msg	False
GC-LIT-0470-0485046	01/27/2023 12:18:58 PM				2022.09.20 TPs for Mtg re [redacted] and the Merge v 3.docx	Exemption 5 (deliberative process privilege; attorney-client privilege; attorney work-product doctrine) Exemption 6	<p>The withheld email thread and attachment are intra-agency and consist of legal analysis prepared by an SEC attorney relating to an ENF investigation. The withheld records are deliberative because they discuss legal and factual issues relating to an ongoing investigation, including possible legal questions. The withheld information is pre-decisional because SEC staff had not yet resolved the legal or factual issues.</p> <p>The withheld email thread and attachment were prepared by ENF attorneys in anticipation of litigation and contain legal analysis relating to Enforcement matters.</p> <p>Finally, the withheld email thread and attachment were prepared by attorneys and contain legal advice for senior ENF staff.</p> <p>SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.</p>	.docx	True

Doc ID	Family Date	Email To	Email From	Email CC	File Name / Subject	FOIA Exemption(s)/Privilege Tags	Basis for Withholding	File Extension	Is Attachment
GC-LIT-0470-0595947	02/22/2023 12:24:10 PM	Steven Levine, Nadia Brannon	Kathleen Hitchins		RE Is Ethereum a security.msg	Not responsive record	Upon further review of this record, we have determined that it is not responsive to subpart 3. At the time that this record was created, custodian Kathleen Hitchins was not in a position covered by subpart 3.	.msg	False
GC-LIT-0470-0486395	04/10/2023 12:11:49 PM	David Hirsch, Jorge Tenreiro	SEC ENF staff	SEC ENF staff	Ethereum 2.0 (C-08950) Draft CCM TPs.msg			.msg	False
GC-LIT-0470-0486396	04/10/2023 12:11:49 PM				CCM Draft Talking Points_4.13.23v3.docx	Exemption 5 (deliberative process privilege; attorney work-product doctrine; attorney-client privilege) Exemption 6 Exemption 7(C)	<p>The withheld email and attachment are intra-agency records prepared by SEC attorneys for a Closed Commission Meeting. They contain analysis, recommendations, and draft talking points in connection with the Ethereum 2.0 investigation, to potentially be discussed in an upcoming meeting. The withheld information is pre-decisional because decisions had not been made about the legal issues relating to the investigation and matters discussed in the records.</p> <p>The withheld email and attachment were prepared by ENF attorneys in anticipation of litigation and contain legal analysis relating to Enforcement matters.</p> <p>The withheld email and attachment were prepared by attorneys and contain legal advice for the Commission.</p> <p>SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.</p> <p>ENF staff have a privacy interest in not being associated with a law enforcement investigation, and the public interest in knowing this personal information is not outweighed by their privacy interests.</p>	.docx	True

Doc ID	Family Date	Email To	Email From	Email CC	File Name / Subject	FOIA Exemption(s)/Privilege Tags	Basis for Withholding	File Extension	Is Attachment
GC-LIT-0470-0486479	04/11/2023 08:05:09 PM	David Hirsch, Jorge Tenreiro	SEC ENF staff	SEC ENF staff	FW Ethereum 2.0 CCM.msg	Exemption 5 (deliberative process privilege; attorney work-product doctrine; attorney-client privilege) Exemption 6 Exemption 7(C)	<p>The withheld email thread is intra-agency and contains possible questions, draft answers, and discussion for preparation for an upcoming Closed Commission Meeting. The withheld email thread contains legal analysis and recommendations in connection with the Ethereum 2.0 investigation to potentially be discussed in an upcoming meeting. The withheld information is pre-decisional because decisions had not been made about the legal issues relating to the investigation.</p> <p>The withheld email thread was prepared by an ENF attorney in anticipation of litigation and contains legal analysis relating to an Enforcement matter.</p> <p>The withheld email thread was prepared by attorneys and contains legal advice to senior ENF staff, including input from the Office of the General Counsel.</p> <p>SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.</p> <p>ENF staff have a privacy interest in not being associated with a law enforcement investigation, and the public interest in knowing this personal information is not outweighed by their privacy interests.</p>	.msg	False
GC-LIT-0470-0486480	04/11/2023 08:13:28 PM	David Hirsch, SEC ENF staff	Jorge Tenreiro	SEC ENF staff	Re Ethereum 2.0 CCM.msg	Exemption 5 (deliberative process privilege; attorney work-product doctrine; attorney-client privilege) Exemption 6 Exemption 7(C)	<p>The withheld email thread is intra-agency and contains possible questions, draft answers, and discussion for preparation for an upcoming Closed Commission Meeting. The withheld email thread contains legal analysis and recommendations in connection with the Ethereum 2.0 investigation to potentially be discussed in an upcoming meeting. The withheld information is pre-decisional because decisions had not been made about the legal issues relating to the investigation.</p> <p>The withheld email thread was prepared by an ENF attorney in anticipation of litigation and contains legal analysis relating to an Enforcement matter.</p> <p>The withheld email thread was prepared by attorneys and contains legal advice to senior ENF staff, including input from the Office of the General Counsel.</p> <p>SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.</p> <p>ENF staff have a privacy interest in not being associated with a law enforcement investigation, and the public interest in knowing this personal information is not outweighed by their privacy interests.</p>	.msg	False

Doc ID	Family Date	Email To	Email From	Email CC	File Name / Subject	FOIA Exemption(s)/Privilege Tags	Basis for Withholding	File Extension	Is Attachment
GC-LIT-0470-0486481	04/11/2023 08:14:30 PM	David Hirsch, Jorge Tenreiro, SEC ENF staff	SEC ENF staff	SEC ENF staff	Re Ethereum 2.0 CCM.msg	Exemption 5 (deliberative process privilege; attorney work-product doctrine; attorney-client privilege) Exemption 6 Exemption 7(C)	<p>The withheld email thread is intra-agency and contains possible questions, draft answers, and discussion for preparation for an upcoming Closed Commission Meeting. The withheld email thread contains legal analysis and recommendations in connection with the Ethereum 2.0 investigation to potentially be discussed in an upcoming meeting. The withheld information is pre-decisional because decisions had not been made about the legal issues relating to the investigation.</p> <p>The withheld email thread was prepared by an ENF attorney in anticipation of litigation and contains legal analysis relating to an Enforcement matter.</p> <p>The withheld email thread was prepared by attorneys and contains legal advice to senior ENF staff, including input from the Office of the General Counsel.</p> <p>SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.</p> <p>ENF staff have a privacy interest in not being associated with a law enforcement investigation, and the public interest in knowing this personal information is not outweighed by their privacy interests.</p>	.msg	False
GC-LIT-0470-0486482	04/11/2023 08:15:10 PM	David Hirsch, Jorge Tenreiro, SEC ENF staff	SEC ENF staff	SEC ENF staff	Re Ethereum 2.0 CCM.msg	Exemption 5 (deliberative process privilege; attorney work-product doctrine; attorney-client privilege) Exemption 6 Exemption 7(C)	<p>The withheld email thread is intra-agency and contains possible questions, draft answers, and discussion for preparation for an upcoming Closed Commission Meeting. The withheld email thread contains legal analysis and recommendations in connection with the Ethereum 2.0 investigation to potentially be discussed in an upcoming meeting. The withheld information is pre-decisional because decisions had not been made about the legal issues relating to the investigation.</p> <p>The withheld email thread was prepared by an ENF attorney in anticipation of litigation and contains legal analysis relating to an Enforcement matter.</p> <p>The withheld email thread was prepared by attorneys and contains legal advice to senior ENF staff, including input from the Office of the General Counsel.</p> <p>SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.</p> <p>ENF staff have a privacy interest in not being associated with a law enforcement investigation, and the public interest in knowing this personal information is not outweighed by their privacy interests.</p>	.msg	False

Doc ID	Family Date	Email To	Email From	Email CC	File Name / Subject	FOIA Exemption(s)/Privilege Tags	Basis for Withholding	File Extension	Is Attachment
GC-LIT-0470-0637347	04/12/2023 01:53:37 PM	David Hirsch, Jorge Tenreiro	SEC ENF staff	SEC ENF staff	FW Ethereum 2.0 CCM.msg			.msg	False
GC-LIT-0470-0637348	04/12/2023 01:53:37 PM				CCM Draft Talking Points_4.13.23v4.docx	Exemption 5 (deliberative process privilege; attorney work-product doctrine; attorney-client privilege) Exemption 6 Exemption 7(C)	<p>The withheld email thread and attachment are intra-agency and contain possible questions, draft answers, and discussion for preparation for an upcoming Closed Commission Meeting. They contain analysis and recommendations in connection with the Ethereum 2.0 investigation, to potentially be discussed in an upcoming meeting. The withheld information is pre-decisional because decisions had not been made about the legal issues relating to the investigation and matters discussed in the records, and a staff attorney included line editing to draft answers to questions.</p> <p>The withheld email and attachment were prepared by ENF attorneys in anticipation of litigation and contain legal analysis relating to Enforcement matters.</p> <p>The withheld email and attachment were prepared by attorneys and contain legal advice to senior ENF staff, including input from the Office of the General Counsel.</p> <p>SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.</p> <p>ENF staff have a privacy interest in not being associated with a law enforcement investigation, and the public interest in knowing this personal information is not outweighed by their privacy interests.</p>	.docx	True
GC-LIT-0470-0486420	04/12/2023 02:47:19 PM	SEC ENF staff	SEC ENF staff	SEC ENF staff, Jorge Tenreiro, Davis Hirsch	FW Ethereum 2.0 CCM.msg			.msg	False

Doc ID	Family Date	Email To	Email From	Email CC	File Name / Subject	FOIA Exemption(s)/Privilege Tags	Basis for Withholding	File Extension	Is Attachment
GC-LIT-0470-0486421	04/12/2023 02:47:19 PM				CCM Draft Talking Points_4.13.23v4.docx	Exemption 5 (deliberative process privilege; attorney work-product doctrine; attorney-client privilege) Exemption 6 Exemption 7(C)	<p>The withheld email and attachment are intra-agency and contain possible questions and proposed answers for an upcoming Closed Commission Meeting. They contain analysis and recommendations in connection with the Ethereum 2.0 investigation, to potentially be discussed in an upcoming meeting. The withheld information is pre-decisional because decisions had not been made about the legal issues relating to the investigation and matters discussed in the records.</p> <p>The withheld email and attachment were prepared by ENF attorneys in anticipation of litigation and contain legal analysis relating to Enforcement matters.</p> <p>The withheld email and attachment were prepared by attorneys and contain legal advice to senior ENF staff.</p> <p>SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.</p> <p>ENF staff have a privacy interest in not being associated with a law enforcement investigation, and the public interest in knowing this personal information is not outweighed by their privacy interests.</p>	.docx	True
GC-LIT-0470-0643003	04/12/2023 05:11:18 PM	Laura D'Allaird, Malgorzata Spangenberg, Janna Berke	Victor Suthammanont		Questions for tomorrow's meeting.msg	Exemption 5 (deliberative process privilege; attorney work-product doctrine; attorney-client privilege) Exemption 6	<p>The withheld email is an intra-agency record prepared by an SEC attorney for an upcoming Commission meeting. The withheld email contains possible questions for discussion, analysis, and recommendations in connection with Enforcement matters, including the Ethereum 2.0 investigation, to potentially be discussed in an upcoming meeting. The withheld information is pre-decisional because decisions had not been made about the legal issues relating to the investigations.</p> <p>The withheld email was prepared by an ENF attorney in anticipation of litigation and contains legal analysis relating to an Enforcement matter.</p> <p>The withheld email was prepared by attorneys and reflects legal advice for the Commission.</p> <p>SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.</p>	.msg	False

Doc ID	Family Date	Email To	Email From	Email CC	File Name / Subject	FOIA Exemption(s)/Privilege Tags	Basis for Withholding	File Extension	Is Attach-ment
GC-LIT-0470-0238587	04/12/2023 05:12:29 PM	Gary Gensler	Victor Suthammanont	Amanda Fischer, Ajay Sutaria	413 CCM.msg			.msg	False
GC-LIT-0470-0238589	04/12/2023 05:12:29 PM				Apr 13, 2023 CCM.docx			.docx	True

Doc ID	Family Date	Email To	Email From	Email CC	File Name / Subject	FOIA Exemption(s)/Privilege Tags	Basis for Withholding	File Extension	Is Attachment
GC-LIT-0470-0238590	04/12/2023 05:12:29 PM				Script for REMOTE MEETING 2023-04-13.docx		<p>The withheld email is an intra-agency record prepared by an SEC attorney. The withheld email consists of discussion about ENF matters to be discussed at an upcoming closed Commission meeting. The email is deliberative because it contains analysis of various ENF matters and possible questions and issues to discuss at the upcoming meeting. The email is pre-decisional because decisions had not been made in relation to the issues and matters discussed in the email.</p> <p>The withheld email was prepared to provide legal advice to the Chair relating to ENF and Commission matters.</p> <p>The email was prepared by an attorney in anticipation of litigation and contains legal analysis relating to ENF matters.</p> <p>The withheld attachments are intra-agency records prepared by SEC attorneys. One attachment consists of a list of ENF matters, including matter descriptions, legal analyses, and proposals for next steps. That attachment is deliberative because it contains analysis, recommendations, and proposals for action, and it is pre-decisional because decisions had not been made about the matters discussed in the document.</p>	.docx	True
GC-LIT-0470-0238592	04/12/2023 05:12:29 PM				2- Ethereum 2.0.pdf	Exemption 5 (deliberative process privilege; attorney work-product doctrine; attorney-client privilege) Exemption 6	<p>The second attachment consists of discussion about ENF matters to be discussed at an upcoming closed Commission meeting. The attachment is deliberative because it contains analysis of various ENF matters and possible questions and issues to discuss at the upcoming meeting. The attachment is pre-decisional because decisions had not been made in relation to the issues and matters discussed in the attachment.</p> <p>The third attachment consists of discussion about an ENF matter to be discussed at an upcoming closed Commission meeting. The attachment is deliberative because it contains analysis of an ENF matter and Enforcement staff's recommendation to the Commission on how to proceed with the matter. The attachment is pre-decisional because decisions had not been made in relation to the issues and matters discussed in the attachment.</p> <p>The attachments were prepared by attorneys to provide legal advice to the Chair and Commissioners relating to ENF matters.</p> <p>The attachments were prepared by ENF attorneys in anticipation of litigation and contain legal analysis relating to ENF matters.</p> <p>SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.</p>	.pdf	True
GC-LIT-0470-0264972	04/13/2023 08:25:05 AM	Hester Peirce, Ammon Simmon	Benjamin Vetter		CCM Bullets.msg			.msg	False

Doc ID	Family Date	Email To	Email From	Email CC	File Name / Subject	FOIA Exemption(s)/Privilege Tags	Basis for Withholding	File Extension	Is Attachment
GC-LIT-0470-0264973	04/13/2023 08:25:05 AM				04.13.23 CCM Bullets.docx	Exemption 5 (deliberative process privilege; attorney work-product doctrine; attorney-client privilege) Exemption 6	<p>The email and withheld attachment are intra-agency records prepared by an SEC attorney. The withheld information from the email reflects discussion about which ENF matters staff proposed that they should focus on, and it is pre-decisional because staff had not decided which matters to focus on or add analysis about. Additionally, the attachment consists of discussions and questions about ENF matters to be discussed at an upcoming closed Commission meeting. The attachment is pre-decisional because it is a draft that contains analysis of various ENF matters and possible questions and issues to discuss at the upcoming meeting.</p> <p>The withheld information and attachment were prepared by an attorney in anticipation of litigation and contain legal analysis relating to Enforcement matters.</p> <p>The attachment was prepared to provide legal advice to a Commissioner relating to ENF and Commission matters.</p> <p>SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.</p> <p>Portions of the email have been released.</p>	.docx	True
GC-LIT-0470-0238991	04/13/2023 09:58:41 AM	Jaime Lizarraga	Laura D'Allaird	Commissioner Lizarraga Staff Email Address	CCM Notes.msg			.msg	False
GC-LIT-0470-0238992	04/13/2023 09:58:41 AM				CCM Notes 04.13.23 (Draft 04.13.23).docx	Exemption 5 (deliberative process privilege; attorney work-product doctrine; attorney-client privilege) Exemption 6	<p>The withheld attachment is intra-agency record and consists of notes for a Commissioner for an upcoming closed Commission meeting. The attachment is pre-decisional because the notes reflect discussion, analysis, proposals, and potential issues, including about ENF matters, to discuss at the upcoming meeting.</p> <p>The withheld attachment was prepared by attorneys in anticipation of litigation and contain legal analysis relating to Enforcement matters.</p> <p>The attachment was prepared to provide legal advice to a Commissioner relating to ENF and Commission matters.</p> <p>SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.</p> <p>Portions of the email have been released.</p>	.docx	True
GC-LIT-0470-0473697	04/13/2023 10:12:15 AM	Gurbir Grewal, Sanjay Wadhwa	Luke Pazicky	Joseph Burson, Emily Shea, Gregory Smolar, Marc Johnson	CCM Q&A tracker.msg			.msg	False

Doc ID	Family Date	Email To	Email From	Email CC	File Name / Subject	FOIA Exemption(s)/Privilege Tags	Basis for Withholding	File Extension	Is Attachment
GC-LIT-0470-0473698	04/13/2023 10:12:15 AM				ENF Front Office CCM Q&A Tracker (April 13, 2023).docx	Exemption 5 (deliberative process privilege; attorney work-product doctrine; attorney-client privilege) Exemption 6	<p>The withheld email and attachment are intra-agency records prepared by SEC attorneys. The email and attachment consist of discussions about ENF matters to be discussed at an upcoming closed Commission meeting. The email and attachment are pre-decisional because they contain analysis of various ENF matters and possible questions and issues to discuss at the upcoming meeting.</p> <p>The withheld email and attachment were prepared by attorneys in anticipation of litigation and contain legal analysis relating to Enforcement matters.</p> <p>The attachment was prepared to provide legal advice to Commissioners relating to ENF matters.</p> <p>SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.</p>	.docx	True
GC-LIT-0470-0318986	04/13/2023 10:49:20 AM	Gurbir Grewal, Sanjay Wadhwa, Olivia Choe, Charlotte Buford	Samuel Waldon		FW Today's CCM.msg	Exemption 5 (deliberative process privilege; attorney work-product doctrine; attorney-client privilege) Exemption 6	<p>The withheld email thread is an intra-agency record prepared by an SEC attorney. The withheld email thread consists of discussion about ENF matters to be discussed at an upcoming closed Commission meeting. The email is deliberative because it contains analysis of various ENF matters and possible questions and issues to discuss at the upcoming meeting. The email is pre-decisional because decisions had not been made in relation to the issues and matters discussed in the email.</p> <p>The email was prepared by an attorney in anticipation of litigation and contains legal analysis relating to ENF matters.</p> <p>The email was prepared to provide legal advice to Commissioners relating to ENF matters.</p> <p>SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.</p>	.msg	False
GC-LIT-0470-0264974	04/13/2023 11:04:21 AM	Hester Peirce	Ammon Simon	Benjamin Vetter	RE CCM Bullets.msg			.msg	False

Doc ID	Family Date	Email To	Email From	Email CC	File Name / Subject	FOIA Exemption(s)/Privilege Tags	Basis for Withholding	File Extension	Is Attachment
GC-LIT-0470-0264975	04/13/2023 11:04:21 AM				04.13.23 CCM Bullets.docx	Exemption 5 (deliberative process privilege; attorney work-product doctrine; attorney-client privilege) Exemption 6	<p>The email and withheld attachment are intra-agency records prepared by an SEC attorney. The withheld information from the email reflects discussion about which ENF matters staff proposed that they should focus on, and it is pre-decisional because no decisions had been made about the issues to be discussed in the meeting. The withheld attachment consists of discussions and questions about ENF matters to be discussed at an upcoming closed Commission meeting. The attachment is pre-decisional because it is a draft that contains analysis of various ENF matters and possible questions and issues to discuss at the upcoming meeting.</p> <p>The email and attachment were prepared by attorneys in anticipation of litigation and contain legal analysis relating to Enforcement matters.</p> <p>The email and attachment were prepared to provide legal advice to a Commissioner relating to ENF and Commission matters.</p> <p>SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.</p> <p>Portions of the email have been released.</p>	.docx	True
GC-LIT-0470-0238601	04/13/2023 11:14:12 AM	Gary Gensler	Victor Suthammanont	Amanda Fischer, Ajay Sutaria	FW 413 CCM.msg			.msg	False

Doc ID	Family Date	Email To	Email From	Email CC	File Name / Subject	FOIA Exemption(s)/Privilege Tags	Basis for Withholding	File Extension	Is Attachment
GC-LIT-0470-0238603	04/13/2023 11:14:12 AM				Apr 13, 2023 CCM.docx			.docx	True
GC-LIT-0470-0238605	04/13/2023 11:14:12 AM				2- Ethereum 2.0.pdf		<p>The withheld email thread and attachments are intra-agency records prepared by SEC attorneys. The withheld email thread consists of discussion about ENF matters to be discussed at an upcoming closed Commission meeting. The email thread is deliberative because it contains analysis of various ENF matters and possible questions and issues to discuss at the upcoming meeting. The email thread is pre-decisional because decisions had not been made in relation to the issues and matters discussed in the email.</p> <p>One withheld attachment consists of a list of ENF matters, including matter descriptions, legal analyses, and proposals for next steps. The attachment is deliberative because it contains analysis, recommendations, and proposals for action, and it is pre-decisional because decisions had not been made about the matters discussed in the document.</p> <p>Another withheld attachment consists of discussion about an ENF matter to be discussed at an upcoming closed Commission meeting. The email is deliberative because it contains analysis of an ENF matter and Enforcement staff's recommendation to the Commission on how to proceed with the matter. The email is pre-decisional because decisions had not been made in relation to the issues and matters discussed in the attachment.</p> <p>Another withheld attachment consists of discussion about ENF matters to be discussed at an upcoming closed Commission meeting. The attachment is deliberative because it contains analysis of various ENF matters and possible questions and issues to discuss at the upcoming meeting. The attachment is pre-decisional because decisions had not been made in relation to the issues and matters discussed in the attachment.</p>	.pdf	True
GC-LIT-0470-0238606	04/13/2023 11:14:12 AM				Script for REMOTE MEETING 2023-04-13.docx	Exemption 5 (deliberative process privilege; attorney work-product doctrine; attorney-client privilege) Exemption 6 Exemption 7(C)	<p>The withheld email thread and attachments were prepared by attorneys to provide legal advice to the Chair relating to ENF and Commission matters.</p> <p>The withheld email thread and attachments were prepared by attorneys in anticipation of litigation and contain legal analysis relating to ENF matters.</p> <p>SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.</p> <p>ENF staff have a privacy interest in not being associated with a law enforcement investigation, and the public interest in knowing this personal information is not outweighed by their privacy interests.</p>	.docx	True

Doc ID	Family Date	Email To	Email From	Email CC	File Name / Subject	FOIA Exemption(s)/Privilege Tags	Basis for Withholding	File Extension	Is Attachment
GC-LIT-0470-0294993; GC-LIT-0470-0295276; GC-LIT-0470-0508156; GC-LIT-0470-0294995	04/13/2023 11:18:17 AM; 11:21:32 AM; 11:22:28 AM; 11:29:36 AM	Laura Jarsulic, Samuel Waldon	Victor Suthammanont		RE Today's CCM.msg	Exemption 5 (deliberative process privilege; attorney work-product doctrine; attorney-client privilege) Exemption 6	<p>The withheld email threads are intra-agency records prepared by SEC attorneys. The withheld email threads consist of discussions about ENF matters to be discussed at an upcoming closed Commission meeting. The email threads are deliberative because they contain analysis of various ENF matters and possible questions and issues to discuss at the upcoming meeting. The email threads are pre-decisional because decisions had not been made in relation to the issues and matters discussed in the emails.</p> <p>The email threads were prepared by attorneys in anticipation of litigation and contains legal analysis relating to ENF matters.</p> <p>The email threads also contain legal advice from attorneys to the Chair and Commissioners relating to an ENF matter.</p> <p>SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.</p>	.msg	False
GC-LIT-0470-0318985	04/13/2023 11:22:05 AM	Gurbir Grewal, Sanjay Wadha, Oliva Choe, Charlotte Buford	Samuel Waldon		FW Today's CCM.msg	Exemption 5 (deliberative process privilege; attorney work-product doctrine; attorney-client privilege) Exemption 6	<p>The withheld email thread is an intra-agency record prepared by SEC attorneys. The withheld email thread consists of discussions about ENF matters to be discussed at an upcoming closed Commission meeting. The email thread is deliberative because it contains analysis of various ENF matters and possible questions and issues to discuss at the upcoming meeting. The email thread is pre-decisional because decisions had not been made in relation to the issues and matters discussed in the email thread.</p> <p>The email thread was prepared by attorneys in anticipation of litigation and contains legal analysis relating to ENF matters.</p> <p>The email thread also contains legal advice to the Chair and Commissioners relating to an ENF matter.</p> <p>SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.</p>	.msg	False

Doc ID	Family Date	Email To	Email From	Email CC	File Name / Subject	FOIA Exemption(s)/Privilege Tags	Basis for Withholding	File Extension	Is Attachment
GC-LIT-0470-0646392	04/13/2023 03:12:21 PM	Laura Cunningham, Margaret McGuire, Kelly Rock	Paul Bohr		PJB notes from 4132023 CCM .msg			.msg	False
GC-LIT-0470-0646393	04/13/2023 03:12:21 PM				2023.04.13 CCM Notes (PJB).docx	Not responsive record	Upon further review of these records, we have determined that they are not responsive to subpart 3. At the time that this record was created, custodian Laura Cunningham was not in a position covered by subpart 3.	.docx	True
GC-LIT-0470-0264965	04/13/2023 04:12:10 PM	Mark Uyeda	Charles Lee	Commissioner Uyeda's Staff email	413 CCM Summary.msg	Exemption 5 (deliberative process privilege; attorney work-product; attorney-client privilege) Exemption 6	The email is an intra-agency record and consists of an attorney's non-verbatim notes taken during a closed Commission meeting concerning various ENF matters. The records are deliberative because they reflect the note-taker's selective notes of the information deemed important for further discussion and consideration. The records are pre-decisional because they concern issues and matters that related to decisions about matters likely to be considered by the Commission in the future. The email also reflects legal analysis and information about ENF matters gathered in anticipation of litigation. The email also reflects legal advice to the Commissioners relating to ENF and Commission matters. SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.	.msg	False
GC-LIT-0470-0640967	04/14/2023 08:14:37 AM	Paul Bohr, Margaret McGuire, Laura Cunningham	Kelly Rock		4.13.23.docx.msg			.msg	False
GC-LIT-0470-0640968	04/14/2023 08:14:37 AM				4.13.23.docx	Not responsive record	Upon further review of these records, we have determined that they are not responsive to subpart 3. At the time that this record was created, custodian Laura Cunningham was not in a position covered by subpart 3.	.docx	True

Doc ID	Family Date	Email To	Email From	Email CC	File Name / Subject	FOIA Exemption(s)/Privilege Tags	Basis for Withholding	File Extension	Is Attachment
GC-LIT-0470-0265007	06/12/2023 04:33:57 PM	Uyeda Counsels email address; Mark Uyda, Jakel Larson	Taylor Asher		Chair Gensler Lecture re Ether in 2018.msg	Exemption 5 (deliberative process privilege) Exemption 6	The withheld email is intra-agency and contains legal analysis. The withheld record is deliberative because it discusses an issue that SEC staff were considering. The withheld information is pre-decisional because a decision had not been made about the legal issues discussed in the email. SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.	.msg	False
GC-LIT-0470-0641112	07/14/2023 01:15:12 PM	David Hirsch, Jorge Tenreiro	SEC ENF staff	SEC ENF staff	Eth 2.0 (C-8950).msg			.msg	False
GC-LIT-0470-0641113	07/14/2023 01:15:12 PM				2023-07-13 DRAFT RFA to FINMA re Ethereum 2.0.docx	Exemption 5 (deliberative process privilege; attorney work-product doctrine) Exemption 6 Exemption 7(C)	The withheld email discusses and attaches a draft letter SEC staff was considering sending in connection with an investigation. The draft letter contains legal analysis prepared by an SEC attorney. The withheld records are deliberative because they reflect discussion about how to conduct the investigation and about legal theories relevant to the investigation. The withheld information is pre-decisional because a decision had not been made about the effect of the legal issues discussed in the email and no decisions had been made about the ongoing investigation. The withheld attachment is also a draft reflecting comments from SEC staff. The withheld email and attachment were prepared by ENF attorneys in anticipation of litigation and contain legal analysis relating to Enforcement matters. SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. ENF staff have a privacy interest in not being associated with a law enforcement investigation, and the public interest in knowing this personal information is not outweighed by their privacy interests.	.docx	True
GC-LIT-0470-0641110	07/20/2023 09:23:28 AM	David Hirsch, Jorge Tenreiro	SEC ENF staff	SEC ENF staff	FW Eth 2.0 (C-8950).msg			.msg	False

Doc ID	Family Date	Email To	Email From	Email CC	File Name / Subject	FOIA Exemption(s)/Privilege Tags	Basis for Withholding	File Extension	Is Attachment
GC-LIT-0470-0641111	07/20/2023 09:23:28 AM				2023-07-13 DRAFT RFA to FINMA re Ethereum 2.0.docx	Exemption 5 (deliberative process privilege; attorney work-product doctrine) Exemption 6 Exemption 7(C)	<p>The withheld email discusses and attaches a draft letter SEC staff was considering sending in connection with an investigation. The draft letter contains legal analysis prepared by an SEC attorney. The withheld records are deliberative because they reflect discussion about how to conduct the investigation and about legal theories relevant to the investigation. The withheld information is pre-decisional because a decision had not been made about the effect of the legal issues discussed in the email and no decisions had been made about the ongoing investigation. The withheld attachment is also a draft reflecting comments from SEC staff.</p> <p>The withheld email and attachment were prepared by ENF attorneys in anticipation of litigation and contain legal analysis relating to Enforcement matters.</p> <p>SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.</p> <p>ENF staff have a privacy interest in not being associated with a law enforcement investigation, and the public interest in knowing this personal information is not outweighed by their privacy interests.</p>	.docx	True
GC-LIT-0470-0602482	07/21/2023 11:03:48 AM	SEC ENF staff, Jorge Tenreiro	Hirsch, David L	SEC ENF staff	RE Eth 2.0 (C-8950).msg			.msg	False
GC-LIT-0470-0602483	07/21/2023 11:03:48 AM				2023-07-13 DRAFT RFA to FINMA re Ethereum 2.0 (DLH).docx	Exemption 5 (deliberative process privilege; attorney work-product doctrine) Exemption 6 Exemption 7(C)	<p>The withheld email discusses and attaches a draft letter SEC staff was considering sending in connection with an investigation. The draft letter contains legal analysis prepared by an SEC attorney. The withheld records are deliberative because they reflect discussion about how to conduct the investigation and about legal theories relevant to the investigation. The withheld information is pre-decisional because a decision had not been made about the effect of the legal issues discussed in the email and no decisions had been made about the ongoing investigation. The withheld attachment is also a draft reflecting comments from SEC staff.</p> <p>The withheld email and attachment were prepared by ENF attorneys in anticipation of litigation and contain legal analysis relating to Enforcement matters.</p> <p>SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.</p> <p>ENF staff have a privacy interest in not being associated with a law enforcement investigation, and the public interest in knowing this personal information is not outweighed by their privacy interests.</p>	.docx	True

Doc ID	Family Date	Email To	Email From	Email CC	File Name / Subject	FOIA Exemption(s)/Privilege Tags	Basis for Withholding	File Extension	Is Attachment
GC-LIT-0470-0460749; GC-LIT-0470-0458032	08/14/2023 06:16:16 PM; 06:20:47 PM	Valerie Szczepanik; Bernard Nolan	Amy Starr		Re Time for an ETH Discussion.msg	Exemption 5 (deliberative process privilege) Exemption 6	The withheld email thread is intra-agency and contains legal analysis prepared by an SEC attorney. The withheld record is deliberative because it makes a recommendation related to consideration of ether futures filings. The withheld information is pre-decisional because a decision had not been made about ether futures filings. SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.	.msg	False
GC-LIT-0470-0458033	08/14/2023 08:42:08 PM	Jennifer McHugh; Asen Parachkevov	Bernard Nolan	Thankam Varghese	RE Re ETH Futures ETF Comments Guide.msg			.msg	False
GC-LIT-0470-0458034	08/14/2023 08:42:08 PM				DRAFT ETH Futures ETFs - Comment Guide - Draft 8.14.23 BN.docx	Exemption 5 (deliberative process privilege) Exemption 6	The withheld email thread and attachment are intra-agency and contain legal analysis prepared by SEC attorneys. The withheld records are deliberative because they make recommendations and discuss issues related to consideration of ether futures filings. The withheld information is pre-decisional because a decision had not been made about ether futures filings. The withheld records also reflect edits and comments from SEC staff on the draft attachment. SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.	.docx	True
GC-LIT-0470-0460747	08/15/2023 08:36:53 AM	Christian Sandoe; Michael Spratt	Asen Parachkevov	Andrea Magovern; Bernard Nolan, Jennifer McHugh; Thankam Varghese	Re Draft ETH Futures ETF Comments Guide.msg			.msg	False
GC-LIT-0470-0460748	08/15/2023 08:36:53 AM				DRAFT ETH Futures ETFs - Comment Guide - Draft 8.15.23.docx	Exemption 5 (deliberative process privilege) Exemption 6	The withheld email and attachment are intra-agency and contain legal analysis prepared by SEC attorneys. The withheld records are deliberative because they make recommendations and discuss issues related to consideration of ether futures filings. They also reflect the proposed drafting and editing process for the attachment. The withheld information is pre-decisional because a decision had not been made about ether futures filings. The withheld attachment also reflects edits and comments from SEC staff on the draft attachment. SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.	.docx	True
GC-LIT-0470-0281207	08/15/2023 10:27:45 AM	Asen Parachkevov	Michael Spratt	Andrea Magovern; Bernard Nolan, Jennifer McHugh; Thankam Varghese; Christian Sandoe	RE Re Draft ETH Futures ETF Comments Guide.msg			.msg	False

Doc ID	Family Date	Email To	Email From	Email CC	File Name / Subject	FOIA Exemption(s)/Privilege Tags	Basis for Withholding	File Extension	Is Attachment
GC-LIT-0470-0281208	08/15/2023 10:27:45 AM				DRAFT ETH Futures ETFs - Comment Guide - Draft 8.15.23 +MS.docx	Exemption 5 (deliberative process privilege) Exemption 6	The withheld email and attachment are intra-agency and contain legal analysis prepared by SEC attorneys. The withheld records are deliberative because they make recommendations and discuss issues related to consideration of ether futures filings. They also reflect the proposed drafting and editing process for the attachment. The withheld information is pre-decisional because a decision had not been made about ether futures filings. The withheld attachment also reflects edits and comments from SEC staff on the draft attachment. SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.	.docx	True
GC-LIT-0470-0280418	08/15/2023 11:37:16 AM	Asen Parachkevov	Thankam Varghese		FW Re Draft ETH Futures ETF Comments Guide.msg			.msg	False
GC-LIT-0470-0280419	08/15/2023 11:37:16 AM				DRAFT ETH Futures ETFs - Comment Guide - Draft 8.15.23.docx	Exemption 5 (deliberative process privilege) Exemption 6	The withheld email and attachment are intra-agency and contain legal analysis prepared by SEC attorneys. The withheld records are deliberative because they make recommendations and discuss issues related to consideration of ether futures filings. They also reflect the proposed drafting and editing process for the attachment. The withheld information is pre-decisional because a decision had not been made about ether futures filings. The withheld attachment also reflects edits and comments from SEC staff on the draft attachment. SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.	.docx	True
GC-LIT-0470-0460758	08/15/2023 11:52:51 AM	Bernard Nolan; Christian Sandoe; Michael Spratt	Asen Parachkevov	Andrea Magovern; Jennifer McHugh; Thankam Varghese	RE Re Draft ETH Futures ETF Comments Guide.msg			.msg	False
GC-LIT-0470-0460759	08/15/2023 11:52:51 AM				DRAFT ETH Futures ETFs - Comment Guide - Draft 8.15.23 +MS.docx	Exemption 5 (deliberative process privilege) Exemption 6	The withheld email and attachment are intra-agency and contain legal analysis prepared by SEC attorneys. The withheld records are deliberative because they make recommendations and discuss issues related to consideration of ether futures filings. They also reflect the proposed drafting and editing process for the attachment. The withheld information is pre-decisional because a decision had not been made about ether futures filings. The withheld records also reflects edits and comments from SEC staff on the draft attachment. SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.	.docx	True

Doc ID	Family Date	Email To	Email From	Email CC	File Name / Subject	FOIA Exemption(s)/Privilege Tags	Basis for Withholding	File Extension	Is Attachment
GC-LIT-0470-0587715	08/17/2023 12:26:40 PM	Brent Fields; Christian Sandoe; Andrea Magovern; Michael Spratt	Asen Parachkevov	Bernard Nolan; Thankam Varghese; Jennifer McHugh	RE ETH Futures ETFs - 2x Draft Comments re ETH Regulatory Risks.msg	Exemption 5 (deliberative process privilege) Exemption 6	The withheld email is intra-agency and contains legal analysis prepared by an SEC attorney. The withheld record is deliberative because it makes a recommendation related to consideration of ether futures filings. It also reflects the proposed drafting and editing process for the attachment as well as edits and comments from SEC staff on a draft document. The withheld information is pre-decisional because a decision had not been made about ether futures filings. SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.	.msg	False
GC-LIT-0470-0641172	09/20/2023 02:10:44 PM	David Hirsch, SEC ENF staff	Jorge Tenreiro	SEC ENF staff	RE Eth 2.0 (C-8950).msg	Exemption 5 (deliberative process privilege; attorney work-product doctrine) Exemption 6 Exemption 7(C)	The withheld email thread is intra-agency and reflects preparation for a call among SEC staff about an ENF investigation, including a list of issues to discuss and consider about the conduct of the ongoing investigation. The withheld emails are deliberative because they reflect discussion about conducting an investigation, including questions and issues to discuss and possible future steps. The withheld information is pre-decisional because a decision had not been made about the issues discussed in the email. The withheld email was prepared by ENF attorneys in anticipation of litigation and contains legal analysis relating to an Enforcement matter. SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. ENF staff have a privacy interest in not being associated with a law enforcement investigation, and the public interest in knowing this personal information is not outweighed by their privacy interests.	.msg	False

Doc ID	Family Date	Email To	Email From	Email CC	File Name / Subject	FOIA Exemption(s)/Privilege Tags	Basis for Withholding	File Extension	Is Attachment
GC-LIT-0470-0509637; GC-LIT-0470-0643832; GC-LIT-0470-0603026	09/21/2023 12:08:57 PM; 12:35:27 PM; 12:39:17 PM	David Hirsch, Jorge Tenreiro, SEC ENF staff	SEC ENF staff		Eth 2.0 - Draft Email to CFGC.msg	Exemption 5 (deliberative process privilege; attorney work-product doctrine) Exemption 6 Exemption 7(C)	<p>The withheld email thread is intra-agency and concerns a draft email to send to other SEC staff about issues to consider in connection with an ongoing investigation. The withheld thread is deliberative because it contains a draft email and reflects discussion about and questions relating to conducting an investigation. The withheld information is pre-decisional because a decision had not been made about the content of the draft email or the issues discussed in the email.</p> <p>The withheld email thread was prepared by ENF attorneys in anticipation of litigation and contains legal analysis relating to an Enforcement matter.</p> <p>SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.</p> <p>ENF staff have a privacy interest in not being associated with a law enforcement investigation, and the public interest in knowing this personal information is not outweighed by their privacy interests.</p>	.msg	False
GC-LIT-0470-0505297	09/21/2023 12:41:33 PM	SEC staff in the Office of the General Counsel and the Office of Corporation Finance	SEC ENF staff	David Hirsch, Jorge Tenreiro, SEC ENF staff	Eth 2.0 (C-8950).msg	Exemption 5 (deliberative process privilege; attorney work-product doctrine) Exemption 6 Exemption 7(C)	<p>The withheld email is intra-agency and lists issues to consider in connection with an ongoing investigation. The withheld record is deliberative because it discusses how to resolve issues related to an investigation. The withheld information is pre-decisional because a decision had not been made about the issues discussed in the email.</p> <p>The withheld email was prepared by ENF attorneys in anticipation of litigation and contains legal analysis relating to Enforcement matters.</p> <p>SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.</p> <p>ENF staff have a privacy interest in not being associated with a law enforcement investigation, and the public interest in knowing this personal information is not outweighed by their privacy interests.</p>	.msg	False

Doc ID	Family Date	Email To	Email From	Email CC	File Name / Subject	FOIA Exemption(s)/Privilege Tags	Basis for Withholding	File Extension	Is Attachment
GC-LIT-0470-0782604; GC-LIT-0470-0642624; GC-LIT-0470-0505298	09/21/2023 12:44:49 PM; 09/26/2023 01:35:11 PM; 09/26/2023 04:25:45 PM	David Hirsch, Jorge Tenreiro, SEC staff in the Office of the General Counsel and the Office of Corporation Finance	SEC ENF staff		Eth 2.0 (C-8950).msg	Exemption 5 (deliberative process privilege; attorney work-product doctrine) Exemption 6 Exemption 7(C)	<p>The withheld calendar invitation is intra-agency and lists issues and questions to consider in connection with an ongoing investigation during an upcoming call. The withheld record is deliberative because it discusses how to resolve issues related to an investigation. The withheld information is pre-decisional because a decision had not been made about the issues discussed in the email.</p> <p>The withheld calendar invitation was prepared by ENF attorneys in anticipation of litigation and contains legal analysis relating to Enforcement matters.</p> <p>SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.</p> <p>ENF staff have a privacy interest in not being associated with a law enforcement investigation, and the public interest in knowing this personal information is not outweighed by their privacy interests.</p>	.msg	False
GC-LIT-0470-0508012	09/27/2023 04:22:41 PM	David Hirsch	Jorge Tenreiro		Fwd Eth 2.0 (C-8950).msg	Exemption 5 (deliberative process privilege; attorney work-product doctrine) Exemption 6 Exemption 7(C)	<p>The withheld email thread is intra-agency and lists issues and questions to consider in connection with an ongoing investigation during upcoming calls. The withheld record is deliberative because it discusses how to resolve issues related to an investigation. The withheld information is pre-decisional because a decision had not been made about the issues discussed in the email.</p> <p>The withheld email thread was prepared by ENF attorneys in anticipation of litigation and contains legal analysis relating to Enforcement matters.</p> <p>SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.</p> <p>ENF staff have a privacy interest in not being associated with a law enforcement investigation, and the public interest in knowing this personal information is not outweighed by their privacy interests.</p>	.msg	False
GC-LIT-0470-0506722	11/14/2023 12:26:47 PM	David Hirsch, Jorge Tenreiro, SEC ENF staff	SEC ENF staff		ETH 2.0 (C-8950).msg			.msg	False

Doc ID	Family Date	Email To	Email From	Email CC	File Name / Subject	FOIA Exemption(s)/Privilege Tags	Basis for Withholding	File Extension	Is Attachment
GC-LIT-0470-0506723	11/14/2023 12:26:47 PM				[B5]--FOIA CONFIDENTIAL TREATMENT REQUESTED.pdf	Exemption 5 (deliberative process privilege; attorney work-product doctrine) Exemption 6 Exemption 7(C)	The withheld calendar invitation is intra-agency and lists issues and questions relating to a voluntary submission provided by a third party (unrelated to the Ethereum 2.0 investigation) that warranted further discussion in connection with an ENF investigation. The withheld calendar invitation is deliberative because it lists issues that the staff believed they needed to address and provides ideas and questions related to those issues. The withheld calendar invitation is pre-decisional because a decision had not been made about the issues raised in the email. The withheld calendar invitation was prepared by ENF attorneys in anticipation of litigation and contains legal analysis relating to Enforcement matters. SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. ENF staff have a privacy interest in not being associated with a law enforcement investigation, and the public interest in knowing this personal information is not outweighed by their privacy interests.	.pdf	True
GC-LIT-0470-0782175; GC-LIT-0470-0782838	01/26/2024 05:51:55 PM; 01/31/2024 09:51:36 AM	Pauley, Kristin; Hirsch, David L; Tenreiro, Jorge; SEC Staff	SEC ENF staff		Eth 2.0 (C-8950).msg			.msg	False
GC-LIT-0470-0782176; GC-LIT-0470-0782839	01/26/2024 05:51:55 PM				2013.10.13.Voluntary.Submission.Galaxy.Digital--FOIA CONFIDENTIAL TREATMENT REQUESTED.pdf	Exemption 5 (attorney work-product doctrine) Exemption 6 Exemption 7(C)	The withheld information consists of a request for a meeting concerning the Ethereum 2.0 investigation and an assessment about information provided by a third party, along with the third party submission selected by an ENF attorney. The request and assessment are from an ENF attorney relating to an ENF matter. SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. ENF staff have a privacy interest in not being associated with a law enforcement investigation, and the public interest in knowing this personal information is not outweighed by their privacy interests. Portions of the calendar invitation have been released.	.pdf	True
GC-LIT-0470-0645357	02/01/2024 06:03:05 PM	Hirsch, David L; Tenreiro, Jorge	Pauley, Kristin	SEC ENF staff	Eth 2.0 (C-8950).msg			.msg	False
GC-LIT-0470-0645358	02/01/2024 06:03:05 PM				C-8950_Status Memo_1.29.24.docx			.docx	True

Doc ID	Family Date	Email To	Email From	Email CC	File Name / Subject	FOIA Exemption(s)/Privilege Tags	Basis for Withholding	File Extension	Is Attachment
GC-LIT-0470-0645359	02/01/2024 06:03:05 PM				2024.2.1 C-8950_Talking Points.docx	Exemption 5 (deliberative process privilege; attorney client privilege; attorney work-product doctrine) Exemption 6 Exemption 7(C)	<p>The email and withheld attachments are intra-agency and consist of an overview of the status of the Ethereum 2.0 investigation as well as legal analysis prepared by ENF attorneys. The withheld information and attachments are deliberative because they reflect discussion about what matters and issues the ENF attorneys proposed that Chair Gensler and ENF leadership should focus on, as well as possible next steps in the investigation. The withheld information is pre-decisional because a decision had not been made about the legal issues discussed in the records.</p> <p>Additionally, the withheld information and attachments were prepared by ENF attorneys and contain legal analysis relating to an ENF investigation.</p> <p>This email was also sent by an ENF attorney to provide legal advice to Chair Gensler and ENF leadership relating to an ENF matter.</p> <p>SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.</p> <p>ENF staff have a privacy interest in not being associated with a law enforcement investigation, and the public interest in knowing this personal information is not outweighed by their privacy interests.</p> <p>Portions of the email have been released.</p>	.docx	True
GC-LIT-0470-0515348	02/01/2024 07:04:47 PM	Shillman, David S.; Juzenas, Eric	Kim, Molly		FW Spot ETH - security not security.msg	Not responsive record	Upon further review of this record, we have determined that it is not responsive to subpart 3. At the time that this record was created, custodian Eric Juzenas was not in a position covered by subpart 3.	.msg	False
GC-LIT-0470-0514381	02/02/2024 09:41:43 AM	Orr, Andrea	Bergoffen, Roni E		FW Spot ETH - security not security.msg	Not responsive record	Upon further review of this record, we have determined that it is not responsive to subpart 3. At the time that this record was created, custodian Andrea Orr was not in a position covered by subpart 3.	.msg	False
GC-LIT-0470-0297613	02/02/2024 02:16:34 PM	Ding, Yue	Orr, Andrea		FW Spot ETH - security not security.msg	Not responsive record	Upon further review of this record, we have determined that it is not responsive to subpart 3. At the time that this record was created, custodians Andrea Orr and Yue Ding were not in a position covered by subpart 3.	.msg	False

Doc ID	Family Date	Email To	Email From	Email CC	File Name / Subject	FOIA Exemption(s)/Privilege Tags	Basis for Withholding	File Extension	Is Attachment
GC-LIT-0470-0514393	02/05/2024 11:38:22 AM	SEC ENF staff	SEC ENF staff		B5			.msg	False
							<p>The withheld calendar invitation and attachment are intra-agency and concern a draft action memorandum relating to an ENF investigation. The calendar invitation is deliberative because it contains a proposed discussion topic. The calendar invitation is pre-decisional because no final agency decisions or findings had been made concerning the issues discussed in the action memorandum.</p> <p>The withheld attachment is deliberative because it reflects staff's recommendations to the Commission concerning an ENF matter and the reasons for those recommendations. It is pre-decisional because it was prepared before a decision was made on the issues discussed in the attachment. It is also a non-final draft.</p> <p>The calendar invitation and attachment are also from attorneys, and they provide legal advice to the Commissioners.</p> <p>The calendar invitation and attachment also reflect legal analysis and strategy prepared by ENF attorneys in connection with anticipated and ongoing litigation.</p> <p>SEC staff have a privacy interest in their email addresses, and there is no public interest in knowing their contact information.</p>		
GC-LIT-0470-0514394	02/05/2024 11:38:22 AM				B5	<p>Exemption 5 (deliberative process privilege; attorney-client privilege; attorney work-product doctrine)</p> <p>Exemption 6</p> <p>Exemption 7(C)</p>	<p>ENF staff have a privacy interest in not being associated with a law enforcement investigation, and the public interest in knowing this personal information is not outweighed by their privacy interests.</p>	.docx	True

Doc ID	Family Date	Email To	Email From	Email CC	File Name / Subject	FOIA Exemption(s)/Privilege Tags	Basis for Withholding	File Extension	Is Attachment
GC-LIT-0470-0468452	02/07/2024 11:09:15 PM	Szczepanik, Valerie	Glennon, Liam (Contractor)		RE Chair's Urgent Request to ENF FinHub Assistance.msg	Exemption 5 (deliberative process privilege; attorney-client privilege; attorney work-product doctrine) Exemption 6	<p>The withheld email thread among SEC ENF and FinHub staff is intra-agency and consists of a request for attorney work product by attorneys, discussion about how to respond to that request, and analysis about the substance of a project requested by the Chair and ENF. The thread is deliberative because it reflects a request for analysis, questions about how to put together and approach the requested analysis, and proposed sources, analysis, and formatting for the project. The thread is pre-decisional because there was no final decision about the results of the project.</p> <p>This email thread containing a request for legal work product was also sent by an attorney to provide legal advice to others in the Commission.</p> <p>The withheld email thread was prepared by an attorney and contains legal analysis relating to anticipated and ongoing SEC actions.</p> <p>SEC staff have a privacy interest in their email addresses, and there is no public interest in knowing their contact information.</p>	.msg	False
GC-LIT-0470-0283308	02/08/2024 02:34:17 PM	Ward Doran, Morgan	Szczepanik, Valerie		Re Urgent Request.msg	Exemption 5 (deliberative process privilege; attorney-client privilege; attorney work-product doctrine) Exemption 6	<p>The withheld email thread is intra-agency among SEC ENF and FinHub staff and consists of a request for attorney work product by attorneys, discussion about how to respond to that request, and analysis about the substance of a project requested by the Chair and ENF. The thread is deliberative because it reflects a request for analysis, questions about how to put together and approach the requested analysis, and proposed sources, analysis, and formatting for the project. The thread is pre-decisional because there was no final decision about the results of the project.</p> <p>This email thread containing a request for legal work product was also sent by an attorney to provide legal advice to others in the Commission.</p> <p>The withheld email thread was prepared by an attorney and contains legal analysis relating to anticipated and ongoing SEC actions.</p> <p>SEC staff have a privacy interest in their email addresses, and there is no public interest in knowing their contact information.</p>	.msg	False
GC-LIT-0470-0466137	02/09/2024 01:24:51 PM	Szczepanik, Valerie	Ward Doran, Morgan		FW Urgent Request.msg			.msg	False

Doc ID	Family Date	Email To	Email From	Email CC	File Name / Subject	FOIA Exemption(s)/Privilege Tags	Basis for Withholding	File Extension	Is Attachment
GC-LIT-0470-0466138	02/09/2024 01:24:51 PM				B5	Exemption 5 (deliberative process privilege; attorney-client privilege; attorney work-product doctrine) Exemption 6	<p>The withheld email thread is intra-agency among SEC ENF and FinHub staff and consists of a request for attorney work product by attorneys, discussion about how to respond to that request, and analysis about the substance of a project requested by the Chair and ENF. The thread is deliberative because it reflects a request for analysis, questions about how to put together and approach the requested analysis, and proposed sources, analysis, and formatting for the project. The thread is pre-decisional because there was no final decision about the results of the project.</p> <p>This email thread containing a request for legal work product was also sent by an attorney to provide legal advice to others in the Commission.</p> <p>The withheld email thread was prepared by an attorney and contains legal analysis relating to anticipated and ongoing SEC actions.</p> <p>The withheld attachment consists of the requested attorney work product compiled to provide legal advice to others in the Commission. It was prepared by attorneys and contains analysis relating to anticipated and ongoing SEC actions.</p> <p>SEC staff have a privacy interest in their email addresses, and there is no public interest in knowing their contact information.</p>	.xlsx	True
GC-LIT-0470-0643418	02/14/2024 04:47:26 PM	Hirsch, David L; Tenreiro, Jorge	Juzenas, Eric	Gaw, Michael J.; Vorosmarti, Richard	ETH--Security or Not.msg	Exemption 5 (deliberative process privilege) Exemption 6	<p>The withheld email is an intra-agency record and contains discussion about ETH. The email is deliberative because it contains proposed analysis, and it is pre-decisional because no decision had been made about the analysis and issue discussed in the email.</p> <p>SEC staff have a privacy interest in their email addresses, and there is no public interest in knowing their contact information.</p>	.msg	False

Doc ID	Family Date	Email To	Email From	Email CC	File Name / Subject	FOIA Exemption(s)/Privilege Tags	Basis for Withholding	File Extension	Is Attachment
GC-LIT-0470-0811120	07/19/2024 11:54:54 AM	Tenreiro, Jorge	Pauley, Kristin		C-8950 Draft Closing Narrative.msg		The email and withheld attached case closing recommendation are intra-agency records relating to the Ethereum 2.0 investigation that detail a recommendation for closing the investigation. The records are deliberative because they reflect analysis and a recommendation by staff about an investigation. The withheld information is pre-decisional because decisions had not been made about issues relating to the investigation discussed in the record.	.msg	False
GC-LIT-0470-0811121	07/19/2024 11:54:54 AM				Case Closing Narrative Eth 2.0 C-08950 7.18.24.docx	Exemption 5 (deliberative process privilege; attorney work-product doctrine; attorney-client privilege) Exemption 6	The withheld attachment is also a non-final draft case closing recommendation. Additionally, the withheld records were prepared by ENF attorneys in connection with anticipated litigation and contain legal analysis relating to the Ethereum 2.0 investigation. The withheld attachment also reflects legal advice prepared by attorneys for the Commissioners. SEC staff have a privacy interest in their email addresses, and there is no public interest in knowing their contact information. Portions of the email have been released.	.docx	True
GC-LIT-0470-0809076	07/19/2024 04:10:12 PM	Pauley, Kristin	Tenreiro, Jorge		Closing narrative.msg			.msg	False

Doc ID	Family Date	Email To	Email From	Email CC	File Name / Subject	FOIA Exemption(s)/Privilege Tags	Basis for Withholding	File Extension	Is Attach-ment
GC-LIT-0470-0809077	07/19/2024 04:10:12 PM				B5	Exemption 5 (deliberative process privilege; attorney work-product doctrine; attorney client privilege) Exemption 6	<p>The withheld email and attached case closing recommendation are intra-agency records relating to the Ethereum 2.0 investigation that detail a recommendation for closing the investigation. The records are deliberative because they reflect analysis and a recommendation by staff about an investigation. The withheld information is pre-decisional because decisions had not been made about issues relating to the investigation discussed in the record. Additionally, the withheld email contains a question relating to the ENF investigation.</p> <p>The withheld attachment is also a non-final draft case closing recommendation that reflects proposed edits.</p> <p>Additionally, the withheld records were prepared by ENF attorneys in connection with anticipated litigation and contains legal analysis relating to the Ethereum 2.0 investigation.</p> <p>The withheld attachment also reflects legal advice prepared by attorneys for the Commissioners.</p> <p>SEC staff have a privacy interest in their email addresses, and there is no public interest in knowing their contact information.</p>	.docx	True
GC-LIT-0470-0812872	07/19/2024 05:40:41 PM	Hill, Angela R.; Clay, Felisha K.	Pauley, Kristin	Tenreiro, Jorge	Ethereum 2.0 (C-8950) Case Closing .msg	Exemption 5 (deliberative process privilege; attorney work-product doctrine; attorney client privilege)	<p>The withheld email and attached case closing recommendation are intra-agency records relating to the Ethereum 2.0 investigation that detail a recommendation for closing the investigation. The records are deliberative because they reflect analysis and a recommendation by staff about an investigation. The withheld information is pre-decisional because decisions had not been made about issues relating to the investigation discussed in the record.</p> <p>Additionally, the withheld records were prepared by ENF attorneys in connection with anticipated litigation and contains legal analysis relating to the Ethereum 2.0 investigation.</p>	.msg	False
GC-LIT-0470-0812873	07/19/2024 05:40:41 PM					Exemption 6	<p>The withheld attachment also reflects legal advice prepared by attorneys for the Commissioners.</p> <p>SEC staff have a privacy interest in their email addresses, and there is no public interest in knowing their contact information.</p>	.docx	True

EXHIBIT C

Updated Preliminary Vaughn Index for the Securities and Exchange Commission’s Withholdings from the 4/11/2025 Release of Records Responsive to Narrowed Subpart 4¹ of FOIA Request No. 23-03269-FOIA in *History Associates, Inc. v. SEC*, 24-cv-1858

	Email/Email Thread Date(s)	Author(s)/ Recipient(s)	Description of Withheld Information/Document(s)	FOIA Exemption(s)	Basis for Withholding
1.	January 16 and 17, 2024	Kristin Pauley, Jorge Tenreiro, David Hirsch	<p>An email thread between SEC staff was withheld.</p> <p>The names of certain Enforcement (“ENF”) staff and SEC staff contact information were also withheld.</p>	<p>Exemption 5 (deliberative process privilege; attorney work product doctrine)</p> <p>Exemption 6</p> <p>Exemption 7(C)</p>	<p>The email thread is intra-agency and contains discussion about potential staffing of a new SEC employee, the status of certain ENF matters, and possible next steps in the Ethereum 2.0 investigation. The withheld information is pre-decisional because decisions had not been made about staffing or about next steps in the ENF matters.</p> <p>Additionally, the withheld thread was prepared by ENF attorneys in anticipation of litigation and contains analysis and a proposal relating to an ENF matter.</p> <p>SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.</p> <p>ENF staff have a privacy interest in not being associated with a law enforcement investigation, and the public interest in knowing this personal information is not outweighed by their privacy interests.</p>

¹ Narrowed subpart 4 seeks all documents or communications sent to or by all former SEC Commissioners, their counsels, the Director of the Division of Enforcement, and the Director of the Crypto Asset and Cyber Unit concerning the decision to close the ETH 2.0 investigation.

	Email/Email Thread Date(s)	Author(s)/ Recipient(s)	Description of Withheld Information/Document(s)	FOIA Exemption(s)	Basis for Withholding
2.	February 6, 2024	Jorge Tenreiro, Gurbir Grewal, Sanjay Wadhwa, Gregory Smolar, David Hirsch	An email from Jorge Tenreiro and the attachment to that email were withheld.	Exemption 5 (deliberative process privilege; attorney work product doctrine; attorney client privilege)	<p>The email and attachment are intra-agency records and contain analysis and recommendations in connection with Enforcement matters, including the Ethereum 2.0 investigation, to potentially be discussed in an upcoming meeting. The withheld information is pre-decisional because decisions had not been made about the legal issues relating to the investigation discussed in the records.</p> <p>Additionally, the withheld email and attachment were prepared by ENF attorneys in anticipation of litigation and contain legal analysis relating to Enforcement matters.</p> <p>The withheld email and attachment were prepared by attorneys and contain legal advice relating to SEC actions for the ENF Director.</p>
3.	February 13, 2024	Kristin Pauley, David Hirsch, Jorge Tenreiro	<p>An email from Kristin Pauley and the three attachments to that email were withheld.</p> <p>The contact information of SEC staff was also withheld.</p>	<p>Exemption 5 (deliberative process privilege; attorney work product doctrine)</p> <p>Exemption 6</p>	<p>The email and attachments are intra-agency records and contain analysis and recommendations in connection with the Ethereum 2.0 investigation. The withheld information is pre-decisional because decisions had not been made about the issues relating to the investigation discussed in the records.</p> <p>Additionally, the withheld email and attachments were prepared by ENF attorneys in anticipation of litigation and contain discussion about the status of the matter, legal analysis, and proposed next steps relating to the Ethereum 2.0 investigation.</p> <p>SEC staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.</p>

	Email/Email Thread Date(s)	Author(s)/ Recipient(s)	Description of Withheld Information/Document(s)	FOIA Exemption(s)	Basis for Withholding
4.	February 14, 18, 20, 2024	Jorge Tenreiro, Michael Seaman, Jonathan Ingram, Erik Gerding, Gurbir Grewal	Portions of an email thread among SEC staff was withheld.	<p>Exemption 5 (deliberative process privilege; attorney work product doctrine; attorney client privilege)</p> <p>Exemption 6</p>	<p>The email thread is an intra-agency record and contains discussion and questions about a memo and law firm analysis concerning Ether as well as analysis about possible effects on SEC ENF actions. Information in the email thread is deliberative because it reflects discussion about what legal issues SEC staff, including Chair Gensler, should focus on. The withheld information is pre-decisional because a decision had not been made about the legal issues discussed in the email.</p> <p>Additionally, the withheld information was prepared by attorneys in anticipation of litigation and contains legal analysis relating to the investigation.</p> <p>The withheld information was prepared by attorneys and contains legal advice relating to SEC actions to be provided to Chair Gensler.</p> <p>SEC staff have a privacy interest in their email addresses, and there is no public interest in knowing their contact information.</p> <p>Portions of the email thread have been released.</p>

	Email/Email Thread Date(s)	Author(s)/ Recipient(s)	Description of Withheld Information/Document(s)	FOIA Exemption(s)	Basis for Withholding
5.	February 26, 28, 2024 April 22, 2024	Jorge Tenreiro, Gurbir Grewal, Sanjay Wadhwa, Gregory Smolar	<p>Portions of an email thread, as well as the attachments to the thread, were withheld.</p> <p>The email addresses of SEC staff were also withheld.</p>	<p>Exemption 5 (deliberative process privilege; attorney client privilege; attorney work product doctrine)</p> <p>Exemption 6</p>	<p>The email and attachments are intra-agency records and contain analysis and recommendations about possible approaches on particular legal issues relating to Ether. The withheld information is pre-decisional because a decision had not been made about the legal issues relating to Ether discussed in the email and attachment.</p> <p>Additionally, the withheld email and attachments were prepared by an ENF attorney in anticipation of litigation and contain legal analysis relating to Enforcement investigations and policy.</p> <p>This email was also sent by an attorney to provide legal advice to the ENF Director relating to SEC actions and policy.</p> <p>SEC staff have a privacy interest in their email addresses, and there is no public interest in knowing their contact information.</p> <p>Portions of the email thread were released.</p>

	Email/Email Thread Date(s)	Author(s)/ Recipient(s)	Description of Withheld Information/Document(s)	FOIA Exemption(s)	Basis for Withholding
6.	February 27, 2024	Luke Pazicky, Gurbir Grewal, Sanjay Wadhwa, Marc Johnson, Gregory Smolar	A calendar invitation for the Weekly Chair Meeting and its six attachments were withheld.	Exemption 5 (deliberative process privilege; attorney work product doctrine; attorney client privilege)	<p>The withheld calendar invitation and attachments are intra-agency records that reflect analysis about various Enforcement matters to possibly be discussed in an upcoming SEC staff meeting with Chair Gensler. The records are deliberative because they reflect discussion about what legal issues Chair Gensler and SEC staff should focus on, analysis of those issues, and staff recommendations. The withheld information is pre-decisional because decisions had not been made about the issues discussed in the calendar invitation and attachments.</p> <p>Additionally, the withheld records were prepared and selected by ENF attorneys in anticipation of litigation and contain analysis relating to pending and possible SEC actions.</p> <p>Certain of the withheld records were also prepared by attorneys to provide legal advice relating to pending and possible SEC actions and SEC policy.</p>

	Email/Email Thread Date(s)	Author(s)/ Recipient(s)	Description of Withheld Information/Document(s)	FOIA Exemption(s)	Basis for Withholding
7.	March 20, 2024	Gregory Smolar, Gurbir Grewal, Sanjay Wadhwa, Marc Johnson, Gregory Padgett	A calendar invitation for the Weekly Chair Meeting and its two attachments were withheld.	Exemption 5 (deliberative process privilege; attorney work product doctrine)	<p>The withheld calendar invitation and attachments are intra-agency records that reflect analysis about various subjects, including Enforcement matters and rulemaking, in an upcoming SEC staff meeting with Chair Gensler. The records are deliberative because they reflect discussion about what issues Chair Gensler and SEC staff should focus on, analysis of those issues, and staff recommendations. The withheld information is pre-decisional because decisions had not been made about the issues discussed in the calendar invitation and attachments.</p> <p>Additionally, the withheld records were prepared and selected by ENF attorneys in anticipation of litigation and contain legal analysis and status updates relating to pending SEC actions.</p> <p>One withheld attachment is a public document, but providing the document would reveal information about the staff attorney's proposal about what Chair Gensler should focus on.</p>

	Email/Email Thread Date(s)	Author(s)/ Recipient(s)	Description of Withheld Information/Document(s)	FOIA Exemption(s)	Basis for Withholding
8.	March 20, 2024	Gregory Smolar, Gurbir Grewal, Sanjay Wadhwa, Marc Johnson, Gregory Padgett	A calendar invitation for the Weekly Chair Meeting and its three attachments were withheld.	Exemption 5 (deliberative process privilege; attorney work product doctrine; attorney client privilege)	<p>The withheld calendar invitation and attachments are intra-agency records that reflect analysis about various matters, including Enforcement matters and rulemaking, in an upcoming SEC staff meeting with Chair Gensler. The records are deliberative because they reflect discussion about what issues Chair Gensler and SEC staff should focus on, analysis of those issues, and staff recommendations. The withheld information is pre-decisional because decisions had not been made about the issues relating to the investigation discussed in the calendar invitation and attachments.</p> <p>Additionally, the withheld records were prepared and selected by ENF attorneys in anticipation of litigation and contain legal analysis relating to pending SEC matters.</p> <p>One withheld attachment was prepared by an attorney to provide legal advice relating to a pending SEC action.</p> <p>One withheld attachment is a public document, but providing the document would reveal information about the staff attorney's proposal about what Chair Gensler should focus on and would provide information about legal advice an SEC attorney was providing.</p>

	Email/Email Thread Date(s)	Author(s)/ Recipient(s)	Description of Withheld Information/Document(s)	FOIA Exemption(s)	Basis for Withholding
9.	March 25, 2024	Gregory Smolar, Gurbir Grewal, Sanjay Wadhwa, Marc Johnson, Gregory Padgett	A calendar invitation for the Weekly Chair Meeting and its three attachments were withheld.	Exemption 5 (deliberative process privilege; attorney work product doctrine; attorney client privilege)	<p>The withheld calendar invitation and attachments are intra-agency records that reflect analysis about various subjects, including Enforcement matters and rulemaking, in an upcoming SEC staff meeting with Chair Gensler. The records are deliberative because they reflect discussion about what legal issues Chair Gensler and SEC staff should focus on, analysis of those issues, and staff recommendations. The withheld information is pre-decisional because decisions had not been made about the issues discussed in the calendar invitation and attachments.</p> <p>Additionally, the withheld records were prepared and selected by ENF attorneys in anticipation of litigation and contain legal analysis relating to pending SEC matters.</p> <p>One withheld attachment was prepared by an attorney to provide legal advice relating to a pending SEC action.</p> <p>One withheld attachment is a public document, but providing the document would reveal information about the staff attorney’s proposal about what Chair Gensler should focus on and would provide information about legal advice an SEC attorney was providing.</p>

	Email/Email Thread Date(s)	Author(s)/ Recipient(s)	Description of Withheld Information/Document(s)	FOIA Exemption(s)	Basis for Withholding
10.	April 17, 2024	Jorge Tenreiro, Gregory Smolar, Gurbir Grewal, Sanjay Wadhwa	Portions of an email thread and the email addresses of SEC staff were withheld.	Exemption 5 (deliberative process privilege; attorney work product doctrine; attorney client privilege) Exemption 6	<p>The email is an intra-agency record and reflects discussion about issues relating to ETH. The withheld information is deliberative because it reflects consultation about issues relating to ETH, and it is pre-decisional because a decision had not been made about the legal issues relating to ETH discussed in the email.</p> <p>Additionally, the withheld email was prepared by an ENF attorney in anticipation of litigation and contains legal analysis relating to ETH.</p> <p>This email was also sent by an attorney and reflects legal advice provided to Chair Gensler relating to, among other things, the Ethereum 2.0 investigation.</p> <p>SEC staff have a privacy interest in their email addresses and details about their personal lives, and there is no public interest in knowing their contact information or details about their personal lives.</p> <p>Portions of the email were released.</p>
11.	April 18, 2024	Gregory Padgett, Gurbir Grewal, Sanjay Wadhwa, Marc Johnson, Gregory Smolar	A calendar invitation for the Weekly Chair Meeting and its three attachments were withheld. An updated version of the calendar invitation with an additional attachment were also withheld.	Exemption 5 (deliberative process privilege; attorney work product doctrine)	<p>The withheld calendar invitation and attachments are intra-agency records that reflect analysis about various subjects, including Enforcement matters, in an upcoming SEC staff meeting with Chair Gensler. The records are deliberative because they reflect discussion about legal issues Chair Gensler and SEC staff should focus on and analysis of those issues. The withheld information is pre-decisional because decisions had not been made about the issues discussed in the calendar invitation and attachments.</p> <p>Additionally, the withheld records were prepared and selected by ENF attorneys in anticipation of litigation and contain legal analysis relating to pending and possible SEC actions.</p>

	Email/Email Thread Date(s)	Author(s)/ Recipient(s)	Description of Withheld Information/Document(s)	FOIA Exemption(s)	Basis for Withholding
12.	May 10, 2024	Jorge Tenreiro, Gurbir Grewal, Sanjay Wadhwa, Gregory Smolar	<p>An email from Jorge Tenreiro and an attachment to that email were withheld.</p> <p>The email addresses of SEC staff were also withheld.</p>	<p>Exemption 5 (deliberative process privilege; attorney work product doctrine; attorney client privilege)</p> <p>Exemption 6</p>	<p>The email and attachment are intra-agency records and contain discussion and recommendations about matters and issues that Enforcement staff proposed that SEC Enforcement leadership should focus on, including about the Ethereum 2.0 investigation. The withheld information is pre-decisional because a decision had not been made about the matters and issues discussed in the email.</p> <p>Additionally, the withheld email was prepared by an ENF attorney in anticipation of litigation and contains legal analysis relating to Enforcement matters.</p> <p>This email was also sent by an attorney to provide legal advice to the ENF Director relating to, among other things, the Ethereum 2.0 investigation.</p> <p>SEC staff have a privacy interest in their email addresses, and there is no public interest in knowing their contact information.</p> <p>Portions of the email were released.</p>

	Email/Email Thread Date(s)	Author(s)/ Recipient(s)	Description of Withheld Information/Document(s)	FOIA Exemption(s)	Basis for Withholding
13.	May 13, 2024	SEC Enforcement staff	Portions of email threads between SEC staff were withheld. The contact information of SEC staff was also withheld. The names of certain Enforcement staff were also withheld.	Exemption 5 (deliberative process privilege; attorney work product doctrine) Exemption 6 Exemption 7(C)	<p>The email thread is intra-agency and contains discussion about potential staffing of three Enforcement matters as well as the statuses of and next steps in Enforcement matters. The withheld information is pre-decisional because decisions had not been made about staffing or about the next steps in the matters.</p> <p>Additionally, the withheld thread was prepared by ENF attorneys in anticipation of litigation and contains analysis relating to Enforcement matters.</p> <p>SEC staff have a privacy interest in their email addresses, and there is no public interest in knowing their contact information.</p> <p>ENF staff have a privacy interest in not being associated with a law enforcement investigation, and the public interest in knowing this personal information is not outweighed by their privacy interests.</p> <p>Portions of the email thread were released.</p>

	Email/Email Thread Date(s)	Author(s)/ Recipient(s)	Description of Withheld Information/Document(s)	FOIA Exemption(s)	Basis for Withholding
14.	May 13, 14, 2024	Marc Johnson, Sanjay Wadhwa, Gurbir Grewal	Portions of an email thread among SEC staff were withheld.	Exemption 5 (deliberative process privilege; attorney client privilege) Exemption 6	<p>The email thread is an intra-agency record and contains discussion about matters and issues SEC staff proposed that Chair Gensler and Commissioner Lizarraga should focus on, including about Ether and the Ethereum 2.0 investigation. The withheld information is pre-decisional because a decision had not been made about the legal issues relating to Ether and the investigation discussed in the email.</p> <p>Additionally, the withheld email was prepared by an ENF attorney in anticipation of litigation and contains legal analysis relating to a then-ongoing investigation.</p> <p>This email was also sent by an attorney to provide legal advice relating to, among other things, the Ethereum 2.0 investigation.</p> <p>SEC staff have a privacy interest in their email addresses, and there is no public interest in knowing their contact information.</p> <p>Portions of the email were released.</p>

	Email/Email Thread Date(s)	Author(s)/ Recipient(s)	Description of Withheld Information/Document(s)	FOIA Exemption(s)	Basis for Withholding
15.	May 14, 2024	Gregory Padgett, Gurbir Grewal, Sanjay Wadhwa, Marc Johnson, Gregory Smolar	A calendar invitation for the Weekly Chair Meeting and its five attachments were withheld.	Exemption 5 (deliberative process privilege; attorney client privilege; attorney work product doctrine) Exemption 4	<p>The withheld calendar invitation and attachments are intra-agency records that reflect analysis about various subjects, including Enforcement matters and rulemaking, in an upcoming SEC staff meeting with Chair Gensler. The records are deliberative because they reflect discussion about what issues Chair Gensler and SEC staff should focus on, analysis of those issues, and staff recommendations. The withheld information is pre-decisional because decisions had not been made about the issues discussed in the calendar invitation and attachments.</p> <p>Additionally, the withheld records were prepared and selected by ENF attorneys in anticipation of litigation and contain legal analysis and proposed next steps relating to pending SEC actions.</p> <p>This calendar invitation was also sent by an attorney to provide legal advice relating to pending and possible SEC actions.</p> <p>One withheld attachment consists of correspondence and documents provided by a third party, which sought FOIA confidential treatment of their submission, in connection with an ENF matter unrelated to Ether or the Ethereum 2.0 investigation.</p>

	Email/Email Thread Date(s)	Author(s)/ Recipient(s)	Description of Withheld Information/Document(s)	FOIA Exemption(s)	Basis for Withholding
16.	May 21, 2024	Gurbir Grewal, Jorge Tenreiro, Scott Schneider	<p>Portions of an email thread, as well as attachments to the thread, were withheld.</p> <p>The contact information of SEC staff were also withheld.</p>	<p>Exemption 5 (deliberative process privilege; attorney work product doctrine; attorney client privilege)</p> <p>Exemption 6</p>	<p>The withheld email thread and attachments are agency records. The email thread contains discussion about a draft statement from Chair Gensler about the Financial Innovation and Technology for the 21st Century Act and legal analysis about Ether. The email thread is deliberative because it reflects discussion and analysis about the draft statement and about a legal issue relating to Ether. The withheld information is pre-decisional because decisions had not been made about the issues discussed in the thread.</p> <p>The attachments to the emails consist of draft legal analysis and talking points regarding Ether developed in connection with SEC actions. The withheld attachments are pre-decisional because no decision had been made about the issues discussed in the documents.</p> <p>Additionally, the withheld records were prepared by ENF attorneys in anticipation of litigation and contain legal analysis, including talking points for oral argument in a court proceeding.</p> <p>The withheld records also contain legal advice relating to issues in SEC actions to be provided to Chair Gensler.</p> <p>Portions of the email thread were released.</p>

	Email/Email Thread Date(s)	Author(s)/ Recipient(s)	Description of Withheld Information/Document(s)	FOIA Exemption(s)	Basis for Withholding
17.	June 12, 2024	Amanda Fischer, Scott Schneider, Megan Barbero, Lisa Helvin, Jorge Tenreiro, Corey Frayer	<p>The attachment to an email in an email thread was withheld.</p> <p>The email addresses of SEC staff were also withheld from the email.</p>	<p>Exemption 5 (deliberative process privilege; attorney client privilege)</p> <p>Exemption 6</p>	<p>The withheld attachment is an intra-agency record that contains proposed talking points for then-upcoming congressional testimony. The attachment is deliberative because it contains recommendations to Chair Gensler and commentary about those recommendations. The attachment is pre-decisional because it is a draft and no final agency decisions had been made about how Chair Gensler might respond to possible questions during testimony.</p> <p>The attachment is also from attorneys, and it provides legal advice to Chair Gensler.</p> <p>SEC staff have a privacy interest in their email addresses, and there is no public interest in knowing their contact information.</p> <p>Portions of the email were released.</p>

	Email/Email Thread Date(s)	Author(s)/ Recipient(s)	Description of Withheld Information/Document(s)	FOIA Exemption(s)	Basis for Withholding
18.	June 12, 2024	Gary Gensler, Amanda Fischer, Kevin Burris, Megan Barbero, Lisa Helvin, Jorge Tenreiro, Corey Frayer, Lily Bailey	In an email from Corey Frayer, analysis about a proposed response to a possible question during congressional testimony was withheld. The attachment to the email, which contains proposed talking points for congressional testimony, was withheld. The email addresses of SEC staff were also withheld.	Exemption 5 (deliberative process privilege; attorney client privilege) Exemption 6	The email thread and withheld attachment are intra-agency records that contain proposed talking points and answers to questions for then-upcoming congressional testimony. The email and attachment are deliberative because they contain recommendations to Chair Gensler and commentary about those recommendations. The thread is pre-decisional because no final agency decisions had been made about how Chair Gensler might respond to possible questions. The email thread and attachment are also from attorneys, and they provide legal advice to Chair Gensler. SEC staff have a privacy interest in their email addresses, and there is no public interest in knowing their contact information. Portions of the email were released.
19.	June 19, 2024	Janna Berke, Malgorzata Spangenberg, Susan Poklemba, Caroline Crenshaw	In an email between SEC staff, the email addresses of staff were withheld.	Exemption 6	SEC staff have a privacy interest in their email addresses, and there is no public interest in knowing their contact information. Portions of the email were released.

	Email/Email Thread Date(s)	Author(s)/ Recipient(s)	Description of Withheld Information/Document(s)	FOIA Exemption(s)	Basis for Withholding
20.	July 19, 2024	SEC Enforcement Staff	The Enforcement Case Closing Narrative for the Ethereum 2.0 investigation was withheld.	Exemption 5 (deliberative process privilege; attorney work-product doctrine; attorney-client privilege)	<p>The withheld case closing narrative is an intra-agency record that describes the Ethereum 2.0 investigation and details a recommendation for closing the investigation. The record is deliberative because it reflects analysis and a recommendation by staff about an investigation. The withheld information is pre-decisional because decisions had not been made about issues relating to the investigation discussed in the record.</p> <p>Additionally, the withheld record was prepared by ENF attorneys in anticipation of litigation and contains legal analysis relating to the Ethereum 2.0 investigation.</p> <p>The withheld record also reflects legal advice prepared by attorneys for the Commissioners.</p>

EXHIBIT D



UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
STATION PLACE
100 F STREET, NE
WASHINGTON, DC 20549-2465

Office of FOIA Services

June 6, 2025

Ms. Jessica Albert and Ms. Eva Lavery-Wilson
History Associates Incorporated
300 N. Stonestreet Avenue
Rockville, MD 20850

Re: Freedom of Information Act (FOIA), 5 U.S.C. § 552
Request No. **24-00020-LITG (23-03120-FOIA, 23-03128-
FOIA, and 23-03269-FOIA)**

Dear Ms. Albert and Ms. Lavery-Wilson:

This letter is a partial response to your FOIA Request Nos. 23-03128-FOIA, 23-03120-FOIA, and 23-03269-FOIA. FOIA Request Nos. 23-03128-FOIA and 23-03120-FOIA, dated and received in this office on August 8, 2023, seek "all investigative files and any other factual documents received by the Commission, any Commissioner, and/or any Commission Staff or otherwise in the Commission Staff's custody or control, or any internal or external communications reflecting or concerning any investigations by the Commission or Commission Staff, of" Enigma MPC (Request No. 23-03120-FOIA) and Zachary Coburn (Request No. 23-03128-FOIA). FOIA Request No. 23-03269-FOIA, dated and received in this office on July 28, 2023, seeks "all records concerning Ethereum's shift to a proof-of-stake consensus mechanism that have been created since January 1, 2018."

Reference is made to our interim responses to these requests dated January 7, 2025, January 28, 2025, April 11, 2025, and May 9, 2025. Additional reference is made to our letter dated October 5, 2023, regarding FOIA Request No. 23-03120-FOIA in which we granted your request in part and released to you three pages of records, in part, and informed you that we are withholding additional records that may be responsive to the request pursuant to FOIA Exemption 7(A). Additional reference is made to our letter dated August 11, 2023, regarding FOIA Request No. 23-03128-FOIA in which we informed you that we are withholding responsive records pursuant to FOIA Exemption 7(A).

Ms. Jessica Albert
Ms. Eva Lavery-Wilson
June 6, 2025
Page Two

24-00020-LITG

Additional reference is made to our letter dated October 10, 2023, regarding FOIA Request No. 23-03269-FOIA in which we informed you that we could not locate any responsive records, as well as the Office of the General Counsel's subsequent appeal decision dated February 6, 2024, that responsive records are protected from disclosure pursuant to FOIA Exemption 7(A).

Your counsel and the SEC's counsel agreed that the SEC will process four narrowed subparts of FOIA Request No. 23-03269-FOIA. This letter further addresses subpart 2. Subpart 2 seeks all documents and communications sent by the SEC to third parties regarding Ethereum's shift to a proof-of-stake mechanism.

We are releasing to you 1,266 pages in further response to subpart 2, with the exception of certain information that has been withheld pursuant to 5 U.S.C. §§ 552(b)(5), (b)(6), and (b)(7)(C) for the following reasons:

- FOIA Exemption 5 protects certain information prepared in anticipation of litigation, forms an integral part of the pre-decisional process, and/or contains advice given to the Commission or senior staff by the SEC's attorneys. Therefore, it is protected from release by the attorney work-product doctrine and/or the deliberative process and/or attorney-client privileges embodied in Exemption 5;
- FOIA Exemption 6 protects certain information the release of which would constitute a clearly unwarranted invasion of personal privacy; and
- FOIA Exemption (7)(C) protects information the release of which could reasonably be expected to constitute an unwarranted invasion of personal privacy. Release of this information could subject the employees and third-party individuals named in the documents to

Ms. Jessica Albert
Ms. Eva Lavery-Wilson
June 6, 2025
Page Three

24-00020-LITG

harassment from the public in the performance of their official duties.

We are also withholding in full 102 documents in response to subpart 2 pursuant to 5 U.S.C. §§ 552(b)(3), (b)(4), (b)(5), (b)(6), (b)(7)(A), and (b)(7)(C) for the above and following reasons:

- FOIA Exemption 3 protects information prohibited from disclosure by another federal statute;
- FOIA Exemption 4 protects confidential commercial or financial information that is customarily and actually treated as private by its owner and provided to the government under an assurance of privacy; and
- FOIA Exemption 7(A) protects from disclosure records compiled for law enforcement purposes, the release of which could reasonably be expected to interfere with enforcement activities.

Please be advised that we have considered the foreseeable harm standard when reviewing records and applying FOIA exemptions.

I am the deciding official with regard to this adverse determination. You have the right to appeal my decision to the SEC's General Counsel under 5 U.S.C. § 552(a)(6), 17 CFR § 200.80(f)(1). The appeal must be received within ninety (90) calendar days of the date of this adverse decision. Your appeal must be in writing, clearly marked "Freedom of Information Act Appeal," and should identify the requested records. The appeal may include facts and authorities you consider appropriate.

You may file your appeal by completing the online Appeal form located at https://www.sec.gov/forms/request_appeal, or mail your appeal to the Office of FOIA Services of the Securities and Exchange Commission located at Station Place, 100 F Street NE, Mail Stop 2465, Washington, D.C. 20549, or deliver it to Room 1120 at that address.

Ms. Jessica Albert
Ms. Eva Laverty-Wilson
June 6, 2025
Page Four

24-00020-LITG

If you have any questions, please contact Alexandra Verdi at verdim@sec.gov. You may also contact me at foiapa@sec.gov or (202) 551-7900. You may also contact the SEC's FOIA Public Service Center at foiapa@sec.gov or (202) 551-7900. For more information about the FOIA Public Service Center and other options available to you please see the attached addendum.

Sincerely,

Matthew Hurd

Matthew Hurd
Attorney Advisor

Enclosure

ADDENDUM

For further assistance you can contact a SEC FOIA Public Liaison by calling (202) 551-7900 or visiting <https://www.sec.gov/oso/help/foia-contact.html>.

SEC FOIA Public Liaisons are supervisory staff within the Office of FOIA Services. They can assist FOIA requesters with general questions or concerns about the SEC's FOIA process or about the processing of their specific request.

In addition, you may also contact the Office of Government Information Services (OGIS) at the National Archives and Records Administration to inquire about the FOIA dispute resolution services it offers. OGIS can be reached at 1-877-684-6448 or via e-mail at ogis@nara.gov. Information concerning services offered by OGIS can be found at their website at [Archives.gov](https://www.archives.gov). Note that contacting the FOIA Public Liaison or OGIS does not stop the 90-day appeal clock and is not a substitute for filing an administrative appeal.

From: Brannon, Nadia P
Sent: 2022-07-29T23:07:43Z
Subject: FW: Digital Assets Prep Call
Received: 2022-07-29T23:07:43Z
[Crypto Basics SEC training Aug 2022 Day 1.pptx](#)

Deck 2

Nadia P. Brannon

U.S. Securities and Exchange Commission

44 Montgomery Street, Suite 2800 | San Francisco, CA 94104

Phone (b)(6) | Email (b)(6)@sec.gov | Mobile (b)(6)



<http://www.sec.gov>

From: Brannon, Nadia P
Sent: Friday, July 29, 2022 2:27 PM
To: (b)(6)@fbi.gov
Subject: RE: Digital Assets Prep Call

Hi (b)(6)
Our calendars are completely out of synch☺. I am out next week, (b)(6) Very poor reception. So, for any communication, we will need to plan beforehand, so I can drive to a place where I can have connection.

My personal cell is (b)(6) Text me.

Please let me know if you want to talk on Friday, the 5th, Sunday the 7th or Monday the 8th. On Friday and Sunday I can make myself available any time. On the 8th I am available any time other than 10 – 10.30 am PST and 12 pm – 2 pm PST. I can start at 7 am PST, if that works for you.

Here are the preliminary drafts of the three presentations. I still need to go over them and re-read them, check for typos/errors. Please feel free to add/ modify, particularly the second one.

At this juncture, we just need to focus on the first one, which we present on the 9th at 10 am PST (1 pm PST). Training people asked to send it to them by next Friday, the 5th. They will start the webex 30 minutes early for us to prep, i.e. at 9.30 am PST on the 9th.

Best,

Nadia P. Brannon

U.S. Securities and Exchange Commission

44 Montgomery Street, Suite 2800 | San Francisco, CA 94104

Phone (b)(6) | Email (b)(6)@sec.gov | Mobile (b)(6)



<http://www.sec.gov>

From: (b)(6)@fbi.gov
Sent: Monday, July 25, 2022 9:38 AM
To: Brannon, Nadia P (b)(6)@SEC.GOV
Subject: Automatic reply: Digital Assets Prep Call

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Greetings!
I will be out of the office with limited access to my email (b)(6) I will get back to you as soon as I can.

Thank you for your patience and understanding!

Very Respectfully,

(b)(6)

Desk (b)(6)
Cell (b)(6)

Case 1:24-cv-01858-ACR Document 34-4 Filed 06/20/25 Page 8 of 601

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To: Thompson, Andrew S (EXAMS-Contractor) (b)(6) DSEC.GOV]
Cc: Thompson, Angela (b)(6) SEC.GOV], (b)(6) (fbl.gov]
From: Brannon, Nadia P
Sent: 2022-08-08T20:46:45Z
Subject: Slides for tomorrow's training on Digital Assets
Received: 2022-08-08T20:46:45Z
Crypto Basics SEC training Aug 2022 Day 1.pptx

Hi Andrew,
Attached are the final slides for tomorrow's training.
Sorry for the delay - had some unexpected delays.
We will dial-in 30 minutes earlier tomorrow.

(b)(5)

Valerie Szczepanik from FinHub reviewed the deck.
We will send you copies of the slide for the next week and the week after as soon as they are finalized.
P.S. It does not appear that the August 23 training is on the training calendar. If you could also send the outlook calendar invitation to both of us, that would be great.

Thanks,
Nadia P. Brannon
U.S. Securities and Exchange Commission
44 Montgomery Street, Suite 2800 | San Francisco, CA 94104
Phone (b)(6) | Email (b)(6)@sec.gov | Mobile (b)(6)



http://www.sec.gov

From: Brannon, Nadia P
Sent: 2022-07-29T21:28:17Z
Subject: RE: Digital Assets Prep Call
Received: 2022-07-29T21:28:18Z

[Crypto Basics SEC training Aug 2022 Day 2.pptx](#)
[Crypto Basics SEC training Aug 2022 Day 3.pptx](#)
[Crypto Basics SEC training Aug 2022 Day 1.pptx](#)

Hi (b)(6)
Our calendars are completely out of synch☺. I am out next week, (b)(6) Very poor reception. So, for any communication, we will need to plan beforehand, so I can drive to a place where I can have connection. My personal cell is (b)(6) Text me.
Please let me know if you want to talk on Friday, the 5th, Sunday the 7th or Monday the 8th. On Friday and Sunday I can make myself available any time. On the 8th I am available any time other than 10 – 10.30 am PST and 12 pm – 2 pm PST. I can start at 7 am PST, if that works for you.

Here are the preliminary drafts of the three presentations. I still need to go over them and re-read them, check for typos/errors. Please feel free to add/ modify, particularly the second one.
At this juncture, we just need to focus on the first one, which we present on the 9th at 10 am PST (1 pm PST). Training people asked to send it to them by next Friday, the 5th. They will start the webex 30 minutes early for us to prep, i.e. at 9.30 am PST on the 9th.
Best,

Nadia P. Brannon
U.S. Securities and Exchange Commission
44 Montgomery Street, Suite 2800 | San Francisco, CA 94104
Phone (b)(6) Email (b)(6) @sec.gov | Mobile (b)(6)



<http://www.sec.gov>
From: (b)(6) fbi.gov>

Sent: Monday, July 25, 2022 9:38 AM
To: Brannon, Nadia P (b)(6) SEC.GOV>
Subject: Automatic reply: Digital Assets Prep Call

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Greetings!
I will be out of the office with limited access to my email (b)(6) I will get back to you as soon as I can.
Thank you for your patience and understanding!

Very Respectfully,
(b)(6)
Desk (b)(6)
Cell (b)(6)

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From: Rundquist, Paul
Sent: 2023-09-08T12:00:59Z
Subject: RE: Penstemon / SEC
Received: 2023-09-08T12:01:38Z
[IOSCOPD744.pdf](#)

Good morning,
I'm looking forward to meeting up, do you have any good times for an initial phone call with myself to talk about our mission, I'm hoping for a preliminary call to talk about who we are, and what we're looking for, then a teams meeting later in the week with our leadership and your team.

We are Finhub here at the Securities and Exchange Commission (SEC), our focus is on the evaluation of the regulatory implications of new technology in Fintech, and our Director, Valerie Szczepanik has been heavily involved in leading the agency's crypto work from the very first cases. In support of that mission, as a regulator we rely heavily on deep understanding of the underlying technology. We are interested in working with you to see what we can do in terms of pushing forward simulation, data preservation and analysis, and functional evaluation of cryptocurrency and blockchain systems of interest to the SEC. Here is our webpage detailing our previous work: [SEC.gov | Strategic Hub for Innovation and Financial Technology \(FinHub\)](#) Our office was involved in drafting and editing this recent policy report for our international partners: [CR04/2023 Policy Recommendations for Decentralized Finance \(DeFi\) \(iosco.org\)](#)

Best,
Paul Rundquist
Financial Analyst, Finhub

From: (b)(6) @sandia.gov
Sent: Thursday, September 7, 2023 2:24 PM
To: Rundquist, Paul (b)(6) @SEC.GOV
Cc: (b)(6) @sandia.gov; (b)(6) @sandia.gov; (b)(6) @sandia.gov
Subject: Penstemon / SEC

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hey Paul!
I'm just bringing our convo down to the low side, appreciate the comments you gave after checking out our slides from the Deep Dive! I wanted to get a few of us on this email so you have our emails (added (b)(6) as well for non-penstemon stuff) and frankly a good chunk of what we do can be discussed on the low side (especially with logistics and FIREWHEEL options and some of our research paths in the thrusts).
I'd love to hear more about your mission space at the SEC and what common threads we might have and how we can collaborate. Would you be up for a teams call at some point to start the conversation? I'd also bring one or two of my thrust leads depending on which threads you guys are most interested in (public Ethereum, smart contracts, digital identity, etc).
Anyway, thanks for the reach out and looking forward to meeting up.

(b)(6)
Sandia National Laboratories
(b)(6) (work)
(b)(6) @sandia.gov

Policy Recommendations for Decentralized Finance (DeFi) Consultation Report



**THE BOARD
OF THE
INTERNATIONAL ORGANIZATION OF SECURITIES COMMISSIONS**

CR/04/2023

September 2023

This paper is for public consultation purposes only. It has not been approved for any other purpose by the IOSCO Board or any of its members.

Copies of publications are available from:
The International Organization of Securities Commissions website: www.iosco.org

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Foreword

The International Organization of Securities Commissions (IOSCO) has published this Consultation Report with the aim of finalising IOSCO's policy recommendations to address market integrity and investor protection issues in decentralized finance (DeFi) by the end of 2023.¹ In line with IOSCO's established approach for securities regulation, the Policy Recommendations for DeFi² are addressed to relevant authorities and look to support jurisdictions seeking to establish compliant markets in the most effective way possible.

Feedback to the Consultation Process

IOSCO welcomes input from all stakeholders as part of this consultation process. Please submit consultation responses to deficonsultation@iosco.org on or before 19 October 2023.

Your comment letter should indicate prominently that it is a *Public Comment on IOSCO's Consultation Report on Policy Recommendations for Decentralized Finance (DeFi)*.

All comments received will be made available publicly unless anonymity is specifically requested. Comments will be converted to PDF format and posted on the IOSCO website.

Following the public consultation period, IOSCO aims to finalize the DeFi recommendations and publish a final report around the end of 2023, in accordance with its [Crypto-Asset Roadmap](#) of July 2022, and in conjunction with its [CDA recommendations](#).

¹ The DeFi Working Group is led by staff from the United States Securities and Exchange Commission, with members from the staff of the Australian Securities and Investments Commission; Securities Commission of The Bahamas; European Securities and Markets Authority; French Autorité des Marchés Financiers; Hong Kong Securities and Futures Commission; Central Bank of Ireland; Italian Commissione Nazionale per le Società e la Borsa; Financial Services Commission/Financial Supervisory Service of the Republic of Korea; Mauritius Financial Services Commission; Ontario Securities Commission; Quebec Autorité des Marchés Financiers; Monetary Authority of Singapore; Comisión Nacional del Mercado de Valores of Spain; Financial Conduct Authority of the United Kingdom; and the United States Commodity Futures Trading Commission.

² The Policy Recommendations in this Consultation Report are focused on decentralized finance (DeFi). IOSCO has separately consulted on issues related to Crypto and Digital Asset Markets more generally. See IOSCO, CONSULTATION REPORT ON POLICY RECOMMENDATIONS FOR CRYPTO AND DIGITAL ASSET MARKETS (May 2023), available at <https://www.iosco.org/library/pubdocs/pdf/IOSCOPD734.pdf>.

Table of Contents

EXECUTIVE SUMMARY	1
SECTION I. INTRODUCTION TO THIS CONSULTATIVE REPORT.....	3
SECTION II. STATE OF THE DEFI MARKET	6
SECTION III. RECOMMENDATIONS AND GUIDANCE.....	16
Recommendation 1 – Analyze DeFi Products, Services, Arrangements, and Activities to Assess Regulatory Responses.....	19
Recommendation 2 – Identify Responsible Persons	22
Recommendation 3 – Achieve Common Standards of Regulatory Outcomes.....	24
Recommendation 4 – Require Identification and Addressing of Conflicts of Interest.....	30
Recommendation 5 – Require Identification and Addressing of Material Risks, Including Operational and Technology Risks	33
Recommendation 6 – Require Clear, Accurate and Comprehensive Disclosures ...	35
Recommendation 7 – Enforce Applicable Laws	36
Recommendation 8 – Promote Cross-Border Cooperation and Information Sharing	37
Recommendation 9 – Understand and Assess Interconnections Among the DeFi Market, the Broader Crypto-Asset Market, and Traditional Financial Markets	39
SECTION IV. QUESTIONS FOR PUBLIC CONSULTATION	43
ANNEX A – RECENT EVENTS AND THEIR IMPACT ON DEFI	44
ANNEX B – DEFI EXPLOITS, ATTACKS AND ILLICIT USES	52
ANNEX C – DATA GAPS AND CHALLENGES	60
ANNEX D – DEFI GOVERNANCE	66
ANNEX E – UPDATE TO RISKS AND CONSIDERATIONS RELATING TO DEFI ACTIVITIES.....	84
ANNEX F – MAPPING OF IOSCO PRINCIPLES TO DEFI ACTIVITIES	99
ANNEX G – SUMMARY OF UPDATED SURVEY RESULTS AND OUTREACH	110

EXECUTIVE SUMMARY

DeFi commonly refers to financial products, services, arrangements, and activities that use distributed ledger or blockchain technologies (DLT), including self-executing code referred to as *smart contracts*. DeFi aims to disintermediate and decentralize legacy ecosystems by eliminating the need for some traditional financial intermediaries and centralized institutions, and by enabling certain direct investment activities.³ DeFi is an important, evolving, and expanding technological innovation. The use of DLT may have the potential to foster financial innovation, increase efficiencies, and improve access to financial products, services, and activities. Proposed use cases for DLT include those relating to primary market issuance, secondary market trading, asset servicing and lifecycle management. While IOSCO encourages responsible innovation that benefits investors and the markets, it has prioritized the need to focus on analyzing and responding to market integrity and investor protection concerns, including those emerging from technological developments in DeFi.

This consultation report proposes nine policy recommendations that IOSCO plans to finalize by the end of 2023 to address market integrity and investor protection concerns arising from DeFi by supporting greater consistency of regulatory frameworks and oversight in member jurisdictions. They are complementary to the Policy Recommendations for Crypto and Digital Assets (CDA) Markets⁴ issued for consultation in May 2023. The two sets of IOSCO recommendations have been developed in accordance with IOSCO's Crypto-Asset Roadmap (Roadmap) published in July 2022.⁵

The proposed recommendations follow a 'lifecycle' approach in addressing the key risks identified in this report. They are principles-based and outcomes-focused, and aimed at DeFi products, services, arrangements, and activities by applying IOSCO's widely accepted global standards for securities markets regulation.

³ *DeFi* is a term used in industry and broader discussions. It does not give rise to a unique or different legal arrangement. Currently, there is no generally accepted definition of *DeFi*, even among industry participants, or what makes a product, service, arrangement, or activity decentralized. While DeFi may seek to eliminate traditional intermediaries, this report notes that certain DeFi arrangements and activities are in fact providing products and services that are equivalent to those provided by traditional market intermediaries and may be treated as market intermediaries in a particular jurisdiction.

⁴ IOSCO, POLICY RECOMMENDATIONS FOR CRYPTO AND DIGITAL ASSET MARKETS CONSULTATION REPORT (May 2023), available at <https://www.iosco.org/library/pubdocs/pdf/IOSCOPD734.pdf>.

⁵ See IOSCO, CRYPTO-ASSET ROADMAP FOR 2022-2023 (July 2022), available at <https://www.iosco.org/library/pubdocs/pdf/IOSCOPD705.pdf>. The FTF was established in March 2022 to develop recommendations to the Board of IOSCO and thereafter to oversee the implementation of IOSCO's regulatory agenda for Fintech and crypto-assets. The FTF is prioritising policy-focused work on crypto-asset markets and activities in its initial 12 to 24 months of operation, while continuing to monitor market developments associated with broader Fintech-related trends and innovation.

One of IOSCO's goals is to promote greater consistency with respect to the regulation and oversight of crypto-asset activities, given the cross-border nature of the markets, potential for regulatory arbitrage and significant risk of harm to retail investors. IOSCO is also seeking to encourage consistency in the way crypto-asset markets and securities markets are regulated within individual IOSCO jurisdictions, in accordance with the principle of "same activity, same risk, same regulatory outcome."

The proposed recommendations also cover the need for enhanced cooperation among regulators to coordinate and respond to cross-border challenges in enforcement and supervision, and to address regulatory arbitrage concerns, that arise from the cross-border nature of global crypto-asset activities conducted by DeFi participants who often offer their products and services across multiple jurisdictions.

While the proposed recommendations are not directly addressed to market participants, all participants in crypto-asset markets are strongly encouraged to carefully consider the expectations and outcomes articulated through the proposed recommendations and the respective supporting guidance in the conduct of regulated and cross-border activities.

SECTION I. INTRODUCTION TO THIS CONSULTATIVE REPORT

Background

In March 2022, IOSCO published its Decentralized Finance Report (2022 Report), presenting a comprehensive description of the DeFi market as of the date of that report.⁶ Since the 2022 Report, the use of DLT-based applications has increased in scale and scope, with some predicting continued growth in this area in the coming years.⁷ The 2022 Report noted that it is important for IOSCO members to develop a holistic and comprehensive understanding of the DeFi market, including by identifying and analyzing, among other things, the structural components of the DeFi market, the participants and activities involved, and the products and services offered.

Objectives of the Report

Consistent with the Roadmap, the present report is intended to build on the 2022 Report by providing recommendations and guidance to IOSCO members as they analyze DeFi within their own regulatory frameworks. While recognizing the value of responsible innovation, this report seeks to make clear that market regulators globally should apply a “same activity, same risk, same regulatory outcome” approach to financial markets, regardless of the technology that may be used to deliver financial products and services. In certain jurisdictions, this could mean that existing laws and regulations apply. To facilitate a level-playing field between crypto-asset markets and traditional financial markets and to reduce the risk of regulatory arbitrage, regulatory frameworks for DeFi (existing or new) should seek to achieve regulatory outcomes for investor protection and market integrity that are the same as, or consistent with, those required in traditional financial markets.

Like the 2022 Report, this report emphasizes the need for regulators to understand the DeFi market and its significance, what financial products and services are offered, who is offering those products and services, and to whom regulatory obligations may apply. This report is intended to assist IOSCO members reach that understanding based on their own analyses. As the 2022 Report notes, applicable regulatory frameworks apply to DeFi products, services, arrangements, and activities, notwithstanding characterizations or assertions of decentralization by market participants.

⁶ See IOSCO, DECENTRALIZED FINANCE REPORT (Mar. 2022), available at <https://www.iosco.org/library/pubdocs/pdf/IOSCOPD699.pdf> [hereinafter 2022 Report]. The 2022 Report contains a detailed explanation of terms used in the 2022 Report and in this report. While each report cites to a number of sources, much of the reports’ content represents a compilation of information developed by examining publicly available sources, including websites, white papers, and software code, including smart contract code. Not all of these sources have been cited.

⁷ See BCC PUBLISHING, GLOBAL DECENTRALIZED FINANCE (DEFI) MARKET: TRENDS, GLOBAL SCENARIO, INNOVATIONS & MARKET (Jan. 2023), available at <https://www.bccresearch.com/market-research/finance/global-decentralized-finance-market.html>.

The report aims to assist global regulators as they identify the “**Why, What, Who, and How**” in applying IOSCO’s Objectives and Principles for Securities Regulation and relevant supporting IOSCO standards, recommendations, and good practices (hereinafter IOSCO Standards) and their own regulatory frameworks to DeFi.

- **Why:** The report describes the state of the DeFi market and why it presents significant investor and market risks, arising through participants operating in non-compliance with, or outside of, existing investor and market protection regulatory frameworks. Further, since the publication of the 2022 Report, the DeFi market has been prone to increasing exploits and attacks, illicit uses, and other misconduct, resulting in investor and market harm. Moreover, the ability to apply regulatory oversight is challenging, due in part to significant data gaps and technological complexities.
- **What:** The report describes the common products and services offered in the DeFi markets, demonstrating that they do not materially differ from products and services offered in traditional financial markets, and that they present the same risks, along with additional risks due to the way they are offered.
- **Who:** The report identifies the types of persons and entities typically involved in the development and provision of products and services using DLT-based components and offers ways to analyze their involvement to determine potential regulatory touchpoints.
- **How:** The report provides recommendations and guidance to regulators as they examine the application of IOSCO Standards, and existing or new frameworks within their own respective jurisdictions, to DeFi products, services, arrangements, and activities.

Acknowledging the definitional and interpretive jurisdictional differences that currently exist, IOSCO has developed the proposed recommendations and guidance in this report by developing a functional, economic approach to the analysis, assessment, and mitigation of DeFi risks, rather than seeking to develop a one-size-fits-all prescriptive taxonomy.

Accordingly, IOSCO is taking an outcomes-focused, principles-based approach to risk identification, assessment, and mitigation. This approach has been informed by a mapping of IOSCO Standards to DeFi products, services, arrangements, and activities, and has enabled IOSCO to examine and assess how its existing policy framework aligns with key risks identified in DeFi.

Topics Covered in the Report

Section I (Introduction) introduces the report and describes its high-level objectives.

Section II (State of the DeFi Market) and the accompanying Annexes provide an overview of the state of DeFi, highlighting developments since the 2022 Report. These are intended to inform IOSCO members about the rapidly developing DeFi market through an analysis of recent events, trends and risks, and their implications for investors and the markets in DeFi.

Section III (High-Level Recommendations and Guidance) sets out nine policy recommendations that are intended to assist IOSCO members as they apply existing or develop new regulatory frameworks to achieve regulatory outcomes for investor protection and market integrity in DeFi that are the same as, or consistent with, those required in traditional financial markets.

The recommendations emphasize the importance of regulators developing a holistic and comprehensive understanding of DeFi products, services, arrangements, and activities.

This report recognizes that some jurisdictions have existing regulatory frameworks for financial instruments that encompass crypto and digital assets, including DeFi products, services, arrangements, and activities, while other jurisdictions are in the process of developing regulatory frameworks. Each jurisdiction should apply the IOSCO Standards, as they deem appropriate, within their existing or new frameworks.

Section IV (Questions for Public Consultation) contains consultation questions for public feedback.

Pre-Consultation Stakeholder Engagement

The proposed recommendations build on the analysis in the March 2022 report which benefited from broad consultation with IOSCO members, academics, and industry. These recommendations are informed by additional outreach with academics, data analytics firms, researchers, and technologists. The FTF also further surveyed its membership to identify key risks faced by regulators and policy measures needed to address the risks. Within its tight timelines, the FTF has also benefited from an initial discussion with its Affiliate Member Consultative Committee (AMCC) on the proposed framework now under consultation.

SECTION II. STATE OF THE DEFI MARKET

The 2022 Report provided a comprehensive overview of the DeFi market, including DeFi products, services, arrangements, and activities, based on information available at the time of its publication. This section (and the accompanying Annexes) provides: (A) an overview of DeFi's common products and services; (B) an update on recent developments and trends; (C) an overview of DeFi exploits, attacks, and illicit uses; (D) an explanation of data gaps and challenges; and (E) a highlight of key risks and considerations.

A. Common Products and Services Using DLT

Persons and entities are currently offering financial products and services that, at least in part, utilize code deployed on public permissionless DLT-based platforms. These products and services include the offering of financial instruments; trading, lending, and borrowing activities involving financial instruments; and the provision of services relating to financial instruments, including exchange, broker, dealer, asset management, custody, clearing, and settlement.

A common misperception is that DeFi products and services are materially different from those found in traditional financial markets. Another common misperception is that DeFi products and services are offered in a fully automated manner using smart contracts, with no human involvement. However, these are not accurate descriptions of how the DeFi market currently operates in practice. Most of the products and services referred to as DeFi mimic those of traditional financial markets. Moreover, the code that implements a DeFi protocol is created, deployed, operated, and maintained by humans; it does not just spontaneously materialize and self-execute. Further, the smart contracts operating on a blockchain typically are only one component of the product or service being offered. For the most part, the products and services referred to as DeFi are offered by persons or entities using traditional components and infrastructures as well as smart contracts and blockchains.⁸

The 2022 Report details various DeFi products and services commonly offered. The DLT-based components associated with these products and services are commonly referred to as DeFi protocols. Typical DeFi protocols include, for example, decentralized exchange protocols, lending/borrowing protocols, and aggregator protocols. The 2022 Report described the way that these protocols typically operate in detail in, and this report provides an abbreviated description below for ease of reference.

Decentralized Exchange (DEX)⁹

A DEX provider typically provides a service through which one type of crypto-asset can be traded for another. One type of DEX is known as an *order book* DEX where, typically, a central operator maintains a user interface (such as a website or mobile application) and an off-chain order book, with a blockchain primarily serving as a settlement layer. Users

⁸ See 2022 Report, *supra* note 5, at 7-8.

⁹ *Id.* at 14-15.

interested in buying or selling a particular crypto-asset at a certain price (makers) communicate their order to the operator, who will in turn publish the order for the use of other participants who may be interested in matching the order (takers). Once there is a match, the taker typically submits the order to the DEX, which sends the matched order for execution and settlement on a blockchain. Unlike in a centralized trading platform context, the operator may never have control of the users' crypto-assets and may serve only as a *relayer* of information that is necessary for the trade to be executed and settled on the blockchain. The operator typically collects fees from makers and takers for providing this service. In addition, takers typically pay a fee on each trade, a portion of which may go to makers to reward them for providing liquidity.

Another type of DEX uses what are referred to as “automated market makers” (AMMs). Operators of this type of service typically create a “factory” (or set) of smart contracts that can be used by participants to deposit two or more crypto-assets into what is commonly called an AMM or “liquidity pool”, which then is available for other participants who want to exchange one of those crypto-assets for another. Depositors to the liquidity pool are generally referred to as “liquidity providers.” They typically deposit a number of crypto-asset pairs into the liquidity pool and receive in return a crypto-asset, often referred to as a “liquidity provider token” or “LP token,” which represents their *pro rata* interest in the liquidity pool and is redeemable at any time for their slice of the pool, including accrued trading fees. Typically, participants who trade with a liquidity pool deposit a certain number of crypto-asset A and receive a certain number of crypto-asset B. The exchange rate between A and B is automatically determined according to a preset formula that is based on the ratio of assets held by the pool and is designed to programmatically adjust prices to match market prices. Thus, as the ratio of crypto-asset A to crypto-asset B increases, the liquidity pool price of crypto-asset A decreases and the price of crypto-asset B increases. The degree to which the price of each of the assets moves generally depends on the size of the trade and the pool's liquidity. AMM-based DEXs are substantially dependent on arbitrage traders, typically employing bots, who are programmed to buy or sell crypto-assets for profit until its liquidity pool price converges with the average market price.

Lending/Borrowing¹⁰

Providers of lending/borrowing protocols offer a service that allows holders of crypto-assets, often stablecoins,¹¹ to earn a fixed or variable return on those assets by depositing

¹⁰ *Id.* at 11-12.

¹¹ The term “stablecoin” commonly refers to a crypto-asset that aims to maintain a stable value relative to a specified asset, or a pool or basket of assets. *See, e.g.*, FSB, HIGH-LEVEL RECOMMENDATIONS FOR THE REGULATION, SUPERVISION AND OVERSIGHT OF GLOBAL STABLECOIN ARRANGEMENTS 19 (July 2023), available at <https://www.fsb.org/wp-content/uploads/P170723-3.pdf>. There is no universally agreed definition of stablecoin. The term stablecoin does not denote a distinct legal or regulatory classification. Importantly, the use of the term “stablecoin” in this report is not intended to affirm or imply that the asset's value is necessarily stable or that it is a type of currency. Rather, the term is used here because it is commonly employed by market participants

them in a smart contract (or lending pool) that simultaneously allows other participants to borrow those assets. Depositors typically receive a different crypto-asset, which represents that depositor's *pro rata* interest in the lending pool and can be redeemed at any time for the amount of the original deposit and accrued interest. In many such services, interest rates can vary and can be set by algorithms, a protocol project team, or through certain governance voting. Loans can be set for any amount, have no duration, and can usually be repaid at any time. Typically, there are no credit checks due to the pseudonymous nature of lending and borrowing protocols. As a result, the lending and borrowing protocol seeks to mitigate risk and protect solvency by implementing risk parameters, such as loan-to-value ratios, liquidation ratios, liquidation bonuses (or penalties), and reserve factors that vary based on the crypto-asset used as collateral and its risks. Loans are generally required to be over-collateralized.

Aggregator¹²

Providers of *aggregator* services offer users a means to optimize trading, liquidity, or yield-generating opportunities, typically by scanning across protocols for such opportunities and then routing transactions to fulfill desired user parameters. Aggregators allow users, for example, to source trading bids and offers, monitor prices, and transact with a number of protocols from a single interface. Based on the activity being facilitated, aggregators typically include *DEX aggregators* (that query a range of trading protocols for the purpose of finding the best terms for a trade, including optimal trading price, trading fee and *slippage* (i.e., changes in deal terms over time)); *yield aggregators* (that collect user deposits and distribute deposits among protocols, using various strategies to maximize returns); and *portfolio aggregators* (that monitor a user's portfolio of crypto-assets across blockchains and protocols, and may facilitate the management of or trading in the portfolio). Certain aggregators may also function as an aggregator of aggregators, for example, by scanning various DEX aggregators to identify the best trade terms available. Aggregators may charge a fee for their services, which is added to the fee(s) that are otherwise charged by the protocols with which they interact.

DeFi: The Big Picture (Enterprise Level Viewpoint)

Importantly, as the 2022 Report points out, DeFi protocols (and the smart contracts that they use) typically are only one component of a larger enterprise that carries out the provision of any particular product or service. At the enterprise level viewpoint, persons and entities are engaging in real-world activities, facilitated through the use of various technologies (both on-chain and off-chain) to provide financial products and services. Those persons and entities at the enterprise level are described in the 2022 Report as the

and authorities. See FSB, REGULATION, SUPERVISION AND OVERSIGHT OF "GLOBAL STABLECOIN" ARRANGEMENTS (Oct. 2020), available at <https://www.fsb.org/wp-content/uploads/P131020-3.pdf>; see also BIS, THE CRYPTO ECOSYSTEM: KEY ELEMENTS AND RISKS 7 (July 2023), available at <https://www.bis.org/publ/othp72.pdf> (discussing a number of shortcomings that threaten stablecoins' claims to stability, including that the quality and transparency of reserve assets is often lacking).

¹² 2022 Report, *supra* note 5, at 15-16.

Big Picture. There are a number of primary participants involved at the enterprise level, including those engaging in capital formation, development, and deployment of the components necessary to provide a product or service (such as founders, developers, and foundations); those investing in and using the product or service (such as investors, traders, lenders, and borrowers); those contributing to the ongoing operations of the enterprise (including those with control or sufficient influence over the governance of the enterprise); and those providing infrastructure and services around the product or service (such as oracles, bridges, and miners/validators). Each of the stakeholders in any particular arrangement plays an important role and generally expects to earn a profit through participation. As regulators determine appropriate regulatory touchpoints, they will likely find it useful to examine any particular DeFi arrangement and activity at the enterprise level.

In analyzing DeFi arrangements and activities at the enterprise level, it is important to note that, although persons and entities may be using technologies to conduct their business operations in ways that may differ in certain respects from traditional providers, the products and services they provide do not materially differ from those in traditional markets.¹³ Upon close examination, these stakeholders and their roles, and the organizational, technological, and communication mechanisms they use, tend to mimic those that regulators are used to seeing in traditional finance. Therefore, the choices of persons, for example, to organize as a Decentralized Autonomous Organization (DAO) (instead of incorporating); to communicate using internet-based communications platforms (instead of meeting in a physical location or boardroom); to issue crypto-assets (instead of engaging in more traditional forms of fund raising); and to deploy code using computers organized in a peer-to-peer network structure (instead of using a server-client network structure), do not abdicate these persons and entities of their regulatory responsibilities. Regardless of the labels, organizational forms, or technologies used, persons and entities who provide financial products and services are subject to applicable laws.

The *Big Picture* diagram in ANNEX D (reproduced from the 2022 Report) illustrates a common scenario describing participants and activities in DeFi. It can serve as a useful guide for regulators as they analyze any particular DeFi product or service at the enterprise level.

B. Growth of DeFi and the Impact of Recent Market Developments on DeFi Investors and Markets

¹³ See FSB, THE FINANCIAL STABILITY RISKS OF DECENTRALISED FINANCE 1 (Feb. 2023) available at <https://www.fsb.org/wp-content/uploads/P160223.pdf> [hereinafter “FSB DeFi Report”] (“While the processes to provide services are in many cases novel, DeFi does not differ substantially from TradFi in the functions it performs.”).

Fuelled by the use of stablecoins and an influx of participants through centralized crypto-asset platform on-ramps, the combined Total Value Locked (TVL)¹⁴ of the DeFi ecosystem rose dramatically in 2021 and reached a reported all-time high of approximately \$180 billion in November 2021. However, the occurrence of several significant crypto-asset market events since the publication of the 2022 Report have had an impact on the DeFi ecosystem, which has led to investor losses and market disruptions. These events have revealed vulnerabilities in the broader crypto-asset market and have demonstrated the close but often hidden interconnectedness and interdependencies between and among crypto-asset market participants across the crypto-asset ecosystem, including DeFi arrangements and activities. These events demonstrate that shocks to one part of the crypto-asset market, including from events occurring on centralized crypto-asset platforms and involving stablecoins, as well as shocks to traditional financial markets, likely will have spill-over effects into DeFi, impacting investors and the markets.¹⁵

For example, in 2022, the algorithmic stablecoin¹⁶ Terra USD and its associated LUNA token death spiraled, reportedly resulting in billions of dollars in outflows from DeFi applications associated with Terra, as well as the halting of the Terra blockchain.¹⁷ Also in 2022, the insolvency of FTX, at the time one of the largest centralized crypto-asset platforms globally, reportedly impacted certain DeFi protocols and ecosystems with which FTX was associated or had supported, and also impacted FTX's customers, counterparties and investors, with propagating effects into DeFi protocols with whom those parties had interlinkages.¹⁸ In 2023, a New York State supervisory action ordering Paxos Trust Company to cease minting the stablecoin BUSD reportedly caused certain centralized platforms and DeFi protocols to limit the use of BUSD, with some DeFi protocols taking

¹⁴ Total Value Locked (TVL) is an industry reported measure calculated by multiplying the token market value by the number of tokens deposited into a particular DeFi protocol, blockchain, or ecosystem. While TVL has become a metric for gauging interest in a particular crypto-asset sector and can be looked to in a relative sense, it will change with the market value of the tokens it counts and may “double-count” tokens.

¹⁵ See FSB DeFi Report, *supra* note 12, at 18.

¹⁶ An “algorithmic stablecoin” is a stablecoin that purports to maintain a stable value via protocols that provide for the increase or decrease of the supply of the stablecoin in response to changes in demand. See FSB, HIGH-LEVEL RECOMMENDATIONS FOR THE REGULATION, SUPERVISION AND OVERSIGHT OF GLOBAL STABLECOIN ARRANGEMENTS 17 (July 2023), available at <https://www.fsb.org/wp-content/uploads/P170723-3.pdf>.

¹⁷ See, e.g., Krisztian Sandor & Ekin Genç, *The Fall of Terra: A Timeline of the Meteoric Rise and Crash of UST and LUNA*, COINDESK (Dec. 22, 2022, 4:07 pm), <https://www.coindesk.com/learn/the-fall-of-terra-a-timeline-of-the-meteoric-rise-and-crash-of-ust-and-luna/>.

¹⁸ FTX operated (and other centralized crypto-asset platforms operate) as a multifunctional crypto-asset intermediary, which typically provides a vertically integrated suite of products and services within one entity or group of affiliated entities. This operational structure poses significant risks. See CDA Report (describing in detail the significant risks presented by such operational structure). The interconnectedness and interdependencies of centralized crypto-asset platforms with DeFi arrangements and activities, detailed herein and in the 2022 Report, exacerbate risks in DeFi.

steps to freeze their BUSD markets.¹⁹ Also in 2023, the failure of a US regional bank that offered deposit services to a stablecoin issuer contributed to a temporary de-pegging of the stablecoin because of uncertainty about the issuer's access to its deposits.²⁰ This, in turn, caused disruptions in the DeFi markets. These recent events and their respective impacts in DeFi are explained in greater detail in ANNEX A to this report.

Each of these consequential events had a noticeable impact, not only on particular DeFi arrangements and activities at the time of their occurrence (or shortly thereafter), but on the entire DeFi ecosystem as well. In the first week of May 2022, before the collapse of Terra USD/LUNA, the reported combined TVL of the DeFi ecosystem was approximately \$140 billion. By May 14, 2022, that number fell to approximately \$80 billion. In the wake of FTX's collapse, the reported combined TVL fell further to approximately \$40 billion. Reported combined TVL has thus far somewhat stabilized in 2023, fluctuating with the volatility of its underlying crypto-assets, but has remained at approximately only a third of the level it was in April 2022 before Terra USD/LUNA's collapse.²¹

C. DeFi Exploits, Attacks and Illicit Uses

The 2022 Report discussed vulnerabilities associated with products and services that rely on DLT-based arrangements and activities. This report explores in greater depth in ANNEX B how cyber exploits and attacks continue to target these vulnerabilities and have resulted in massive losses for investors and other DeFi participants. Vulnerabilities can exist, for example, in blockchain networks, smart contracts and protocols, governance mechanisms, oracles, and cross-chain bridges. At a high level, exploits and attacks in DeFi target access control points. When such points are compromised, an attacker can, for example, commandeer the ability to alter token balances, interfere with governance processes, change the initial parameters and functionality of a smart contract, and circumvent protections such as multi-signature (multi-sig) procedures.

According to one blockchain analytics firm, attacks on DeFi protocols in 2022 accounted for 82.1% of all crypto-assets stolen by hackers — a total of \$3.1 billion — up from 73.3% in

¹⁹ See *New York regulator says Paxos unable to "safely" issue Binance's stablecoin*, REUTERS (Feb. 13, 2023, 10:01 am), <https://www.reuters.com/article/fintech-crypto-binance-stablecoin/new-york-regulator-says-paxos-unable-to-safely-issue-binances-stablecoin-idUSL8N34T42O>.

²⁰ See FSB, GLOBAL REGULATORY FRAMEWORK FOR CRYPTO-ASSET ACTIVITIES UMBRELLA PUBLIC NOTE TO ACCOMPANY FINAL FRAMEWORK 5 (July 2023), available at: <https://www.fsb.org/2023/07/fsb-global-regulatory-framework-for-crypto-asset-activities/>; see also BIS, THE CRYPTO ECOSYSTEM: KEY ELEMENTS AND RISKS 15 (July 2023), available at <https://www.bis.org/publ/othp72.pdf> ('The fall in crypto prices that started in the second half of 2022 did eventually spill over to the traditional financial system. ... These cases highlight that a business model that is highly exposed to crypto can be problematic for the banking sector.').

²¹ See DEFILLAMA, <https://defillama.com/>. The total market value of crypto-assets reportedly reached nearly \$3 trillion in mid-November 2021, but has declined to approximately one-third that value currently. See, e.g., CoinGecko, Cryptocurrencies Global Charts, available at <https://www.coingecko.com/en/global-charts>.

2021. Of that \$3.1 billion, 64% was attributable to attacks on cross-chain bridges.²² Another blockchain analytics firm reported that nine of the ten largest attacks occurred against DeFi projects.²³ Reports indicate that hacker groups associated with North Korea are among the most prolific.²⁴ Reportedly, North Korean-linked hackers have stolen \$1.1 billion in crypto-assets through hacks of DeFi protocols.²⁵

Recent reports also assert that DeFi protocols increasingly are used for money laundering and other illicit uses.²⁶ Reports describe the use of DeFi protocols as a means to convert stolen crypto-assets of one type for crypto-assets of another type that is more liquid or less volatile and, eventually, these crypto-assets can be converted into fiat currencies at centralized crypto-asset trading platforms. One blockchain analytics firm estimates that hackers holding stolen crypto-assets send a majority of those funds (57%) to DeFi protocols.²⁷ A recent report by the Financial Action Task Force (FATF) found that crypto-assets pose money laundering, terrorist financing, and proliferation financing risks, including abuse by sanctioned actors.²⁸

D. Data Gaps and Challenges

Despite the existence of publicly available blockchain data and blockchain data analytics providers, regulators (and investors) face significant data gaps and challenges in understanding DeFi. Proponents of DeFi often claim that blockchain ecosystems are

²² CHAINALYSIS, THE 2023 CRYPTO CRIME REPORT (Feb. 2023), available at <https://go.chainalysis.com/2023-crypto-crime-report.html>.

²³ TRM, ILLICIT CRYPTO ECOSYSTEM REPORT: A COMPREHENSIVE GUIDE TO ILLICIT FINANCE RISKS IN CRYPTO 32 (June 2023), available at <https://www.trmlabs.com/illicit-crypto-ecosystem-report-2023#:~:text=TRM%20Labs%20data%20indicates%20that%20cryptocurrency%20wallets%20that%20receive%20victim,large%20transnational%20organized%20crime%20groups>.

²⁴ See, e.g., FATF, TARGETED UPDATE ON IMPLEMENTATION OF THE FATF STANDARDS ON VIRTUAL ASSETS AND VIRTUAL ASSET SERVICE PROVIDERS 3 (June 2023), available at <https://www.fatf-gafi.org/en/publications/Fatfrecommendations/targeted-update-virtual-assets-vsps-2023.html> (“Recent reports raise serious concerns about the threat posed by the Democratic People Republic of Korea’s (DPRK) illicit VA-related activities, including ransomware attacks and sanctions evasion, for financing the proliferation of weapons of mass destruction. This activity has enabled an unprecedented number of recent launches of ballistic missiles (including inter-continental ballistic missiles). This threat is significant given both the scale of the funding (USD 1.2 billion worth of stolen VAs since 2017, including VAs stolen from DeFi arrangements) and the serious consequences of proliferation financing.”) (internal citations omitted).

²⁵ CHAINALYSIS, *supra* note 21, at 60.

²⁶ See *id.*; U.S. DEPT OF THE TREASURY, ILLICIT FINANCE RISK ASSESSMENT OF DECENTRALIZED FINANCE (Apr. 2023), available at <https://home.treasury.gov/system/files/136/DeFi-Risk-Full-Review.pdf>.

²⁷ CHAINALYSIS, *supra* note 21.

²⁸ FATF, *supra* note 23, at 4 (“[DeFi] ... pose[s] money laundering, terrorist financing and proliferation financing risks, including abuse by sanctioned actors. ... Both jurisdictions and the private sector should strengthen efforts to monitor these risks, share approaches, and identify challenges to mitigate such risks, in addition to implementing the FATF Standards.”).

completely transparent, given that smart contract code purportedly is publicly accessible and that activity on a blockchain is publicly observable. However, certain aspects of the DeFi ecosystem remain opaque and the data that is publicly accessible is difficult to access and interpret.

There exist several challenges to the accessibility and interpretability of relevant data, including:²⁹

- **Required skills and infrastructure:** Accessing, cleaning, and standardizing data for analysis, including operational data sets from DeFi protocols and market data sets from the DeFi market more broadly, requires sophisticated software engineering and data science skills, as well as infrastructure. Interpreting and extracting insights from DeFi data sets also requires specific skills and infrastructure, including both financial market-related skills for traditional financial analysis, as well as computer science-related skills to interpret code and develop the necessary data pipeline and analytical infrastructure. Various datasets and analytical tools are also needed. In addition, while industry proponents claim that smart contracts are transparent, in practice the source code for smart contracts implemented on blockchains are in machine-readable (not human-readable) format, may not conform to public descriptions of the code (either in plain text or in a GitHub or GitLab repository of code), and in some cases may be subject to change by the smart contracts' developers.³⁰ As a consequence, what is *written* to a blockchain may need to be analyzed to determine whether it actually reflects what it is purported to represent.³¹ Enhancements to the skills, datasets, and tools necessary to analyze DeFi data could improve a regulator's ability to oversee DeFi arrangements and activities.
- **Lack of standardization:** The lack of standardization across DeFi datasets and codebases makes it difficult to collect, reconcile, and analyze data across protocols, blockchains and markets.³² Data providers may have materially different methodologies for aggregating data and calculating metrics. In addition to the lack of standardization in data sets, there is a lack of standardization in code used to develop DeFi protocols. For example, while there are open-source standards that describe the basic functionality for certain aspects of a token (e.g., ERC-20 standard) or DeFi service

²⁹ The Financial Stability Board has also discussed data challenges in a recent report. See FSB, *supra* note 12.

³⁰ Certain publicly available tools can be used, for example, to compile purported source code from GitHub for comparison to a smart contract's on-chain bytecode; however, use of such tools requires expertise and could require some standardization of data prior to using such a tool.

³¹ For example, the US Securities and Exchange Commission recently filed a case alleging that, among other things, the promoters of a particular DeFi project merely uploaded transaction details to a blockchain, falsely claiming that the transactions had been processed and settled on the blockchain, when in reality they reflected payments made through traditional means off-chain. See <https://www.sec.gov/litigation/complaints/2023/comp-pr2023-32.pdf>.

³² An example of operational data includes the number of addresses interacting with the protocol. An example of market data includes the volume of token swaps within a liquidity pool.

(e.g., liquidity pair smart contract), developers frequently modify code to provide additional functionality for their DeFi protocol. These modifications require analysts to examine each protocol individually to understand and extract relevant information. Compounding this complexity is the *composability* of smart contracts, which allows integrations between DeFi protocols or other smart contracts to create new systems or outputs. Composability can result in risks due to the various methods of integration and the reuse of existing software components. Further moves toward standardization across DeFi data sets and codebases could assist regulators in understanding and assessing DeFi arrangements and activities.

- ***Pseudonymity and Off-chain Activity:*** Another challenge to data analytics is the pseudonymous nature of transactional data on-chain and the opacity of data off-chain. Opacity can be exacerbated by the practice of market participants using multiple pseudonymous addresses to obfuscate their activity. This can lead to challenges in assessing, for example, levels of retail investor participation, concentrations in the market, interconnectedness within DeFi or to the broader financial ecosystem, or risks posed by a given market participant or activity. Improvements to recordkeeping and reporting could alleviate challenges to data analytics.

Such data gaps and challenges are pervasive in the DeFi ecosystem and are explored in greater detail in ANNEX C.

E. Key Risks and Considerations

As the 2022 Report noted, although DeFi has been presented as providing certain benefits, it also presents numerous risks to participants, including to investors and the markets, currently and as it is developing. In some jurisdictions, participants in the DeFi market may be operating in non-compliance with applicable laws and regulations. In others, participants may be operating outside the scope of existing regulatory frameworks. The 2022 Report identified key investor and market protection risks known in DeFi at that time and gave a detailed description of many of those risks, including risks arising from: asymmetry and fraud, market integrity issues, front-running (or similar activities), flash loans, market dependencies, use of leverage, illicit activity, operational and technology-based issues, cybersecurity issues, nascent stage of development, governance mechanisms, and the spill-over of risks to centralized/traditional markets. The risks identified in the 2022 Report continue to exist in DeFi today.

Events and trends observed since the 2022 Report have highlighted risks attendant to DeFi and the crypto-asset markets more broadly, including from market interconnectedness and interdependencies, the use of leverage, unpredictable and opaque governance structures, as well as risks from the structures of DLT-based arrangements themselves. The Financial Stability Board (FSB) recently released a report detailing the financial stability risks of DeFi (hereinafter FSB DeFi Report).³³ The FSB DeFi Report describes a panoply of risks, such as operational fragilities, liquidity and maturity mismatches, leverage, and

³³ FSB DeFi Report, *supra* note 12.

interconnectedness, and notes that these risks can be amplified by DeFi's technological features, the high degree of structural interlinkages among participants in DeFi, and from non-compliance with existing regulatory requirements or lack of regulation.³⁴ The FSB DeFi Report notes that, given the nascent and evolving nature of DeFi, severe market integrity issues could lead to potential impacts on financial stability, if the sector grows further and becomes more interconnected with traditional finance and the real economy.³⁵ The FSB DeFi Report specifically cites to the reliance of some DeFi products on continuous investor inflows to remunerate early adopters, a business model recognized as unsustainable.³⁶ A recent Bank for International Settlements (BIS) report concerning key risks of the crypto ecosystem, including DeFi, found that crypto has inherent structural flaws that pose serious risks not only to its own stability and safety, but also to that of the traditional financial system.³⁷

The risk discussion in ANNEX E details some of the investor protection and market integrity risks in the DeFi market, particularly those associated with DeFi governance structures, derivatives and levered strategies, and the use of oracles and cross-chain bridges. More specifically, DeFi governance structures are often opaque, experimental, unpredictable, and/or easy to manipulate. Participation in such structures generally entails engagement with others on a pseudonymous or anonymous basis. This results in a lack of transparency into how governance mechanisms actually operate in practice, obfuscating the identity of controlling persons and masking conflicts and potential collusive behavior. The DeFi market also continues to offer exposure to levered strategies, exposing investors to well-known risks and also those exacerbated by features such as the automated liquidation of positions through smart contracts and hidden interlinkages. Furthermore, DeFi's reliance on connectivity to off-chain data and interoperability through oracles and cross-chain bridges continues to present considerable risks.

³⁴ *Id.* at 16.

³⁵ *Id.* at 23.

³⁶ *Id.*

³⁷ BIS, THE CRYPTO ECOSYSTEM: KEY ELEMENTS AND RISKS 1 (July 2023), available at <https://www.bis.org/publ/othp72.pdf> (“[W]hile DeFi mostly replicates services offered by the traditional financial system, it does not finance any activity in the real economy but amplifies known risks. As growth is driven mainly by the speculative influx of new users hoping for high returns, crypto and DeFi pose substantial risks to (especially retail) investors.”).

SECTION III. RECOMMENDATIONS AND GUIDANCE

The following recommendations have been developed based on information and analysis from the 2022 Report; subsequent events, developments, and analysis; a survey to IOSCO members (the results of which are described in **ANNEX G**); and public source research and outreach to industry, academic and researchers. The recommendations and guidance describe how regulators can analyze DeFi products, services, arrangements, and activities, and are intended to support those authorities in jurisdictions seeking to apply IOSCO's Standards to DeFi through existing regulatory frameworks, as well as those authorities that are considering new frameworks to address any potential gaps in order to achieve regulatory outcomes that are the same as, or consistent with those that are required in traditional financial markets.

In developing the guidance to the recommendations, a mapping was done of common DeFi products, services, arrangements, and activities across the IOSCO Principles for Securities Regulation, which includes a mapping of certain DeFi products, services, arrangements, and activities to those found in traditional finance. The complete mapping is found in **ANNEX E**. Portions of the mapping have been incorporated into the guidance to illustrate how regulators can apply IOSCO Principles through their own regulatory frameworks.

OVERARCHING RECOMMENDATION ADDRESSED TO ALL REGULATORS

Preamble: Intent of the Recommendations

The exposure of investors across the globe to DeFi has grown in recent years, as have investor losses amid regulatory non-compliance, financial crime, fraud, market manipulation, money laundering, and other illegal crypto-asset market activity. Given the similar economic functions and activities of the DeFi market and traditional financial markets, many existing international policies, standards and jurisdictional regulatory frameworks are applicable to DeFi products, services, arrangements, and activities.

IOSCO is issuing these proposed Policy Recommendations to help IOSCO members apply relevant existing IOSCO Standards through their own regulatory frameworks, as appropriate, to DeFi products, services, arrangements, and activities within their jurisdictions. These Recommendations recognize that some jurisdictions have existing regulatory frameworks that encompass DeFi, while other jurisdictions are in the process of developing regulatory frameworks. In addition, in some jurisdictions, the regulatory framework may allocate responsibility for the regulation and oversight of DeFi to a number of regulators that possess discrete and complementary mandates and objectives, to address investor protection and market integrity risks. Each jurisdiction should implement the Recommendations, as they deem appropriate, within their frameworks considering each

regulator's role within those existing or developing frameworks, and the outcomes achieved through the operation of the frameworks in each jurisdiction.³⁸

These Recommendations should be considered by IOSCO members as they apply existing regulatory frameworks (*Existing Frameworks*), or as they are granted new powers and/or are developing new requirements (together *New Frameworks*), to DeFi and related activities in a manner that achieves outcomes across jurisdictions consistent with IOSCO Standards, including the IOSCO Objectives and Principles for Securities Regulation.

These Recommendations and guidance form part of IOSCO's efforts within the broader context of cooperation and coordination with respect to DeFi among international bodies such as the FSB, FATF and the BIS, and between the Standard Setting Bodies such as IOSCO, the Committee on Payments and Market Infrastructures-IOSCO (CPMI-IOSCO) and the Basel Committee on Banking Supervision (BCBS). This should help facilitate a level playing field between crypto-asset markets and traditional financial markets and help reduce the risk of regulatory arbitrage arising from any differences in how the rules are applied and enforced with respect to DeFi and traditional financial markets.

As discussed herein, DeFi products and arrangements may fall within the definitions of securities or other regulated financial instruments in a jurisdiction's Existing Framework or New Framework. However, in jurisdictions where such products and arrangements do not, regulators are encouraged to analyze the applicability and adequacy of their regulatory frameworks, and the extent to which (1) such products and arrangements behave like substitutes for securities or other regulated financial instruments, and (2) investors have substituted securities or other financial instrument investment activities with DeFi investment activities.³⁹

INTEROPERABILITY WITH IOSCO POLICY RECOMMENDATIONS FOR CRYPTO AND DIGITAL ASSET MARKETS

In May 2023, pursuant to its Roadmap, IOSCO published its Policy Recommendations for Crypto and Digital Asset Markets Consultation Report (CDA Report), containing recommendations aimed at the activities performed by crypto-asset service providers (CASPs).⁴⁰ CASPs are service providers that conduct a wide range of activities relating to

³⁸ Given the diversity of operating landscapes across different jurisdictions, the application and/or implementation of the Recommendations can take into account the context of specific legal structures prevailing in each jurisdiction, as well as the respective mandates of individual regulators where relevant. One way for a regulator to accomplish this, through its given mandate and the regulatory frameworks it applies, is to set out clear principles-based expectations for a DeFi participant to meet (which can be supported by regulatory guidance, as appropriate), in order to achieve the same regulatory outcomes articulated in this report.

³⁹ For such jurisdictions, this report may be read and interpreted to mean that the recommendations apply as though the DeFi products and arrangements are within the definition of securities or other regulated financial instruments, and jurisdictions should look to achieve the outcomes set out in the recommendations, as appropriate and consistent with their respective mandates.

⁴⁰ See CDA Report, *supra* note 17, at 1.

crypto-assets,⁴¹ including but not limited to, admission to trading, trading (as agent or principal), operating a market, custody, and other ancillary activities such as services relating to lending/staking of crypto-assets and the promotion and distribution of crypto-assets on behalf of others. These service providers can exist as centralized crypto-asset service providers, which operate under traditional corporate forms, and they can also exist in DeFi, where said activities can be carried outside of traditional corporate forms.

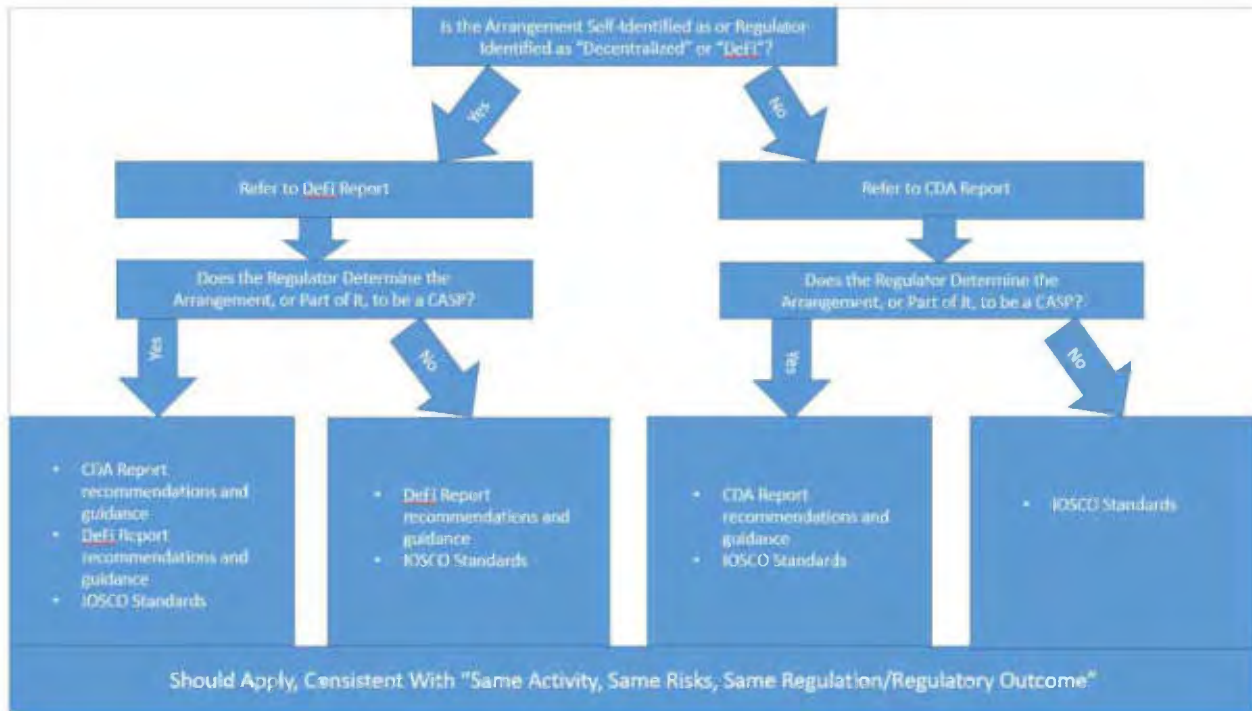
The delineation between centralized and decentralized finance (or CeFi and DeFi) is more a spectrum than a bright line. In the crypto-asset markets, along a spectrum of arrangements, persons and entities typically engage in financial activities that substantially mirror traditional financial activities. They do so using a number of technologies including, to varying degrees, DLT. However, regardless of the organizational form or technologies used, these persons and entities should be treated in line with the guiding principle of “same activity, same risk, same regulatory outcome.”

IOSCO recognizes that regulatory touchpoints are readily identifiable where persons and entities are organized in traditional corporate forms. However, as noted, persons and entities who provide DeFi products and services attempt to arrange and distribute their operations outside of traditional corporate forms. Thus, it is possible that, in certain instances, it may be more challenging to identify regulatory touchpoints to which regulatory obligations may be applied. This report is thus intended to foster a deeper understanding of the DeFi market as currently operating to assist regulators with their analysis.

The recommendations and guidance in this report should be applied to a particular arrangement if it identifies itself or is identified by a regulator as decentralized. This report provides a diagnostic (i.e., understanding the facts and circumstances of an activity) and prognostic (i.e., understanding the investor risks and market risks posed by the activity) approach to examining and assessing DeFi arrangements, such that for a particular activity and its risks, regulators can apply the same regulation or aim to achieve the same regulatory outcome.

To the extent a regulator, applying the recommendations in this report, determines that a particular DeFi arrangement, or a part of that arrangement, falls within the scope of the definition of a CASP, the CDA Report recommendations will also apply to the CASP and the provision of related regulated activities. Thus, whatever form or organization the CASP takes, if a person or entity is a CASP in a particular jurisdiction, the recommendations of the CDA Report will also apply to the CASP. The flow chart below illustrates the interoperability of the CDA Report and this DeFi report:

⁴¹ The term “crypto-asset,” also sometimes called a “digital asset,” refers to an asset that is issued and/or transferred using DLT, including, but not limited to, so-called “virtual currencies,” “coins,” and “tokens.” To the extent digital assets rely on cryptographic protocols, these types of assets are commonly referred to as “crypto-assets.”



Markets participants are strongly encouraged to carefully consider the expectations and outcomes articulated through the proposed recommendations and the respective supporting guidance, including, for CASPs, the recommendations and guidance in the CDA Report.

Recommendation 1 – Analyze DeFi Products, Services, Arrangements, and Activities to Assess Regulatory Responses

A regulator should analyze DeFi products, services, arrangements, and activities occurring or located within its jurisdiction with a view to applying its Existing Framework or New Framework, as appropriate, in accordance with the principle of “same activity, same risk, same regulatory outcome.” To do so, a regulator should aim to achieve a holistic and comprehensive understanding of such DeFi products, services, arrangements, and activities. A regulator should assess what technological knowledge, data, and tools the regulator needs to understand, and analyze DeFi products, services, arrangements, and activities to inform regulatory responses.

Guidance

Understanding DeFi products, services, arrangements, and activities occurring or located within a jurisdiction is critical to determining the appropriate regulatory response, including, the potential application of IOSCO Standards through applicable regulatory frameworks.

The 2022 Report recognized that a comprehensive understanding of the regulatory implications arising from DeFi requires analyzing the totality of the DeFi ecosystem as it exists currently, its interrelationship with centralized crypto-asset platforms and service

providers and traditional markets and activities as well as anticipating how it may continue to develop in the future. Developing a comprehensive understanding involves identifying and analyzing, among other things, the structural components of DeFi products, services, arrangements, and activities; the roles of each of the participants involved, including their incentives and motivations; how participants engage with the various components and each other; and the roles that centralized crypto-asset platforms and service providers play.

In assessing whether a particular product, service, arrangement or activity falls within a regulator's jurisdictional remit, ideally the regulator should aim to gain a holistic understanding of the particular product, service, arrangement and activity at (i) an enterprise level (i.e., based on the factual and substantive economic reality), (ii) a functional level, and (iii) a technical level.

The regulator should seek to understand the DeFi arrangement at the economic reality level, or the “enterprise level.” In so doing, the regulator should seek to understand how each of the participants involved in the particular DeFi arrangement are involved at all stages in the life-cycle of the arrangement. For example, the regulator should seek to ascertain how the particular arrangement was developed and founded, promoted and funded, and how it is operated, used and maintained. The regulator should seek to ascertain how income, revenues and profits are generated, including any fee structures. This includes understanding the life-cycle of any associated tokens. The regulator should also seek to understand the interrelationship of each of the participants with each other, including centralized crypto-asset platforms and traditional markets and activities. The *Big Picture* diagram (depicted in **ANNEX D**) and the 2022 Report identify and describe various participants, and their activities, fund flows, and interrelationships. The *Big Picture* diagram and 2022 Report can serve as guides to a regulator seeking an economic reality or enterprise level view of any particular arrangement in DeFi. Critically, the regulator should seek to ascertain how decisions are made at the enterprise level. In many cases, identifying who exercises control or sufficient influence at the enterprise level will reveal existing or potential regulatory touchpoints.

When examining any particular DeFi arrangement, a regulator could consider a review of publicly available information concerning the DeFi arrangement, including from sources such as websites, white papers, industry reports, and social media. They could also consider engaging with persons involved with or associated with the arrangement, as well as experts, academics, researchers and public advocacy groups, as appropriate. Further, they could consider using available investigatory tools and techniques to gather additional information, including relevant information sharing arrangements with other authorities located within and outside their jurisdiction.

A regulator should also seek to analyze the DeFi arrangement at the functional level. A regulator should seek to understand the activities being conducted by or through the DeFi arrangement and, in particular, what products and/or services are being provided. Many of the financial products and services in DeFi mirror, and in some cases overlap with, more traditional securities and other regulated financial instruments and related products

and services. A potential starting point for this analysis is to map the particular DeFi arrangement to traditional financial products and services. The 2022 Report, which includes comparisons between DeFi activities and traditional financial activities, can serve as a starting point for analysing the common types of DeFi arrangements. The mapping in the guidance under Recommendation 3 below can provide further assistance.

A regulator also could seek to analyze the DeFi arrangement at the technical level, if feasible. Although analysis at the technical level requires the necessary knowledge, data and tools, such analysis is helpful to fully understand and analyze DeFi products, services, arrangements, and activities. This type of analysis requires understanding the relevant technologies in the *tech stack* associated with the DeFi arrangement.⁴² For example, regulators may seek to understand how the *settlement layer* blockchain operates, including what type of consensus mechanism the settlement layer uses, the concentration of participants in the consensus mechanism, and to what degree they may impact the functioning of a smart contract or protocol, including through the inclusion or ordering of transactions (in connection with *maximal extractable value* (MEV) strategies) or by exerting some other control over the DeFi arrangement. The analysis may also include an understanding of how the arrangement's associated smart contracts work, what other technologies and processes the arrangement relies upon (on-chain and off-chain, including bridges and oracles), and what role particular crypto-assets play in the operation of the arrangement. It may also require an understanding of how, technologically, a user interacts with the arrangement, i.e., through various user interfaces, and how those interfaces are controlled and maintained.

Regulators may need to consider whether they have the appropriate resources to evaluate DeFi products, services, arrangements, and activities. Regulators should assess whether there are limitations on their ability to identify appropriate participants that may be subject to regulation. If there are any such limitations, regulators should assess the cause for the limitation – whether regulatory, legal, resource/knowledge-based, or otherwise – and whether and how those can be addressed. If a regulator lacks the capacity to undertake a technical level analysis, the regulator could consider how it might augment its capacity or seek technical assistance.

Further, regulators should seek methods to obtain verifiable data and information about DeFi products, services, arrangements, and activities as they engage in such analysis. This may include the use of blockchain analytical tools and techniques for on-chain data and the use of supervisory, examination and investigatory tools and techniques for on-chain and off-chain data. When considering crypto-asset related data, it is important to bear in mind that on-chain data can be difficult to decipher without the required tools and expertise and is often pseudonymous or anonymous. Off-chain data, such as that available from crypto-asset trading platforms, typically is not audited or otherwise verified. **ANNEX C** provides a detailed analysis of data gaps and challenges in DeFi.

⁴² See 2022 Report, *supra* note 5, at 3-4.

Regulators could consider how best to communicate and engage with DeFi market participants and others (such as academics, researchers, and public policy groups) as they evaluate DeFi products, services, arrangements, and activities within their jurisdictions and apply existing or new frameworks.

Recommendation 2 – Identify Responsible Persons

A regulator should aim to identify the natural persons and entities of a purported DeFi arrangement or activity that could be subject to its applicable regulatory framework (Responsible Person(s)).⁴³ These Responsible Person(s) include those exercising control or sufficient influence over a DeFi arrangement or activity.

Guidance

Responsible Person(s) generally are persons and entities that provide or actively facilitate the provision of products or services. Responsible Person(s) include those that maintain control or sufficient influence over a particular DeFi arrangement or activity.⁴⁴ Regulators can consider, for example, those with design and maintenance control; financial and economic control; and formal and legal control, among other things. In many cases, those who have control or sufficient influence over a particular activity at the enterprise level (see Recommendation 1 above) will also be Responsible Persons.

In conducting this analysis, a regulator should carefully examine any claim that the arrangement or activity is purportedly *decentralized* to the point that no persons or entities are responsible and should subject Responsible Persons to its applicable regulatory

⁴³ Responsible person(s) is meant broadly, to encompass, for example, natural persons, groups of persons, entities and organizations, whether formally or informally constituted.

⁴⁴ See also FATF, UPDATED GUIDANCE FOR A RISK-BASED APPROACH, VIRTUAL ASSETS AND VIRTUAL ASSET SERVICE PROVIDERS 27 (2021), available at: <https://www.fatf-gafi.org/en/publications/Fatfrecommendations/Guidance-rba-virtual-assets-2021.html> (“[C]reators, owners and operators or some other persons who maintain control or sufficient influence in the DeFi arrangements, even if those arrangements seem decentralized, may fall under the FATF definition of a [Virtual Asset Service Provider (‘VASP’)] where they are providing or actively facilitating VASP services. This is the case, even if other parties play a role in the service or portions of the process are automated. Owners/operators can often be distinguished by their relationship to the activities being undertaken. For example, there may be control or sufficient influence over assets or over aspects of the service’s protocol, and the existence of an ongoing business relationship between themselves and users, even if this is exercised through a smart contract or in some cases voting protocols. Countries may wish to consider other factors as well, such as whether any party profits from the service or has the ability to set or change parameters to identify the owner/operator of a DeFi arrangement. These are not the only characteristics that may make the owner/operator a VASP, but they are illustrative. Depending on its operation, there may also be additional VASPs that interact with a DeFi arrangement.”). Indicia of control or influence can include, for example, ownership interest; significant financial interest; significant voting rights; management of or the ability to impact the operations of the protocol at an enterprise or fundamental level; the ability to set permissions or access rights for users of the protocol, or to otherwise impact the rights of other users of the protocol; control over user assets; and the ability to enter into agreements for the protocol or enterprise. What constitutes control may also depend on the relevant regulations in a jurisdiction.

framework. In assessing who is a Responsible Person, rather than relying on labels or concepts such as *decentralization* or the automated nature of smart contracts in DeFi arrangements, a regulator should evaluate all the facts and circumstances, including: (a) the roles of natural persons and entities in a DeFi arrangement and how those persons and entities interact with each other and how those roles may evolve over time; (b) the ability of those natural persons and entities, such as developers or foundations or decentralized autonomous organizations (DAOs), to control or influence the arrangement, including through actions that would impact a smart contract, protocol, or the enterprise level operations of any particular DeFi arrangement; (c) whether there are other parties exercising control or influence over the DeFi arrangement, such as venture capital firms, large investors, or governance/voting token holders or voters; (d) the economics of the arrangement, including financial incentives for participation, such as who is receiving investments and returns on investment, fees, payments for development or governance activities, or payments from inventories or treasuries; and (e) how a regulator might apply regulatory oversight over these natural persons or entities.⁴⁵

When considering persons and entities that may be Responsible Persons, it is important to note that governance mechanisms currently used for DeFi arrangements are not self-implementing. Human involvement typically is necessary to effectuate governance decisions, or to translate and implement proposals to make changes to a project's protocol, smart contracts or other code into usable code. So those making such proposals often must rely on others with technical control and skill (i.e., administrative access and requisite technical capability) to implement governance decisions. Code could also be designed and updated through the deployment of automated methodologies – including those that utilize artificial intelligence or other technologies. For such cases, the person or entity that is responsible for deploying or using such methodologies could also be considered in the assessment of Responsible Persons. ANNEX D gives a detailed analysis of how governance currently operates in DeFi and can be a useful starting point for an analysis.

Depending upon the facts and circumstances, such Responsible Person(s) can include, for example:

- founders and developers of a project;

⁴⁵ *Id.* at 27 (“[C]ountries will need to evaluate the facts and circumstances of each individual situation to determine whether there is an identifiable person(s), whether legal or natural, providing a covered service. Marketing terms or self-identification as a DeFi is not determinative, nor is the specific technology involved in determining if its owner or operator is a [Virtual Asset Service Provider (VASP)]. Countries should apply the principles contained in the Standards in a manner that interprets the definitions broadly, but with regard for the practical intent of the functional approach. It seems quite common for DeFi arrangements to call themselves decentralized when they actually include a person with control or sufficient influence, and jurisdictions should apply the VASP definition without respect to self-description. Countries should be guided by the principle that the FATF intends to cover natural or legal persons who conduct the financial services covered in the definition as a business. If they meet the definition of VASPs, owners/operators should undertake ML/TF risk assessments prior to the launch or use of the software or platform and take appropriate measures to manage and mitigate these risks in an ongoing and forward-looking manner.”).

- issuers of governance/voting tokens;
 - holders and/or voters of governance/voting tokens;
 - DAOs or participants in DAOs;
 - those with administrative rights to smart contracts and/or a protocol (i.e., with the ability to alter the coding or operation of the protocol to some degree);
 - those who have or take on the responsibility of maintaining/updating the protocol or other aspects of the project, such as access rights;
 - those with access to material information about the protocol or project to which other participants lack access;
 - those who are promoting use of the protocol through, for example, providing a user interface or otherwise facilitating interaction with the protocol, and/or releasing updates to the protocol;
 - those with custody (or effective control through an administrative key, voting structure, or otherwise) over user funds or assets, or with the ability to reverse transactions; and
 - those who are profiting, for example, through fees paid by users of the protocol.

Once a regulator identifies Responsible Persons, their activities should be assessed using Existing Frameworks or New Frameworks, as appropriate, in accordance with the principle of “same activity, same risk, same regulatory outcome.”

Recommendation 3 – Achieve Common Standards of Regulatory Outcomes

A regulator should use Existing Frameworks or New Frameworks to regulate, supervise, oversee, and address risks arising from DeFi products, services, arrangements, and activities in a manner consistent with IOSCO Standards. The regulatory approach should be functionally based to achieve regulatory outcomes for investor protection and market integrity that are the same as, or consistent with, those that are required in traditional financial markets.

Guidance

DeFi products, services, arrangements, and activities that involve regulated financial instruments, including securities, in a particular jurisdiction should be subject to applicable laws. Regulators should consider how best to apply their Existing Frameworks or New Frameworks to DeFi products, services, arrangements, and activities. This may include, among other things, IOSCO Standards and laws applicable to issuers, exchanges, trading systems, market intermediaries (including brokers, dealers, investment advisors, custodians, clearing agencies, transfer agents, settlement services, and other service providers), as well as collective investment schemes, hedge funds and other private investment vehicles. The mapping below provides examples of such products, services,

arrangements, and activities that may fall within the scope of securities or other financial instrument laws. The mapping in ANNEX F details how the IOSCO Standards apply generally to DeFi products, services, arrangements, and activities.

In particular, the regulatory approach relating to DeFi should seek to achieve regulatory outcomes for investor and customer protection and market integrity that are the same as, or consistent with, those that are required in traditional financial markets. Regulators should also consider whether existing requirements need to be tailored or adapted to address DeFi-specific features and risks.

- **Investor protection:** A regulator should assess whether their regulatory framework requires material disclosures about DeFi products, services, arrangements, and activities and, if so, who provides them and how. Full, timely and accurate disclosure of material financial and non-financial information provides investors with information about the issuer, the risks and costs of investing in or using a particular DeFi product or service, its governance structure, description of applicable laws, and financial results or other information specific to the DeFi product or service. This may include an analysis of how disclosure standards within the jurisdiction apply to offers/sales of crypto assets in DeFi. A regulator should also assess how their regulatory framework would apply to prevent fraud, misconduct, and other risks to investors, such as those arising from conflicts of interest and interconnectedness.
- **Market integrity:** A regulator should also assess whether their regulatory framework imposes market integrity measures, including those relating to orderly trading with respect to a DeFi product, service, arrangement or activity and, if so, who should provide them and how. To the extent any particular DeFi arrangement (or part thereof) is identified as a CASP, the regulator should apply the recommendations as set forth in the CDA Report accordingly.⁴⁶

As regulators consider to what extent IOSCO Standards and regulatory frameworks within their jurisdiction might apply to particular DeFi products, services, arrangements, and activities, regulators should consider whether they replicate or in fact represent those in traditional finance or whether they are different and, if so, how the features of DeFi, such as technological and operational aspects, may impact the manner of applying existing requirements.

Mapping of Common DeFi Products, Service, Arrangements, and Activities to Traditional Finance

The following mapping may be a helpful starting point for determining what DeFi products, services, arrangements, and activities could fall within the remit of any particular

⁴⁶ See CDA Report, *supra* note 17.

jurisdiction. For a more detailed explanation of how common typologies in DeFi mimic traditional finance, see the 2022 Report⁴⁷ and ANNEX F to this report.

Potential Issuers of Financial Instruments, Including Securities: The following are non-exclusive examples of types of DeFi products, services, arrangements, and activities that could involve the issuance of financial instruments, including securities, in certain jurisdictions, or are similar to such activities in others, either currently or in the future:

- Aggregators and DEXs offering and selling their own crypto-assets, including governance tokens, LP tokens or other crypto-assets;
- Lending/borrowing products or services that offer and sell interests in their pools in exchange for crypto-assets. In these cases, market participants deposit crypto-assets into pools in exchange for an interest in the pool. These pool interests are represented by other crypto-assets or tokens that represent the depositor's *pro rata* value of the lending pool. The holder of the pool interest represented by the token can obtain value from it by trading it in secondary markets, borrowing against it, or by presenting it to the pool for redemption of the crypto-asset deposited and all accrued *pro rata* income.
- Lending/borrowing products or services that offer and sell other crypto-assets, such as governance tokens, that may give the holder particular rights, whether to vote on aspects of the lending/borrowing product or service, or other economic interests in the lending/borrowing product or service.
- An AMM or other liquidity pool that offers and sells interests in the pool of crypto-assets that is the AMM. As with the borrowing and lending product tokens that are issued in exchange for crypto-assets deposited in the pools, AMM tokens are also redeemable by the holder for the crypto-asset plus the *pro rata* income from the pool.
- A developer, founder or promotor of DeFi protocols also may directly offer and sell crypto-assets, including in the form of governance tokens, or other crypto-assets. These offers and sales may occur at the initial funding of the protocols or may occur on an ongoing basis with sales of crypto-assets from the treasury of these protocols.
- Aggregators and DEXs also may be involved in offering and selling crypto-assets or tokens of other issuers, thereby participating in distributions of financial instruments, including securities. This may occur through the aggregator or DEX's operations or offerings through which creators or operators of DeFi protocols may distribute governance tokens or other crypto-assets, including crypto-assets that are placed in treasury for distribution.
- The issuance of derivatives, including derivatives/synthetics on traditional financial instruments, as well as the issuance by a cross-chain bridge, wrapping of a token, or in connection with liquid staking.

Potential Market Intermediaries: There are many DeFi products, services, arrangements, and activities that involve market intermediary participants or activities.

⁴⁷ 2022 Report, *supra* note 5.

This includes exchange, broker, dealer, investment advisor, custodian, clearing agency, transfer agent, and settlement activities, as well as providers of other services including proxy advisory and credit rating services. The following are non-exclusive examples of types of DeFi arrangements that could involve market intermediary activities in certain jurisdictions, or are similar to such activities in others, either currently or in the future:

- Aggregators, DEXs, and other products and services facilitate the exchange of crypto-assets. DEXs can involve order book exchanges, through which DEXs are performing functions typically associated with exchanges. DEXs can also use AMMs, also known as liquidity pools, which provide liquidity for trading markets. AMMs may be seen to be acting as liquidity providers or market makers thus engaging in buying and selling activities like brokers or dealers.
- Aggregators and DEXs also provide services to users to enable them to trade with multiple AMMs. These activities are akin to broker or dealer activity as well.
- The operation of lending/borrowing products also may involve broker or dealer activity, particularly to the extent that the crypto-assets in the pool are financial instruments, including securities, and the lending product is engaging in lending activities with respect to the crypto-assets that are financial instruments, including securities.
- Each of the AMMs and the lending products may also be engaging in custodial activities and acting as counterparties, due to the manner in which the products engage in holding customer crypto-assets and trading customer crypto-assets. Whether these products and protocols may be acting as custodians of crypto-assets may depend, in part, on how the crypto-assets are transferred to the smart contracts.
- Aggregators enable users to seek the most favorable terms across a variety of protocols. Aggregators allow users to source bids and offers, monitor prices and execute transactions across multiple protocols and trading platforms from a single interface. These activities likely involve exchange, broker or dealer, or investment advisor activity, depending on the particular facts.
- Yield aggregators are platforms of investment opportunities which, depending on how they are structured, provide the functions of either or both a broker and/or an investment advisor. Some yield aggregators provide a type of asset management which has similar characteristics to automated investment or robo-advisory services.
- Portfolio aggregators' primary functionality gives investors visibility into their current positions and allows them to execute transactions from the aggregator's interface thus providing the functions of a broker or dealer.
- Aggregators specializing in governance protocols may centralize proposals and voting across various DAOs, providing recommendations on how to vote on certain proposals. In this capacity, these types of aggregators may be acting as

proxy advisors, if voting is delegated to the protocol. Investors may exchange their voting right(s) for compensation in such arrangements.

- Promoters of DeFi products or services.

Potential Collective Investment Schemes: DeFi products, services, arrangements, and activities may fall within the scope of collective investment schemes (retail/non-retail), hedge funds and other private investment vehicles. Further, DeFi activities and participants that involve operation, marketing, management and advising with respect to these funds may be subject to laws that apply to such activities in many jurisdictions. The following are non-exclusive examples of types of DeFi activities that could involve collective investment schemes (retail/non-retail), hedge funds or other private investment vehicles, and those who operate, market, manage and advise with respect to such funds in certain jurisdictions, or are similar to such activities and participants in others, either currently or in the future:

- Certain aggregators and DEXs may be creating collective investment schemes, hedge funds or other private investment vehicles through the use of AMM arrangements. For example, AMMs typically provide a means for participants to deposit two or more crypto-assets into a smart contract (or liquidity pool) and receive a crypto-asset representing the interest in the pool (and income therefrom). Market participants are then able to use aggregators, DEXs and other service providers to engage in trading activities with the pools. The pools may constitute collective investment schemes. While some of this activity may involve broker or dealer activity, the activity can also include the provision of investment advice. For example, some aggregators provide services that offer investment opportunities to users, such as by obtaining for users the best prices for crypto-assets.
- Lending/borrowing protocols also may involve collective investment schemes, funds and other private investment vehicles. Lending products are pools of crypto-assets deposited by holders in exchange for another token representing the interest in the pool. The lending product then enables other crypto-asset market participants to borrow the crypto-assets in exchange for interest payments. The pooled nature of these lending products may satisfy the definition of collective investment scheme in many jurisdictions. Operators of lending and borrowing protocols also may be viewed, depending on their structures, as investment advisors or sponsors of the collective investment scheme. Initially at least, these operators set the terms of the smart contract arrangements, such as the crypto-asset pairs available to trade, maintain the algorithm to update interest rates, set utilization rates, and address instances of default, including maintenance of a reserve factor.
- Some DeFi products may be structured and operate as hedge funds (or other private funds, or retail/non-retail collective investment schemes), depending on applicable laws. For example, vaults are a mechanism for retail investors to participate in allegedly on-chain *hedge funds* by deploying capital into single or multi-strategy pools run by smart contracts. The sale of the interests in these pools may be

collective investment vehicles as they are offered to the public or, if limited to institutions, may be hedge funds. There are also hedge funds that invest or interact with DeFi activities, products and services and the IOSCO Standards applicable to hedge funds would apply to these hedge funds as well.

Potential Exchange/Trading Systems: There are DeFi products, services, arrangements, and activities that could involve exchange and trading system activity. This includes exchange and over the counter activities, both in cash (spot) crypto-asset and derivatives markets. The following are non-exclusive examples of types of DeFi activities and participants that could involve exchange and trading system activity subject to regulation in certain jurisdictions, or are similar to such activities in others, either currently or in the future:

- Aggregators and DEXs facilitate the exchange of crypto-assets. DEXs can involve order book exchanges, through which DEXs are performing functions typically associated with exchanges. DEXs can also use AMMs, also known as liquidity pools, that provide liquidity for trading markets.
- Aggregators and DEXs facilitate the trading of crypto-assets. These activities can involve exchange and trading system activities, and also may operate as an issuer or primary distribution mechanism for new tokens or crypto-assets.
- Aggregators and DEXs also may be acting as a market for derivatives. These kinds of derivatives trading activities include providing protection or selling protection against loss (similar to swaps activities), selling synthetic exposures based on the value of other assets (which could include securities), and engaging in *perpetual futures* trading activity.
- Certain lending/borrowing products may act as exchanges or trading systems depending on the particular structure.
- Many protocols enable automated, and often high-speed, trading, often by sophisticated, well-capitalized entities. Algorithmic trading is common in the DeFi space, and bots are employed to run various trading strategies or identify arbitrage opportunities. Oracles and bridges offer connectivity with off-chain data and between DeFi protocols.

Potential Clearing and Settlement Entities: The following are non-exclusive examples of types of DeFi activities and participants that could involve clearing and settlement activity subject to regulation in certain jurisdictions, or are similar to such activities in others, either currently or in the future:

- Aggregators and DEXs use DLT to transfer ownership of crypto-assets. Depending on the particular protocol, these crypto-assets may be held within an associated smart contract, nominally on behalf of the user of the protocol. Changes in ownership of crypto-assets within DEX and AMMs likely involve clearing and settlement activity.

- Lending/borrowing protocols, as with DEXs and AMMs, generally rely on associated smart contracts to hold crypto-assets and to effectuate transfers of crypto-assets in associated lending pools. Changes in ownership of crypto-assets lending/borrowing protocols likely involve clearing and settlement activity.
- The activities of certain types of aggregators may also be viewed as clearing and settlement activity. For example, yield aggregators are platforms of investment opportunities which, depending on how they are structured, can provide the functions of either or both a broker and/or an investment advisor while potentially acting as a central counterparty. These activities may also operate as settlement systems, depositories, or central counterparties depending on their structure.
- Layer 1 blockchains could themselves be carrying out clearing and settlement activities.

Having undertaken the analysis described above, if a regulator determines that the DeFi arrangement (or any aspect of it) falls within its jurisdictional remit, the regulator should apply its regulatory framework in accordance with the principle of “same activity, same risk, same regulatory outcome.”

Regulators may also consider what other laws might apply within their jurisdiction (e.g., data protection, consumer protection, cybersecurity, advertising regulation, legal ownership, etc.) and to what extent they may work with other authorities within their jurisdiction to mitigate risks from DeFi.⁴⁸

Regulators should consider whether applicable frameworks may need to be strengthened, augmented or clarified to address any gaps in applicable frameworks to avoid regulatory arbitrage between traditional financial markets and crypto asset and DeFi markets.

Recommendation 4 – Require Identification and Addressing of Conflicts of Interest

In applying Existing Frameworks or New Frameworks, a regulator should seek to require providers of DeFi products and services and other Responsible Persons, as appropriate, to identify and address conflicts of interest, particularly those arising from different roles and capacities of, and products and services offered by, a particular provider and/or its affiliates. These conflicts should be effectively identified, managed and mitigated. A regulator should consider whether certain conflicts are sufficiently acute that they cannot be effectively mitigated, including through effective systems and controls, disclosure, or prohibited actions. This may

⁴⁸ Regulators should also assess the AML/CFT risks of DeFi arrangements and require adherence to FATF Standards. See FATF, TARGETED UPDATE ON IMPLEMENTATION OF THE FATF STANDARDS ON VIRTUAL ASSETS AND VIRTUAL ASSET SERVICE PROVIDERS 4 (June 2023), available at <https://www.fatf-gafi.org/en/publications/Fatfrecommendations/targeted-update-virtual-assets-vasps-2023.html> (“Jurisdictions should assess illicit finance risks of DeFi arrangements, consider how DeFi arrangements fit into their AML/CFT frameworks, and share their experiences, practices and remaining challenges with the FATF’s global network to mitigate the risk of DeFi arrangements.”).

include requiring more robust measures such as legal disaggregation and separate registration and regulation of certain activities and functions to address this Recommendation.

Many DeFi arrangements and activities today are being conducted in a manner that presents conflicts of interest. DeFi participants may be acting in roles and capacities that create conflicts of interest. Such conflicts can arise, for example, if the provider of a DeFi product or service itself has a financial interest derived from user or third-party activities, an ownership interest in a related third-party, or a favorable arrangement with a particular related party. In particular, the provider may take advantage of their control or influence over the governance of the DeFi arrangement to promote proposals or initiatives that inure to their benefit financially. Conflicts could also arise if the provider is engaged in multiple activities in a vertically integrated matter, either themselves or with affiliated parties. For example, the provider may operate a trading platform while simultaneously being a counterparty to transactions with a user as a market maker or employ technologies like bots or algorithms to transact with users. Indeed, a fundamental conflict may exist if developers, founders and early investors lack the incentive to maintain a project after receiving an initial investment and are instead incentivized to exit the project.

Because of the complexities and opacities in DeFi arrangements, discussed in this report and its Annexes, investors may be unaware that such conflicts may exist. In fact, claims that DeFi is completely transparent due to the public nature of blockchains may mislead investors to believe there are no hidden conflicts, therefore exacerbating risks. Aggressive marketing tactics, behavioral engagement practices, and claims about profitability can further entice investors into arrangements that may put the interests of others over the interests of the investor. These could include the promotion of highly levered strategies or the re-hypothecation of investor assets into a cascade of products and services that may provide benefits to promoters of these strategies in the form of increased fees or kick-backs, for example. It may be unclear to a user the role and capacity in which a provider of a product or service is acting at all times. Concerns around conflicts of interest are further heightened if the provider of the DeFi product or service is in a fiduciary or similar relationship with a user.

A regulator should require Responsible Persons, including providers of DeFi products and services, to be responsible for identifying, managing and mitigating conflicts of interest. A regulator should consider whether certain conflicts are sufficiently acute that they cannot be effectively mitigated, including through effective systems and controls, disclosure, or prohibited actions, and may require more robust measures such as legal disaggregation and separate registration and regulation of certain activities and functions.

A regulator should also seek to require Responsible Persons, including providers of DeFi products and services, to identify, and to the extent practicable, address conflicts of interest that do not directly involve the providers but have an adverse impact on their users/investors.

MEV

There are conflicts of interest that may not directly involve the provider of a DeFi product or service but nevertheless have an adverse impact on the users/investors of the DeFi product or service. One example of such a conflict of interest in the DeFi ecosystem presents itself in connection with certain MEV strategies. Among other things, MEV refers to the exploitation of mempool data⁴⁹ by persons or entities participating in a blockchain's consensus mechanism (i.e., miners, validators, or other participants) to maximize their profit by choosing and sequencing proposed transactions from the mempool and/or inserting other transactions that are added to a block to be appended to a blockchain. However, the ability to reorder, insert, and otherwise control transactions enables conduct that in traditional markets would be considered manipulative and unlawful.⁵⁰ This activity can result in transactions failing to achieve execution on the terms expected. Such activity could take the form of typical MEV exploits, the most common involving "front-running," "back-running," and "sandwich attacks" (see **ANNEX B**):

- "Front-running" occurs when a participant attempts to execute their own transaction before a pending mempool transaction to realize a profit. A miner/validator could execute this attack through re-ordering transactions on a proposed block or a participant might attempt to pay a higher gas fee or collude with a miner/validator to move their transaction ahead of the pending transaction.⁵¹
- "Back-running" occurs when a participant seeks to have their transaction executed immediately after a pending transaction. This might be profitable if the pending transaction is to create a new pair for trading on an AMM. An attacker can employ back-running bots that find a new token pair listing and place a transaction order immediately after the initial liquidity to purchase as many tokens as possible, leaving supply in the market depleted.
- A "sandwich attack" is when a participant places two transactions around, one immediately before and another right after, a pending transaction. Searchers typically use sandwich attacks to extract MEV from unsuspecting traders on decentralized exchanges by manipulating the price of an asset. For example, a trader might identify a token that a victim is about to buy and trades to push the price of the asset up, then sells immediately after the victim's buy order has further increased the price.

⁴⁹ The mempool consists of transactions that are waiting to be processed by the blockchain's miners/validators.

⁵⁰ In certain jurisdictions, these MEV strategies may already be subject to, or prohibited by, existing laws and regulations.

⁵¹ One study calculates the losses due to frontrunning attacks between May 2020 and April 2021 to have amounted to more than \$100 million USD. See Agostino Capponi et al., *Inefficiencies in Public Distributed Ledgers* (Dec. 31, 2021), available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3997796.

- Regulators should seek to hold a provider of a DeFi product or service responsible for identifying and, to the extent practicable, managing and mitigating the impact of MEV strategies used by miners/validators on the underlying blockchain on which the provider chooses to operate or offer the product or service. For example, for a DeFi arrangement that facilitates the trading of regulated financial instruments, the design of the trading mechanism could mitigate the impact of MEV to users/investors trading these instruments. There may be additional conflicts that would need to be addressed if the DeFi product or service provider itself were to have an economic interest in the MEV activity, such as through payment for order flow to certain miners/validators or others.

Recommendation 5 – Require Identification and Addressing of Material Risks, Including Operational and Technology Risks

In applying Existing Frameworks or New Frameworks, a regulator should seek to require providers of DeFi products and services and other Responsible Persons, as appropriate, to identify and address material risks, including operational and technology risks. These risks should be identified and effectively managed and mitigated. A regulator should consider whether certain risks are sufficiently acute that they cannot be effectively mitigated and may require more robust measures to address this Recommendation.

A regulator should require providers of DeFi products and services and other Responsible Persons, as appropriate, to establish and maintain a risk management framework that addresses risks arising from the product or service itself, the participants and arrangement, and the market in which the provider of the product or service operates. Where appropriate and consistent with jurisdictional mandates, regulators could impose regulatory requirements to address the risks through means such as the application of “fit and proper” standards.

DeFi arrangements and activities introduce unique operational and technological risks, including those stemming from the underlying DLT, smart contracts and protocols, governance structures, oracles, and bridges. These risks can arise from any one layer of the tech stack that underlies DeFi, as well as from interdependencies between and among those layers of the tech stack. A detailed description of the DeFi tech stack and inherent technological risks can be found in the 2022 Report and in the Annexes to this report. These include, among others, risks arising from the operational interconnectedness of DeFi, due in part to the composability and modularity inherent to DeFi protocols; the proliferation of exploits targeting vulnerable code across protocols’ similar code; and a concentration of critical service providers and other participants within DeFi. A regulator should consider how such risks can be identified and effectively managed and mitigated.

Regulators should evaluate, as with other automated or software code based activities in traditional financial products and services, how the automation of certain functions in DeFi arrangements works and consider (a) risks posed by the use of unique or different

technology that is not already used in traditional financial markets or otherwise covered by existing regulatory frameworks; (b) how technology, generally, may assist in identifying, managing and mitigating risks in automated products and services; and (c) how regulators may use technology to facilitate supervision and oversight, as appropriate, within a jurisdiction's regulatory framework, and to enhance the IOSCO mandates of investor protection and market integrity.

A provider of DeFi products and services often has control over the smart contracts incorporated into the product or service. A regulator should ascertain what type of control a provider has over a product or service, including through administrative rights to alter smart contracts. A regulator should seek to hold those with control or sufficient influence over the operational or technological features of a DeFi product or service responsible for identifying, managing, and mitigating risks, such as the risk of theft or loss of assets through operational or cybersecurity failures.

A provider of DeFi products and services can rely significantly upon oracles and cross-chain bridges for interoperability with off-chain data or other blockchains. When this is the case, a regulator should consider applying identification, management, and mitigation measures similar to those applied to Responsible Persons in traditional finance, even if certain functionality has been outsourced to affiliated or unaffiliated service providers. In this case, a regulator should consider ways to require the provider to identify, mitigate and manage risk by, for example, requiring adequate due diligence and ongoing monitoring of such service providers, the evaluation, mitigation and management of risks, the implementation of business continuity measures, and the like.⁵²

A regulator should consider whether certain risks are sufficiently acute that they cannot be effectively managed or mitigated and may require more robust measures to address this Recommendation.

Oracles and Bridges

Those who provide DeFi products and services often rely on oracles and cross-chain bridges because blockchains essentially operate in siloed environments. Oracles provide connectivity with off-chain data, such as pricing data. Cross-chain bridges provide connectivity with other blockchains. For example, such a bridge can permit a holder of crypto-assets issued on one blockchain to convert to a crypto-asset usable on another, which may facilitate access to liquidity. Such a bridge can also permit the transmission of data between smart contracts of a protocol that is deployed on multiple blockchains, so as to effectuate certain parameter changes to the protocol. However, oracles and bridges present significant technological and operational risks. Those risks are detailed in **ANNEX E**. For example, both oracles and cross-chain bridges have been prone to significant hacks and exploits. One industry report calculates that DeFi protocols lost

⁵² See IOSCO, PRINCIPLES ON OUTSOURCING (Oct. 2021), available at <https://www.iosco.org/library/pubdocs/pdf/IOSCOPD687.pdf>; see also FSB, ENHANCING THIRD-PARTY RISK MANAGEMENT AND OVERSIGHT (June 2023), available at <https://www.fsb.org/wp-content/uploads/P220623.pdf>.

more than \$400 million in 41 separate oracle manipulation attacks in 2022 (see ANNEX E), and that 64% of the \$3.1 billion stolen from DeFi protocols in 2022 was attributable to cross-chain bridges⁵³ (see ANNEX B).

Regulators should assess whether those providing DeFi products and services present operational and technological risks, including those due to reliance on oracles and cross-chain bridges, among other things. Those risks could be amplified, given particular governance structures that may not be suited to addressing technological and operational risks in a timely and effective manner. Regulators should seek to require providers of DeFi products that rely on oracles and cross-chain bridges to identify, manage and mitigate the risks posed by such technology. In some jurisdictions, regulators may choose to require more robust measures.

Recommendation 6 – Require Clear, Accurate and Comprehensive Disclosures

In applying Existing Frameworks or New Frameworks, a regulator should seek to require providers of DeFi products and services and other Responsible Persons, as appropriate, to accurately disclose to users and investors comprehensive and clear information material to the products and services offered in order to promote investor protection and market integrity.

Information about DeFi products, services, arrangements, and activities is often technologically complex and/or opaque. This may arise due to a number of factors, including, but not limited to, the complex nature of the products or services themselves or of the underlying tech stack, and opacities in certain aspects of the arrangement's business, operations and governance. Consequently, the complexity and opacity of DeFi products, services, arrangements, and activities can result in significant information asymmetries, where users and investors are not fully apprised of the nature of the products, services, arrangements, and activities with which they are interacting and the associated risks that they may be exposed to, leading to investor harm.

To address this, a regulator should seek to require providers of DeFi products and services and, as appropriate, other Responsible Persons, to accurately disclose to users and investors comprehensive and clear information about the material aspects of the provider's products, services, business, operations, governance, risks, conflicts of interest, and financial condition. Disclosures should include a plain-language description of material risks to the user or investor. It should also include a description of any crypto-assets involved in the product or service. This may include a prospectus or an equivalent document from an issuer of a crypto-asset or other financial instruments. Disclosure should also include a description of the governance and lines of responsibility and accountability within the DeFi arrangement, including identifying key persons and the roles they play in the provision of the product or service as well as, as appropriate, related parties and outside service

⁵³ CHAINALYSIS, *supra* note 21, at 58.

providers. Information in marketing and promotional communications should be consistent with such disclosures.

Regulators should require providers of DeFi products and services and other Responsible Persons to disclose any material risks associated with the underlying technologies used to deliver these products and services, as appropriate and in line with jurisdictional legal frameworks.

Recommendation 7 – Enforce Applicable Laws

A regulator should apply comprehensive authorization, inspection, investigation, surveillance, and enforcement powers, consistent with its mandate, to DeFi products, services, arrangements, and activities that are subject to Existing Frameworks and New Frameworks, including measures to detect, deter, enforce, sanction, redress and correct violations of applicable laws and regulations. A regulator should assess what technological knowledge, data and tools the regulator needs to enforce applicable laws.

Guidance

Consistent with the principle of “same activity, same risk, same regulatory outcome,” DeFi products, services, arrangements, and activities should be regulated in a manner consistent with the aim of promoting investor protection and preventing the same types of misconduct and fraudulent and manipulative practices that exist in traditional financial markets, as well as any additional risks presented by DeFi. Regulators should have the powers and capabilities to enforce applicable regulatory, supervisory and oversight requirements, including authorization and licensing requirements, and the ability to undertake inspections or examinations, as appropriate and consistent with their respective mandates. Regulators should seek to bring enforcement actions or other corrective actions against Responsible Persons for fraud and market abuse, in addition to other failures of regulatory compliance, where appropriate. This includes misuse of material, non-public information, insider dealing, market manipulation, issuing false and misleading statements, and misappropriation of funds, among other conduct. The guidance associated with Recommendation 2 can be considered in identifying the appropriate parties that could be held responsible from a regulatory standpoint.

As do other market participants, DeFi market participants may seek to structure their arrangements and activities to avoid regulation, offer products and services within a jurisdiction while operating from another jurisdiction, and/or operate in noncompliance with applicable existing laws, thereby challenging the ability of jurisdictions to regulate, supervise, oversee, and enforce applicable laws, which increases the risk of regulatory arbitrage and weakens investor protections.

In order to address these challenges, regulators should assess whether they have the appropriate powers, tools and resources.⁵⁴ Regulators should seek methods to obtain the

⁵⁴ Regulators should also consider means to engage and inform investors about DeFi activities and risks, including to enhance investors’ understanding of the role of the regulator in relation to DeFi

appropriate data, tools and expertise they will need to conduct investigatory and enforcement activities. This may include crypto-asset market data, including blockchain data, as well as blockchain analytical tools and techniques.

Recommendation 8 – Promote Cross-Border Cooperation and Information Sharing

A regulator, in recognition of the cross-border nature of DeFi products, services, arrangements, and activities, should have the ability to cooperate and share information with regulators and relevant authorities in other jurisdictions with respect to such arrangements, and activities. This includes having available cooperation and information sharing arrangements and/or other mechanisms to engage with regulators and relevant authorities in other jurisdictions. These should accommodate the authorization and on-going supervision of regulated persons and entities and enable broad assistance in enforcement investigations and related proceedings.

Guidance

The owners and operators of DeFi products and services often are based in multiple jurisdictions and/or offer their DeFi products and services on a cross-border basis. Those with control or sufficient influence over the operation of DeFi arrangements can be geographically dispersed across a number of jurisdictions. At the same time, there is often a lack of transparency regarding the ownership and operation of the DeFi products and services, including a lack of available information on the identity and location of the owners and operators of the DeFi protocols and the size and scope of the DeFi arrangements and activities occurring in particular jurisdictions. To the extent that such information is available, the information is often highly complex or technical and/or otherwise limited in some way, including due to the pseudonymous nature of many DeFi activities.

Some DeFi arrangements and activities may claim not to have a geographical location or will claim they have no presence in a particular jurisdiction. Some may point to the fact that they employ a distributed governance structure or that various actors involved in the arrangement or activity are geographically dispersed. Some may choose an organizational structure that is called a *Decentralized Autonomous Organization* or DAO or they may legally organize in one jurisdiction, have personnel in another jurisdiction, and offer products and/or services in yet another jurisdiction. Regulators should consider whether their regulatory framework captures whatever activity is occurring in their own jurisdiction and should consider ways to cooperate with other jurisdictions to the fullest extent practicable in order to address risks to investors and markets within their own jurisdictions.

activities and to provide investors with tools to assess the risks associated with particular DeFi activities and to protect themselves against fraud and other abuses. In so doing, regulators could consider investor education techniques, including those discussed in the IOSCO, RETAIL MARKET CONDUCT TASK FORCE FINAL REPORT (March 2023), available at <https://www.iosco.org/library/pubdocs/pdf/IOSCOPD730.pdf>, and in the IOSCO, INVESTOR EDUCATION ON CRYPTO-ASSETS FINAL REPORT (Dec. 2020), available at <https://www.iosco.org/library/pubdocs/pdf/IOSCOPD668.pdf>.

Recognizing the cross-border nature of DeFi products, services, arrangements, and activities, regulators should have the ability to cooperate and share information to assist one another to fulfill their respective mandates relating to such products, services, arrangements, and activities. Regulators also should have in place effective cooperation and information sharing arrangements and/or other mechanisms to engage with relevant authorities in other jurisdictions. These should allow regulators to provide broad assistance in enforcement investigations and related proceedings and, as appropriate, the authorization and supervision of regulated DeFi market participants. Cooperation and information sharing should also aim to facilitate a shared understanding of activities and risks of DeFi across jurisdictions. Regulators should aim to share information and cooperate in a timely and effective way, especially when there is a risk of investor or market harm. Regulators should consider ad hoc arrangements to address matters of urgency.

To enhance effective supervision of the markets, regulators should consider bilateral and/or multilateral cooperation arrangements beyond the enforcement context, as appropriate, such as supervisory colleges, networks, regional arrangements, or other forms of cross-jurisdictional cooperation, to support rigorous and effective ongoing supervision of DeFi activities and arrangements operating across multiple jurisdictions.

Regulators should cooperate with each other and share information, both domestically and internationally, consistent with their respective mandates and applicable legal requirements and, to the greatest extent possible, to promote effective information sharing to assist one another with fulfilling their respective mandates and, where appropriate, to encourage the consistency of outcomes relating to DeFi, including cooperation and information sharing in the following areas:

- **Emerging Risks:** Regulators should cooperate and share information relating to DeFi activities occurring across jurisdictions, for effective risk monitoring of DeFi activities, and to facilitate a shared understanding of related risks, including to market integrity, investor protection, and financial stability. In particular, regulators should share information on emerging trends and other developments with the potential for significant cross-border impacts, as well as information to assist with understanding and analyzing DeFi arrangements (i.e., in furtherance of these Recommendations). Sharing typologies of DeFi arrangements and activities, as appropriate, may also assist in analyzing and comparing observed behavior.
- **Registration/Authorization:** Regulators should cooperate and share information relating to requests by other regulators regarding firms engaged in DeFi activities to become registered and/or authorized to conduct business in a particular jurisdiction, for example, as a type of trading venue authorized within a particular jurisdiction. Among other things, regulators should have the ability to share information relevant to the requesting regulator's decision whether to register and/or authorize such firms, provided that any confidentiality requirements are satisfied. Examples of information that should be shared may include the ownership and operation of the DeFi products and services in which the firm is engaged, and

other relevant features of the DeFi activities of the firm, including the size and scope of the DeFi products and services offered by the firm and the firm's compliance with relevant applicable laws and regulations across jurisdictions.

- **Supervision:** Regulators should also seek to enable cooperation and information sharing to further the effective supervision of DeFi activities, consistent with their respective jurisdictions' laws and regulations. Regulators should use existing cooperation and information sharing arrangements (e.g., memoranda of understanding, ad-hoc arrangements, supervisory colleges, networks), to the fullest extent practicable, or consider establishing new bilateral or multilateral cooperation and information sharing arrangements that may encompass additional subject areas or jurisdictional authorities, to support the effective ongoing supervision of DeFi activities operating across multiple jurisdictions. Regulators should utilize such arrangements to provide assistance to one another with, among other things, examinations and inspections of registered firms engaged in DeFi activities, including to provide other regulators with access to the books and records of those firms, if appropriate.
- **Enforcement:** IOSCO has in place effective mechanisms for cross-border cooperation between financial market authorities to enable the enforcement of laws and regulations applicable to DeFi. Information requests relating to DeFi are captured by IOSCO's Multilateral Memorandum of Understanding (MMoU)⁵⁵ and Enhanced Multilateral Memorandum of Understanding (EMMoU)⁵⁶, premised on the underlying principle of "same activity, same risk, same regulatory outcome." Regulators should use the MMoU and EMMoU to the greatest extent possible to enable cooperation and information sharing relating to DeFi activities. Beyond the MMoU and EMMoU, regulators should also share information with one another and, where relevant, with law enforcement authorities, and work together to stop abusive and criminal behaviors, including financial crime and money laundering, and to mitigate risks to investors.

Recommendation 9 – Understand and Assess Interconnections Among the DeFi Market, the Broader Crypto-Asset Market, and Traditional Financial Markets

When analyzing DeFi products, services, arrangements, and activities, a regulator should seek to understand the interconnections among DeFi arrangements, the broader crypto-asset market, and also the traditional financial markets. In so doing, a regulator should consider how those interconnections impact risks to

⁵⁵ IOSCO, MULTILATERAL MEMORANDUM OF UNDERSTANDING CONCERNING CONSULTATION AND COOPERATION AND THE EXCHANGE OF INFORMATION (rev. May 2012), available at <https://www.iosco.org/library/pubdocs/pdf/IOSCOPD386.pdf>.

⁵⁶ IOSCO, ENHANCED MULTILATERAL MEMORANDUM OF UNDERSTANDING CONCERNING CONSULTATION AND COOPERATION AND THE EXCHANGE OF INFORMATION (2016), available at <https://www.iosco.org/about/pdf/Text-of-the-EMMoU.pdf>.

investor protection and market integrity, and how they might identify further regulatory touchpoints, including potential responsible persons. A regulator should, as appropriate, seek to employ, maintain and develop suitable methods for monitoring and assessing DeFi products, services, arrangements, and activities.

Guidance

The 2022 Report discussed the importance of centralized crypto-asset trading, lending and borrowing platforms and stablecoins to DeFi. Specifically, centralized platforms are often the on-ramp to participation in DeFi, including by retail investors, and stablecoins facilitate participation in DeFi arrangements, serving as the perceived stable value asset used as one side of a trading pair, or in liquidity or collateral pools to fund or collateralize DeFi activities. Thus, events (such as liquidity crises) that cause shocks or disruptions on centralized platforms or to stablecoins likely will impact DeFi markets. Indeed, some recent crypto-asset market events and their impact on DeFi are discussed in ANNEX A. Regulators should consider how interconnectedness within the crypto-asset markets will impact investor protection and market integrity in DeFi markets. Regulators should also consider whether steps should be taken with respect to centralized platforms and stablecoins and to adhere to the recommendations and guidance contained in the CDA Report⁵⁷ to provide additional investor and market protections.

Regulators should consider how regulatory touchpoints in the DeFi market, the broader crypto-asset market, and traditional financial markets could provide information and, where appropriate, regulators should require the relevant Responsible Persons to apply investor and market protections. Regulators should consider ways to identify these touchpoints, including through surveys of registered entities or through other regulatory frameworks, such as those that pertain to anti money laundering (AML)/countering the financing of terrorism (CFT).

Regulators should understand and assess risks relating to the exposures of traditional financial market participants (i.e., existing regulated entities) to DeFi structures (e.g., through hedge funds, private equity funds, intermediaries, broker or dealers, investment advisers, transfer agents, clearing agencies, custodians, and other institutional participants). Regulators should consider additional approaches to provide important investor, customer and market protections for DeFi market participants, including through their regulation and oversight of traditional financial market participants or centralized crypto-asset platforms involved, directly or indirectly, in DeFi arrangements or activities.

Given the potential effects of DeFi on TradFi, it is important to be able to monitor and evaluate interlinkages between DeFi and traditional financial markets. The following outlines some ways that crypto-assets could touch traditional entities, though these are not exhaustive of all types of connectivity:⁵⁸

⁵⁷ CDA Report, *supra* note 17.

⁵⁸ See also FSB DeFi Report, *supra* note 12, at 25-26; BIS, THE CRYPTO ECOSYSTEM: KEY ELEMENTS AND RISKS 15 (July 2023), available at <https://www.bis.org/publ/othp72.pdf> (“[R]isks along the bank-crypto nexus extend beyond (direct and indirect) exposures because of the potential negative externalities

Entity		Potential Relationship to DeFi
Issuer of financial instrument, including securities		Issue crypto-asset; engage in crypto-asset-related operational activities (e.g., mining/validating); hold crypto-assets (e.g., in corporate treasury); participate in governance
Funds (registered)		Invest in DeFi related investments or have exposure to DeFi products/services; participate in governance
Broker/dealer/investment adviser		Conduct services relating to DeFi products/services; link customers to DeFi products/services
Banks/trusts/money services businesses/credit card issuers		Provide services relating to DeFi products/services; invest in DeFi products/services; link customers to DeFi products/services
Third party service providers (auditors/accountants/transfer agents/credit rating entities)		Provide services to DeFi products/services

Regulators should assess potential data sources to monitor interconnections with traditional markets. Such data or indicators might pertain to:

- Traditional financial services being provided to DeFi participants (i.e., banking, loans, holding or managing reserves, fiat to crypto-asset exchange, etc.)
- Correlations between crypto-assets and certain traditional assets (and changes over time)⁵⁹

associated with banks channeling funds into the crypto ecosystem, given their role as the mainstay of the monetary system. Along with banks, other financial entities such as family offices, hedge funds and asset managers could also increase their crypto investments, lured by the potentially high returns.”).

⁵⁹ See Tara Iyer, *Cryptic Connections: Spillovers between Crypto and Equity Markets*, GLOBAL FIN. STABILITY NOTES No 2022/001 (Jan. 11, 2022), <https://www.imf.org/en/Publications/global-financial-stability-notes/Issues/2022/01/10/Cryptic-Connections-511776>.

- Spillovers between crypto-asset prices and select traditional assets (and changes over time) (e.g., computed by the application of econometric models)⁶⁰
- Size/reserves of stablecoins
- VC/private institutional investment in crypto-assets
- Derivative/synthetic exposure to crypto-assets
- Crypto-assets that are derivatives/synthetics of real-world assets
- The use of real-world assets as collateral or components in DeFi activities

⁶⁰

Id.

SECTION IV. QUESTIONS FOR PUBLIC CONSULTATION

1. Do you agree with the Recommendations and guidance in this Report? Are there others that should be included?
2. Do you agree with the description of DeFi products, services, arrangements, and activities described in this Report? If not, please provide details. Are there others that have not been described? If so, please provide details.
3. Do you agree with the Report's assessment of governance mechanisms and how they operate in DeFi? If not, please provide details.
4. Do you agree with the risks and issues around DeFi protocols identified in this Report? If not, please provide details. Are there others that have not been described? If so, please provide details. How can market participants help address these risks and/or issues, including through the use of technology? How would you suggest IOSCO members address these risks and/or issues?
5. Do you agree with the description of data gaps and challenges in the Report? If not, please provide details. Are there others that have not been described? If so, please provide details. How can market participants address these data gaps and challenges, including through the use of technology? How would you suggest IOSCO members address data gaps and challenges?
6. Do you agree with the application of IOSCO Standards to DeFi activities contained in this Report? Are there other examples of how IOSCO Standards can apply?
7. Is there any additional guidance that you would find relevant to help IOSCO members comply with these Recommendations? If so, please provide details.
8. Given the importance of the application of IOSCO Standards to DeFi activities, are there technological innovations that allow regulators to support innovation in DeFi/blockchain technologies while at the same time addressing investor protection and market integrity risks? If so, please provide details.
9. Are there particular methods or mechanisms that regulators can use in evaluating DeFi products, services, arrangements, and activities, and other persons and entities involved with DeFi? If yes, please explain.
10. Do you find the interoperability between this report and the IOSCO CDA Report to be an effective overall framework? If not, please explain.

ANNEX A – RECENT EVENTS⁶¹ AND THEIR IMPACT ON DEFI

Terra USD (UST)/LUNA Collapse

Event Summary:

Over the course of several days in May 2022, the value of Terraform Labs' algorithmic stablecoin, Terra USD (UST), and native token of the Terra blockchain (LUNA), both collapsed, erasing nearly \$40 billion in reported total market value. The price of UST began to depeg from \$1 on May 7, 2022, falling to approximately \$0.37 on May 12, 2022, while the price of LUNA, which was purported to be used to stabilize UST's price, fell from approximately \$119 in April 2022, to a few cents by May 12, 2022.⁶²



Source: CoinGecko

⁶¹ This report refers to specific recent events as examples. Use of these examples in the report does not constitute any claim about compliance or non-compliance of any particular crypto-asset, person or entity with existing laws and regulations in relevant jurisdictions. Individual jurisdictions might have different legal interpretations of terms used in this report and different views of compliance or non-compliance of the mentioned crypto-assets, persons or entities with laws and regulations relevant to these jurisdictions. All factual descriptions of crypto-assets, persons and entities are based on information currently known to the authors of this report and are subject to change and revision if new information arrives.

⁶² The U.S. Securities and Exchange Commission filed an enforcement action against Terraform Labs PTE Ltd. and its founder, Do Hyeong Kwon, on February 16, 2023. See <https://www.sec.gov/litigation/complaints/2023/comp-pr2023-32.pdf>.

Impact to DeFi Market:

In the weeks after UST lost its \$1 peg, billions of dollars worth of crypto-assets reportedly were taken out of the Terra ecosystem. The TVL of DeFi applications on the Terra blockchain dropped from approximately \$20 billion on May 5, 2022 to less than \$75 million on May 28, 2022. This includes the “Anchor” protocol associated with Terra, which had TVL of more than \$16 billion at its peak.



Source: DeFiLlama

The Terra blockchain was halted during this period, preventing users from conducting transactions, while validators and developers reportedly were coordinating activities. In the broader DeFi ecosystem, the death spiral of UST and LUNA appears to have caused a contagion effect, impacting the overall TVL across DeFi platforms on various blockchains. This resulted in a decline from approximately \$142 billion on May 5, 2022, to less than \$80 billion on May 13, 2022, for a TVL loss of nearly 44% in less than two weeks. One research paper suggests that the existence of bridges between the Terra blockchain and other blockchains exacerbated the impacts of the Terra collapse across DeFi, finding that “bridges between programmable blockchain networks create increased risk of spillover effects to other blockchains’ programmable environments in the wake of a major shock event like Terra’s collapse.”⁶³ The rapid decline in TVL on the Terra blockchain was seen to demonstrate, among other things, the risks of algorithmic stablecoins, the reality that a blockchain can be halted where no user may thereafter transact or exit their positions when desired, and the impact of sentiment and confidence of DeFi market participants on DeFi

⁶³ See <https://www.federalreserve.gov/econres/feds/files/2023044pap.pdf>.

arrangements and activities. In particular, it would appear that the performance of crypto-assets native to a blockchain or DeFi arrangement is linked to their overall credibility.⁶⁴



Source: DeFiLlama

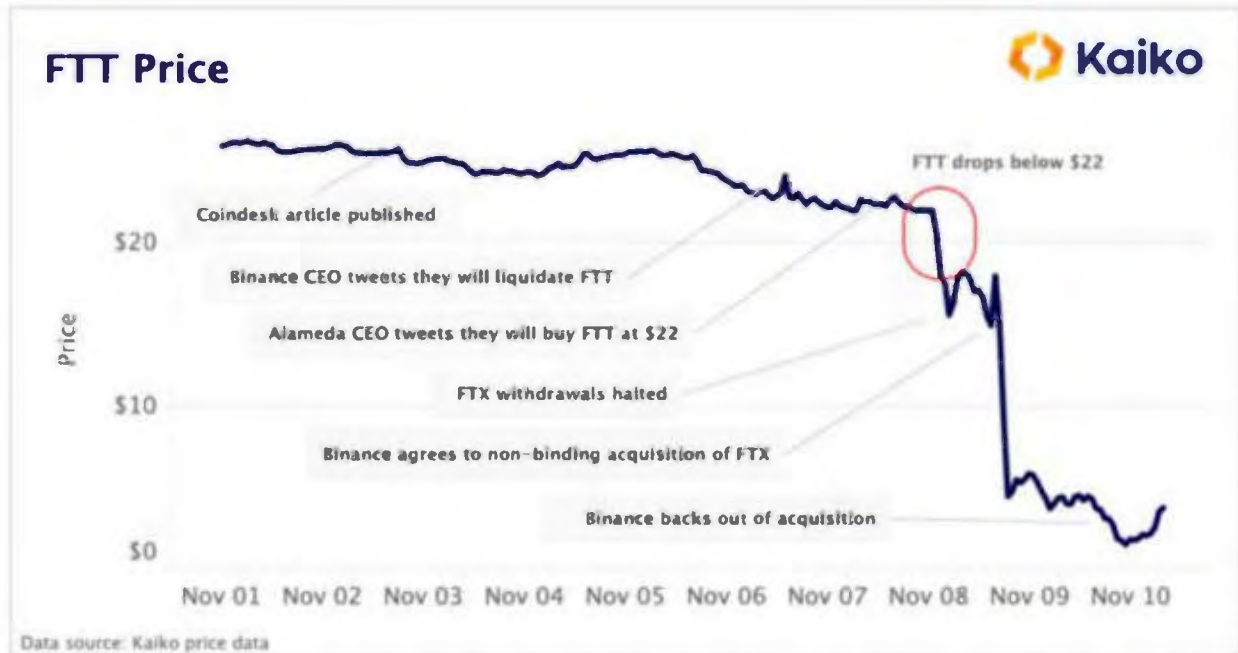
FTX Insolvency

Event Summary:

On November 2, 2022, an article was published, stating that FTX, at the time one of the largest centralized crypto-asset trading platforms by trading volumes, recorded on its balance sheet a significant amount of the *exchange token* of the FTX trading platform (FTT) that purportedly gave certain benefits to holders. Subsequently, the CEO of Binance Holdings Limited (Binance) announced on November 6, 2022, that Binance would liquidate its FTT holdings, which reportedly began a bank-like run as FTX customers apparently lost confidence in the solvency of FTX. FTX reportedly suffered a liquidity crisis, halted customer withdrawals on November 8, 2022, and declared bankruptcy on November 10, 2022.⁶⁵

⁶⁴ See also BIS, THE CRYPTO ECOSYSTEM: KEY ELEMENTS AND RISKS 7 (July 2023), <https://www.bis.org/publ/othp72.pdf> (noting that the Terra collapse highlights “the tendency to fragmentation through crypto’s vulnerability to new entrants who prioritise market share and capacity and the expense of decentralisation and security.”).

⁶⁵ The events leading to FTX’s insolvency are the subject of on-going civil and criminal actions. See, e.g., <https://www.sec.gov/news/press-release/2022-219>; <https://www.cftc.gov/PressRoom/PressReleases/8638-22>; <https://www.justice.gov/usao-sdny/pr/united-states-attorney-announces-charges-against-ftx-founder-samuel-bankman-fried>.



Source: Kaiko

Impact to DeFi Market:

The collapse of FTX appears to have led to wider contagion in the crypto-asset markets, in which market participants suffered losses. Among those impacted were customers, both retail and institutional, with funds on FTX, counterparties to FTX, investors in FTX and FTT, and others. Although FTX was a centralized crypto-asset platform, this contagion appears to have spread to the DeFi ecosystem. FTX and its principal reportedly were major promoters of the Solana blockchain and its ecosystem.⁶⁶ One particular DeFi protocol built on Solana reportedly required a hard fork because FTX purportedly owned the private key to the protocol. The contagion from FTX also appears to have affected a number of other platforms through financial interlinkages, such as lending platforms and a crypto-asset related investment fund.⁶⁷ The investment fund reportedly was a participant in a DeFi lending pool run by a delegate firm on a given DeFi protocol that underwrote loans on the protocol. As a result of the investment fund's default, other participants in the lending pools were reported to have suffered losses, including an insurance protocol and a smart contract auditing platform. Further, there was an increase in DeFi transaction volumes, potentially due to the inability to use FTX and other lending platforms and/or a loss of confidence in centralized crypto-asset platforms. Due to the pseudonymity of DeFi

⁶⁶ *Life After FTX: How Solana DeFi Is Starting Over—Without SBF's Serum*, YAHOO! NEWS, Dec. 7, 2022, <https://news.yahoo.com/life-fts-solana-defi-starting-223848156.html>.

⁶⁷ *A Hedge Fund Hit by FTX Collapse Defaults on \$36 Million of Debt*, BLOOMBERG, Dec. 6, 2022, https://www.bloomberg.com/news/articles/2022-12-06/crypto-fund-orthogonal-defaults-on-36-million-debt-as-fts-contagion-spreads?utm_source=website&utm_medium=share&utm_campaign=copy.

participants, it remains a complex challenge to proactively identify participants and their potential interlinkages and concentration risks.

BUSD Minting Cessation

Event Summary:

On February 13, 2023, the New York State Department of Financial Services (NYDFS) ordered Paxos Trust Company (Paxos) to cease minting Paxos-issued Binance USD (“BUSD”).⁶⁸ In response, Paxos informed its customers of its intent to end its relationship with Binance for BUSD.⁶⁹ Prior to the NYDFS cease-minting order, Paxos had been authorized by NYDFS since September 2019 to offer BUSD subject to the conditions that all Paxos-minted BUSD on the Ethereum blockchain be backed by cash, short term treasuries, and other highly liquid investments on a 1:1 basis as well as be subject to other regulatory requirements.⁷⁰ NYDFS stated that all US residents who own Paxos-minted BUSD could still exchange BUSD at a 1:1 rate for US dollars even after the cease-minting order. NYDFS also stated that its prior approval order to Paxos authorized only BUSD on the Ethereum blockchain, noting it had not authorized the Binance-Peg BUSD, a wrapped version of BUSD, purportedly designed to track the value of BUSD at a 1:1 ratio.⁷¹ Approximately one month later on March 13, 2023, the CEO of Binance announced that Binance was converting \$1 billion of BUSD to BTC, ETH and BNB (the “exchange token” of the Binance platform).

Impact to DeFi Market:

Concurrent to the February 13, 2023, announcements by NYDFS and Paxos, the reported total TVL across DeFi rose by approximately 7% over a three day period ending on February 16, 2023, from approximately \$46 billion to more than \$49 billion, the highest level since the first week of November 2022, shortly before the collapse of FTX. Simultaneously, investors reportedly withdrew approximately \$2.3 billion worth of BUSD from Binance within four days of the NYDFS announcement.

The NYDFS supervisory action relating to BUSD may have impacted the willingness of certain DeFi market participants to use BUSD. Participants in Curve’s busdv2 liquidity pool exchanged BUSD for the two other pool components, USDT and DAI,⁷² to such an extent

⁶⁸ See https://www.dfs.ny.gov/consumers/alerts/Paxos_and_Binance.

⁶⁹ See <https://paxos.com/2023/02/13/paxos-will-halt-minting-new-busd-tokens/>.

⁷⁰ See https://www.dfs.ny.gov/reports_and_publications/press_releases/pr1909051.

⁷¹ See <https://www.binance.com/en/blog/ecosystem/understanding-busd-and-binancepeg-busd-5526464425033159282>.

⁷² DAI purports to be a crypto-asset-collateralized stablecoin pegged to USD that is maintained and regulated by MakerDAO. See <https://makerdao.com/whitepaper/DaiDec17WP.pdf>.

that on February 14, 2023, 81% of the assets in busdv2 were BUSD.⁷³ Market participants reportedly experienced intense selling pressure and price slippage.⁷⁴ Both centralized exchanges⁷⁵ and DeFi protocols⁷⁶ reportedly limited the use of BUSD. The impact of these actions by NYDFS and Paxos illustrate, among other things, certain risks of stablecoins. In this particular instance, for example, Binance reportedly was minting BUSD on a non-Ethereum blockchain without consistently maintaining a 1:1 reserve rate. These events also illustrate how investors may tend to migrate assets from a centralized platform to DeFi when they lose confidence in the centralized platform, how investors may tend to avoid crypto-assets against which regulatory or supervisory actions have been commenced, the high impact certain events can have on liquidity and transaction fees on DeFi platforms, and the ability of purported “decentralized” DeFi platforms to freeze or restrict certain products or assets when certain risks arise.

USDC Depeg

Event Summary:

In 2023, the failure of a US regional bank that offered deposit services to a stablecoin issuer contributed to a temporary de-pegging of its stablecoin because of uncertainty about the issuer’s access to its deposits.⁷⁷

⁷³ Omkar Godbole, *Investors Rush to Tether as Paxos' BUSD Faces Regulatory Heat, Curve Liquidity Pools Show*, COINDESK (Feb. 14, 2023, 7:29 am), <https://www.coindesk.com/markets/2023/02/14/investors-rush-to-tether-as-paxos-busd-faces-regulatory-heat-curve-liquidity-pools-show/?ref=biztoc.com>.

⁷⁴ See, e.g., Tiny Cat (@insigocelot), TWITTER (Feb. 13, 2023, 7:57 AM), <https://twitter.com/insigocelot/status/1625116840782442498> (“And just like that defi exit liquidity for BUSD was gone. Only significant remaining pool of BUSD liquidity remaining is on Pancake Swap. All stable pools on Ethereum thoroughly dumped. A \$1,000,000 sale of BUSD on Uni now subject to 35%+ slippage.”); @Mr. Kazoo Bitcoin, TWITTER (Feb. 14, 2023, 4:52 AM), <https://twitter.com/MrKazooBitcoin/status/1625432771660500992> (“You need to pay +\$30 to buy 1 \$BTC on #BUSD market, the slippage is real 😞”).

⁷⁵ Oliver Knight, *Coinbase Officially Suspends Binance USD Stablecoin Trading*, COINDESK (Updated May 9, 2023, 12:10 am), [https://www.coindesk.com/business/2023/03/13/coinbase-officially-suspends-binance-usd-stablecoin-trading/#:~:text=Cryptocurrency%20exchange%20Coinbase%20\(COIN\)%20has,Brian%20Armstrong%20citing%20liquidity%20concerns](https://www.coindesk.com/business/2023/03/13/coinbase-officially-suspends-binance-usd-stablecoin-trading/#:~:text=Cryptocurrency%20exchange%20Coinbase%20(COIN)%20has,Brian%20Armstrong%20citing%20liquidity%20concerns).

⁷⁶ Samuel Haig, *Aave and Maker Pull Back From Paxos Stablecoins*, THE DEFIANT, Feb. 21, 2023, <https://thedefiant.io/aave-and-maker-pull-back-from-paxos-stablecoins>.

⁷⁷ See FSB, GLOBAL REGULATORY FRAMEWORK FOR CRYPTO-ASSET ACTIVITIES 4 (July 2023) available at, <https://www.fsb.org/2023/07/fsb-global-regulatory-framework-for-crypto-asset-activities/>; CIRCLE, USDC RESERVE REPORT (Jan. 2023), available at https://www.circle.com/hubfs/USDCAttestationReports/2023%20USDC_Circle%20Examination%20Report%20January%202023.pdf.

USD Coin Price Chart (USDC)

Last updated 02:56AM UTC. Currency in USD.

☆ Add To Watchlist



Source: CoinGecko

Impact to DeFi Market:

Given the common use of stablecoins as one leg of a trading pair in many DeFi protocols, USDC's depeg had systemic impacts across DeFi. DeFi pools such as Curve's 3pool (where each crypto-asset typically represents 33% of the pool's value) experienced an initial flight from USDC.⁷⁸ Tether (USDT) gained notable inflows following the 3pool USDC flight.⁷⁹

In the wake of these events, a number of DeFi projects made or passed governance or DAO proposals to address USDC risk. For example, MakerDAO launched an emergency proposal

⁷⁸ See Danny Nelson, *DeFi Protocol Curve's \$500M Stablecoin Pool Hammered as traders Flee USDC*, COINDESK (Updated May 9, 2023, 10:10am), <https://www.coindesk.com/business/2023/03/10/defi-protocol-curves-500m-stablecoin-pool-hammered-as-traders-flee-usdc/>.

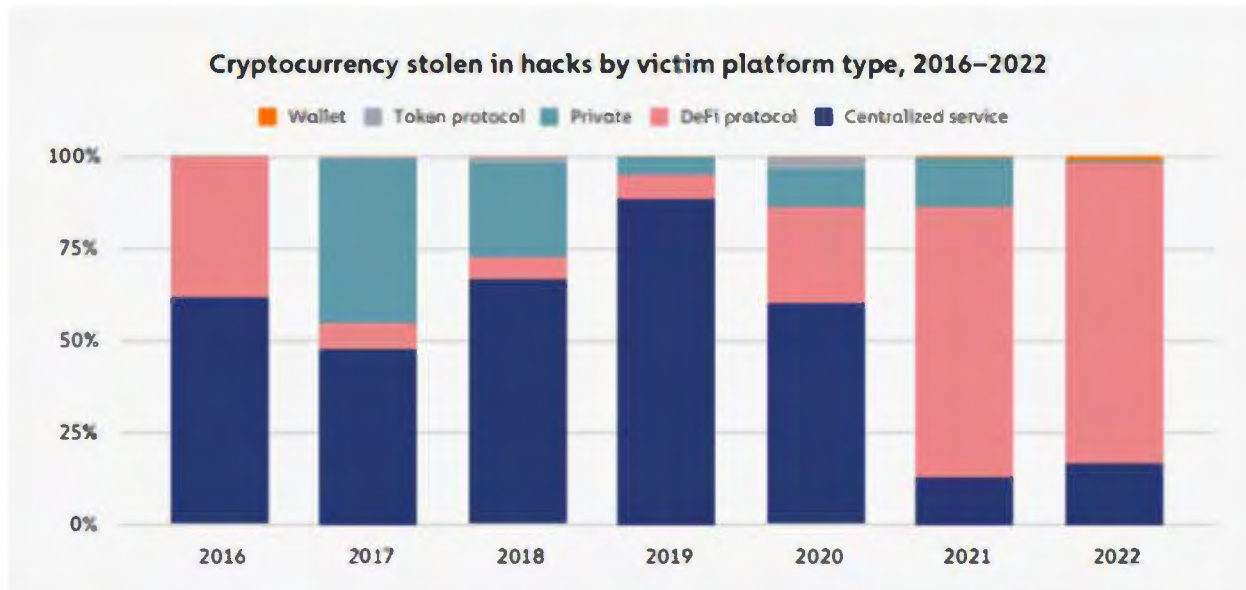
⁷⁹ Krisztian Sandor, *USDC Outflows Surpass \$10B as Tether's Stablecoin Dominance Reaches 22-Month High*, COINDESK (Updated Mar. 30, 2023, 3:55 pm), <https://www.coindesk.com/markets/2023/03/29/usdc-outflows-surpass-10b-as-tethers-stablecoin-dominance-reaches-22-month-high/>.

to change its risk parameters to reduce exposure to USDC.⁸⁰ This proposal appears to have been proposed and passed in roughly eight hours. The USDC depeg illustrates, among other things, interconnectedness between fiat-based stablecoins and the banking sector and the existence of contagion channels between TradFi and DeFi. The USDC depeg also illustrates the risks to participants using stablecoins as collateral in DeFi arrangements. The events also suggest that DeFi participants use elevated rights and exceptions to stated governance processes in DeFi to respond to events that cause market stress or increase risks to a DeFi arrangement or activity.

⁸⁰ See <https://cointelegraph.com/news/maker-dao-files-emergency-proposal-addressing-3-1b-usdc-exposure>; <https://forum.makerdao.com/t/emergency-proposal-risk-and-governance-parameter-changes-11-march-2023/20125>.

ANNEX B – DEFI EXPLOITS, ATTACKS AND ILLICIT USES

The DeFi markets, like other financial markets, are a target for hackers and attackers, including those that seek to exploit vulnerabilities to misappropriate funds and data. This section describes various attacks and specifically highlights flash loan- and Maximal Extractable Value (MEV)-enabled attacks.⁸¹ According to one blockchain analytics firm, attacks on DeFi protocols accounted for 82.1% of all crypto-assets stolen by hackers in 2022— a total of \$3.1 billion — up from 73.3% in 2021. Of that \$3.1 billion, 64% was attributable to attacks on cross-chain bridges.⁸² Another blockchain analytics firm reported that nine of the ten largest attacks occurred against DeFi projects,⁸³ and that hacks on such projects resulted in an average of more than \$20 million stolen per incident.⁸⁴



Source: Chainalysis – The 2023 Crypto Crime Report

A blockchain analytics firm reports that among the most prolific hacker groups are those associated with North Korea. Reportedly, the North Korea-linked Lazarus Group stole an estimated \$1.7 billion worth of crypto-assets in 2022, and North Korea-linked hackers have stolen \$1.1 billion in crypto-assets through hacks of DeFi protocols. The report

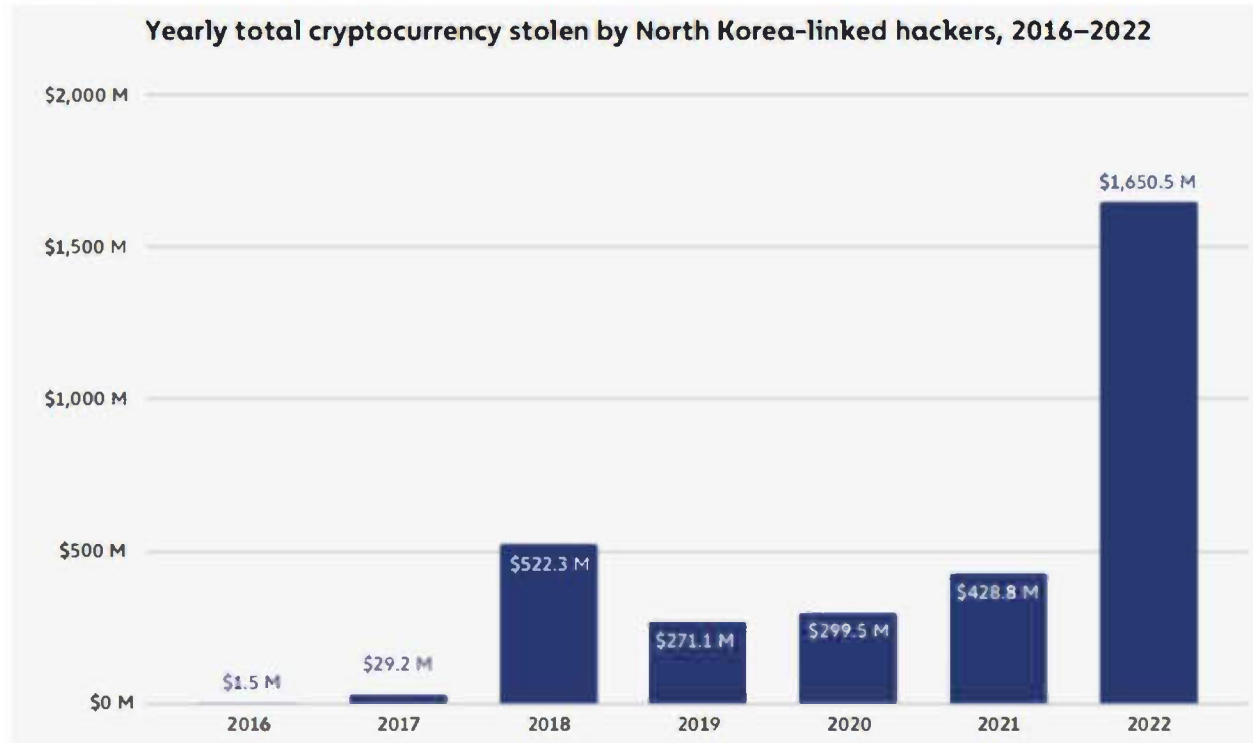
⁸¹ This section does not cover market manipulation and outright scams. *See, e.g.*, IOSCO, RETAIL MARKET CONDUCT TASK FORCE FINAL REPORT (Mar. 2023), available at <https://www.iosco.org/library/pubdocs/pdf/IOSCOPD730.pdf>. Each of these, however, is a significant source of risk.

⁸² CHAINALYSIS, *supra* note 21.

⁸³ TRM, *supra* note 22, at 32.

⁸⁴ *Id.* at 52.

concludes that the funds are laundered through DeFi protocols in order to convert stolen crypto-assets into more liquid or less volatile assets before eventually being converted to fiat currencies at centralized crypto-asset platforms.⁸⁵



Source: Chainalysis – The 2023 Crypto Crime Report

Common Types of Exploits/Attacks

Common types of exploits and attacks observed in DeFi are discussed below. Of note, most attacks have exploited one or more features of DLT-based systems, namely:

- Public, open-source code, which makes it possible for threat actors to study a protocol’s smart contracts and test how it may be exploited;
- DeFi governance structures;
- Private keys, which in some cases can control significant functionality of a smart contract through elevated or administrative functions that allow any holder of those keys to commandeer crypto-assets. Private keys are susceptible to compromise through common cyberattacks, such as phishing, key logging or social engineering;
- Permissionless access, which makes it possible for anyone with the necessary technical skills to interact with any protocols of their choice; and
- The fact that code is often copied and used in multiple protocols, which can exacerbate an attack as it can be carried out across multiple protocols.

⁸⁵ CHAINALYSIS, *supra* note 21.

Exploits and attacks in DeFi target vulnerabilities inherent to DeFi arrangements, such as smart contract code or dependencies on critical infrastructure (e.g., oracles, bridges). Threat actors investigate publicly accessible code, and also use tools and techniques such as flash loans and MEV to effectuate an attack. The following discusses vulnerability-related targets for exploits and tools used to carry out attacks.

Smart Contract-Related

Smart contracts are code that is deployed on a blockchain or DLT-based system and form the major building blocks of DeFi protocols. Just as with other software, smart contracts are susceptible to code errors and vulnerabilities, and have proven a major attack vector for DeFi exploits. What are often seen as features of smart contracts (e.g., the fact that they can be self-executing, immutable, composable, and can be publicly inspected) also can translate to vulnerabilities in terms of an attack vector.

One major type of exploit relates to access control, which involves using a smart contract's private key(s) to alter the smart contract in some way. With access to a private key that can sign elevated administrative functions in a smart contract, an attacker could, for example, create, destroy, or transfer tokens, pause functionality, manipulate data, and change or disrupt the way the smart contract operates.⁸⁶ One report notes that of the \$1.4 billion stolen through code exploits in 2022, 90% occurred through "authentication issues, improper validation, and signature verification issues."⁸⁷

Another exploit relates to a smart contract's inability to process data that is outside the range it is able to process (referred to as "integer overflow/underflow"), which may lead to unintended or unexpected outcomes. Smart contracts also are susceptible to "reentrancy attacks," which occur when an attacker can trigger a function on a particular smart contract repeatedly before the smart contract can finish executing the first triggering event of the function, creating a type of loop that allows for multiple executions of a command. This type of attack can result in an attacker withdrawing funds from a smart contract before the smart contract can update a ledger that tracks the allocation of those funds.

Governance-Related

Certain DeFi projects claim or aim to be governed by a community through, for example, the use of governance or voting tokens (see [ANNEX D](#)). Governance-related exploits aim to abuse the decision-making process (e.g., by amassing a majority of governance

⁸⁶ Private keys enable the signing of transactions in blockchain and DLT-based systems. These transactions can enable the transfer of crypto-assets, execution of smart contract functions or on-chain operations such as block proposals or approvals. Private key operational security is critical to prevent private keys from being stolen by malicious actors. While industry-standards for private key security best-practices are lacking, various methods for storing private keys exist, including, but not limited to, written on paper, stored in a local note application, stored on a hardware wallet or distributed by multi party computation (MPC). These methods commonly trade off security for ease of use and access. Bad actors use various schemes to steal private keys, including phishing and social engineering, to acquire access to machines or systems to extract the private keys of investors or DeFi protocol developers.

⁸⁷ TRM, *supra* note 22, at 32.

tokens/voting power) to implement changes or actions to the attacker’s own benefit and against the general community interest (e.g., by requesting and executing a transfer of funds to the attacker’s wallet). An attack on governance mechanisms can be facilitated through other types of attacks, e.g., by exploiting smart contract vulnerabilities, including through the use of a flash-loan attack.

Infrastructure-Related

Infrastructure components in DeFi are fundamental auxiliaries that can impact transaction processing, composability and other capabilities. Critical infrastructure components include oracles and bridges, which provide mechanisms for a multiplicity of data sources off-chain and cross-chain (from other DLT networks) to be utilized and relied upon to provide DeFi products and services in an originating DLT network (which is inherently siloed). Without the bi-directional movement of data between off-chain and cross-chain components, smart contracts that determine the parameters of a DeFi activity are limited to the data held on the originating DLT network. Attacks on these infrastructure components can occur from vulnerabilities that include low quality data collection and aggregation methodologies, reliance on a single point of failure, and the lack of an ability to dynamically reflect changes in reference data.

Tool: Flash Loans

Flash loans are used to borrow and repay crypto-assets in a single block recorded on a blockchain. They are a feature of DeFi that allow users to borrow assets with no collateral requirements, no credit checks, and no borrowing limits (except as based on the amount made available for borrowing by liquidity providers). This is possible because of *atomicity*, a feature of blockchains in which actions are either executed collectively in sequence in one block or fail collectively and absolutely. A flash loan is only valid within the transaction (within a block), which reverts to the pre-transaction state with no loss to the borrower (or lender) if they are unable to repay the loan within the same block.⁸⁸

Flash loan attacks occur when an attacker borrows funds, uses them to effectuate a manipulative transaction, and repays the borrowed funds – all in one block. These attacks are popular because they require less upfront capital, provide large loan sizes, and are permissionless to execute. In addition, it is often difficult to identify malicious flash loan attackers due to the pseudonymity of blockchain addresses.

Flash loan exploits have been used to attack DeFi protocols in a number of ways. One involves an attack to exploit a smart contract vulnerability, permitting an attacker to drain funds from a smart contract. Another involves a “pump attack” that capitalizes on market inefficiencies and fragmentation. In DeFi markets, there is no industry agreed upon

⁸⁸ Arbitrage is a popular use case of flash loans as it allows traders to benefit from price differences across various exchanges. For instance, if token X is \$10 on DEX A and \$12 on DEX B, a user can use a flash loan to (1) borrow \$10,000 worth of crypto-assets; (2) buy 1,000 token X for \$10,000 at DEX A; (3) sell 1,000 token X for \$12,000 at DEX B; and (4) pay back the \$10,000 loan. However, this series of transactions must all occur in one block. In this scenario, the user will benefit by \$2,000 minus fees. If, however, the user could not execute any one of the steps, or pay the fees, all of the steps in the transaction would fail.

centralized pricing source, and prices reported by centralized crypto-asset platforms may or may not be accurate, may be stale, or may not include pricing data from over-the-counter (OTC) markets. As a result, the same crypto-asset can be traded at different prices across different venues. In a pump attack, the attacker manipulates the relative price of two assets, for example, in a DEX liquidity pool and arbitrages away this price difference. Another flash loan related attack involves the manipulation of *oracles*. Oracles are infrastructure components that provide off-chain data, such as data from websites or APIs to on-chain smart contracts. Oracle manipulation in a flash loan context works similarly to a pump attack. In this case, the attacker may use funds from a flash loan to manipulate the price of a crypto-asset trading on a venue that is a reference for an oracle network (e.g., by adjusting the relative price of the two assets in the DEX-based liquidity pool or by conducting manipulative trades on a centralized crypto-asset trading platform) and the manipulated price is broadcasted across the oracle network to a DeFi protocol. The smart contracts using the manipulated price information cannot detect an anomaly and therefore continue to operate on the manipulated price information. The most high-profile oracle manipulations have often used flash loans; however, oracles may be manipulated through other means (e.g., flaws in the oracle's code). One blockchain analytics firm reported that more than 50% of the total amount stolen from attacks on DeFi protocols resulted from price manipulation techniques, such as those using oracle manipulation and flash loans.⁸⁹

Tool: MEV Strategies

A developing area in DeFi involves what is known as MEV. MEV strategies encompass any strategy to capture or extract value from the ordering and inclusion of blockchain transactions, and can refer to value taken through arbitrage,⁹⁰ liquidation⁹¹ and the payment of gas fees.⁹² MEV strategies also refer to the exploitation of mempool data⁹³ that

⁸⁹ TRM, *supra* note 22, at 32.

⁹⁰ One type of MEV opportunity occurs through arbitrage. In the case that two crypto-asset platforms are trading a particular token at different prices, arbitragers can purchase the token on the platform with the lower price and sell it on the platform with the higher price. Some arbitragers use complex algorithms that identify profitable opportunities as quickly as possible. The concept of arbitrage is a profit-making strategy in traditional financial markets and is considered a part of efficient market dynamics.

⁹¹ Another type of MEV opportunity occurs through liquidations of loans in DeFi lending/borrowing protocols that fall below their minimum collateral requirement. Typically, such protocols are over-collateralized, i.e., borrowers must post more collateral than they are borrowing. If the loan-to-value ratio exceeds the set limit, a market participant may close out the loan, taking the collateral. Participants can run specialized algorithms to monitor a network for transactions presenting liquidation opportunities and be the first to liquidate a loan. Liquidators can extract MEV from borrowers by liquidating a borrower's loan before the borrower can repay, then profit by selling the borrower's collateral.

⁹² Another type of MEV opportunity is in the receipt of gas fees, or fees paid to miners/validators to process transactions.

⁹³ The mempool consists of transactions that are awaiting processing by the blockchain's miners/validators.

allows persons analyzing the mempool to maximize the profit they can make by the choice and sequencing of transactions to be proposed in a block to be appended to a blockchain. The most common exploitative strategies involving MEV occur when participants with visibility into pending transactions in the mempool can use that information to transact in a way that benefits themselves at the expense of the participants to the pending transaction. Variations of this strategy have been referred to as front running,⁹⁴ “back-running”⁹⁵ and “sandwich attacks.”⁹⁶ Such conduct in traditional markets would be classified as market manipulation.

While there is the potential for MEV strategies on various blockchains, the following descriptions are focused on MEV strategies relating to Ethereum (including through the use of applicable “MEV Boosting Software”). The key players currently are:

- **Developers:** establish a protocol, creating potential for MEV opportunities, or create software tools, such as MEV Boosting Software, to extract MEV.
- **Validators:** determine which transactions pending in a mempool to include in blocks and in what order. Typically, a validator will decide to order the block with the highest gas fee paid at the front and order in this way until the block is complete.
- **Searchers:** seek to identify and capture MEV opportunities, often through the use of complex algorithms called *bots*. Typically, searchers will pay higher gas prices to place their transactions at specific positions within a block. Some validators could have agreements with searchers to effectuate the searcher’s MEV strategies in exchange for a portion of the MEV captured.

⁹⁴ Front-running occurs when a participant observes a pending transaction that is likely to impact the market in a particular way. The participant will propose a transaction based on that information and attempt to have it execute prior to the pending transaction. A miner/validator could execute this attack through re-ordering of transactions on a proposed block; a searcher might attempt to pay a higher gas fee or collude with a miner/validator to move the transaction ahead of the pending transaction. One study calculates losses due to frontrunning attacks between May 2020 and April 2021 to have amounted to more than \$100 million USD. See Agostino Capponi et al., *Inefficiencies in Public Distributed Ledgers* (Dec. 31, 2021), available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3997796.

⁹⁵ Back-running occurs when a participant orders their transaction to be executed immediately after a pending transaction. This type of attack might be profitable, for example, if the pending transaction is to create a new pair for trading on an automated market maker (AMM). An attacker can employ back-running bots to monitor the mempool for new token pair listings or liquidity pools created on decentralized exchanges. When a bot finds a new token pair listing, it can place a transaction order immediately after the initial liquidity and buy as many tokens as possible, leaving only a small amount for other traders to buy later. The bot can then wait for the price to go up after other traders have purchased the tokens and sell at a higher price for a profit.

⁹⁶ A sandwich attack occurs when a participant places two transactions, one before and another right after a pending transaction. Searchers typically use sandwich attacks to extract MEV from unsuspecting traders on decentralized exchanges by manipulating the price of an asset. For example, a trader can identify a token a victim is about to buy and make a trade to push the price up, then sell the token immediately after the victim’s buy order has further increased the price.

- **Block Builders:** construct blocks from proposed transactions. This is done by running algorithms and simulations to order the bundles of transactions in a block template that maximizes profit. Builders then bid for and buy the validators' blockspace, facilitated by one or more relays, so their execution payloads are proposed to the blockchain.
- **Relays:** facilitate communication interfaces that aggregate blocks from builders to provide the most profitable block to proposers for validation.
- **Proposers:** a validator that has been randomly selected amongst all the validators to build a block for a given slot. Proposers may pay block builders if their proposed block is appended to the blockchain.
- **Impacted Users:** engage in transactions on a blockchain whose execution is affected by MEV strategies.
- **MEV Boosting Software:** seeks to maximize MEV opportunities for miners/validators.

MEV strategies are evolving, and more skilled participants, or those who collude with others, may be gaining more income from MEV strategies. This dynamic may lead to increasing concentration effects as those participants can gain more control over the network. The switch from Ethereum PoW to PoS⁹⁷ resulted in changes to the MEV space including, but not limited to, a terminology change from “Miner Extractable Value” to “Maximal Extractable Value,” an increase in MEV rewards in proportion to block rewards, and a change to the entities in the MEV supply chain (such as validators taking the place of miners). This switch may lead to centralizing effects in Ethereum PoS due to reduced constraints on hardware requirements and natural pooling of ETH at entities such as centralized trading platforms who dedicate resources to sophisticated MEV strategies and create economies of scale.

As Ethereum blocks are built from transactions, parties who seek to obtain MEV will compete for transactions. These participants can access transactions to locate MEV opportunities in two primary ways – through searching transactions on the blockchain/mempool or through access to exclusive transaction order flow. As users want their transactions to be included in a block, there is the potential for users to submit their transactions through a limited number of operationally sophisticated entities, and

⁹⁷ Proof of Work (PoW) commonly refers to a blockchain consensus mechanism where miners compete to solve cryptographic puzzles in order to earn the ability to add new blocks to the blockchain and receive a reward of newly-minted crypto-assets. See, e.g., <https://ethereum.org/en/developers/docs/consensus-mechanisms/pow/>. Proof of Stake (PoS) commonly refers to a blockchain consensus mechanism where validators stake crypto-assets to earn the ability to add new blocks to the blockchain and receive a reward of newly-minted crypto-assets. A validator's stake can be reduced (or 'slashed') through behavior harmful to a blockchain. See <https://ethereum.org/en/developers/docs/consensus-mechanisms/pos/>.

validators with a high inclusion rate of transactions are more likely to obtain transaction order flow.

Dominant validators with sophisticated resources to develop MEV strategies are potentially able to propose the most blocks on the network and extract the most MEV, providing outsized rewards compared to validators with less sophisticated or no MEV strategies. This could enable validators providing staking as a service (SaaS) to offer higher returns to customers, potentially attracting more customers to deploy more validator nodes and increase dominance on and centralization of the network. Solo-staking validators could also earn more rewards from the addition of sophisticated MEV strategies to their validation operations. In both hypothetical examples, sophisticated MEV strategies could result in more rewards earned that can then be staked to control more validators on the network thus potentially increasing centralization risk.

These dynamics could lead to market concentration and, as is the case with other concentrated markets, could give a limited number of entities the potential to extract higher profits from users and to behave in other non-competitive manners such as collusion or censorship of certain transactions.

To address this potential centralization issue, core developers in the Ethereum 2.0 network reportedly have proposed a “proposer-builder separation” (PBS), such that a separate group of participants called “block builders” will build a block of transactions and a separate group of participants will accept the block without knowing the contents of any block until after it is selected. With PBS, block builders presumably would accept transactions from users and searchers, entities who submit groups (“bundles”) of transactions in a specific order to builders and compete to build the most profitable blocks possible from those transactions. Block builders would then send blocks through intermediaries known as relayers to block proposers who would simply pick the highest-bid blocks proposed by block builders and validate the blocks. However, this is merely a proposal and any implementation of PBS into the Ethereum core protocol will likely take time.

As MEV can be extracted based on ordering of transactions in a block, current attempts to minimize MEV opportunities center around increasing opacity in the transaction order, either through anonymizing transactions, through batch auction, private mempools and other market structure changes. There have been reported efforts to “democratize” MEV operations through open-source software to lower the entry to MEV operations and apply the PBS concept outside of the core Ethereum protocol.

ANNEX C – DATA GAPS AND CHALLENGES

Accurate and complete data is critical to the understanding of any financial ecosystem. Specifically, regulators rely on data to monitor a financial ecosystem and its participants, to flag abnormalities and trends, and to investigate non-compliance and illegal activity.

The data needs of regulators and supervisors span many dimensions of the DeFi ecosystem. These dimensions include:

- *Transaction-level data*: Transaction-level data between and among all participants, including smart contracts.
- *Protocol-level data*: Smart contract addresses and underlying code, as well as URLs and programming of user interfaces.
- *Participant data*: Data concerning key participants, including software developers, large investors (e.g., whales, VCs, institutional investors, etc.), and governance/voting token holders.⁹⁸
- *Oracles and other DeFi Infrastructure*: The function, inputs and vulnerabilities of infrastructure, including layer 1 blockchains, layer 2 networks, oracles, bridges, etc.

Available data

As highlighted in the 2022 Report and in this report, the provision of DeFi products and services typically involves on-chain and off-chain activities. Therefore, data relevant to DeFi are located on-chain and off-chain, as well. To the extent data is on-chain, it requires tools and expertise to interpret and may not be in human-readable format. To the extent data is off-chain, it could be inaccessible. Even if off-chain data is made available through, for example, a website or API, the data likely is not audited or otherwise verified, and may be unreliable.

Two key metrics derived from on-chain data are commonly associated with DeFi:

- **Aggregate flow statistics**, which allow analysts to gauge the interest market participants may have in a protocol. Flow data can be aggregated either within one blockchain to determine the preeminence of a protocol within a given blockchain, or across all blockchains in order to determine the protocol's importance in the overall DeFi ecosystem. Flow statistics can be derived by looking at changes in values that are originally derived from a blockchain's publicly available data. Alternatively, some protocols contribute statistics and data to various aggregators and/or dashboards.
- **Total Value Locked (TVL)**, reportedly representing the accumulated deposits by protocol users.

⁹⁸ Specific data on institutional investor participation could improve the measurement and understanding of the interconnection risks.

However, these metrics, though commonly used, lack standardisation and should be scrutinized in terms of the information they convey. In the case of TVL for example, certain types of protocols (e.g., liquidity pools, bridges, etc.) use *locked value* to mint new derivative, synthetic or *wrapped* tokens, which can themselves be deposited in other DeFi applications. This feature of DeFi has sometimes been referred to as re-hypothecation and may result in a crypto-asset and its derivative, synthetic, or wrapped version being counted multiple times for TVL purposes (often called *double-counting*.)⁹⁹ It is also important to note that TVL values fluctuate with the underlying market values of the crypto-assets on which they are based. Aggregate flow data tends to be based on TVL data (e.g., changes in TVL for a given protocol), so this data has similar shortcomings as TVL data. In addition, protocol-contributed data, such as TVL, can be inaccurate for other reasons, and it is not always validated against blockchain activity.

A recent BIS report noted three types of metrics that authorities can monitor to assess risks in DeFi: (1) indicators that gauge the overall size and evolution of the sector; (2) indicators designed to assess financial vulnerabilities; and (3) indicators that gauge the potential for spillovers by tracking and assessing interconnections between DeFi, Centralized Finance (CeFi), traditional finance and the real economy.¹⁰⁰

Some metrics that may be useful for analyzing any particular DeFi protocol are:

- TVL
- aggregate flow
- market value of a protocol (measured by the number of outstanding tokens multiplied by the market value of the token -- sometimes referred to as “market capitalization”)
- number of users
- governance structure and operation
- linkages with other entities (i.e., blockchains, bridges, oracles, etc.)
- multi-sig thresholds for changing smart contracts
- numbers of pairs traded, number of trades, liquidity flows in/out, market share by volume (for DEXs)
- lend/borrow amounts and rates, repayments, liquidations, deposits and withdrawals, liquidation thresholds (for lending/borrowing protocols)
- offered yields (for aggregators or liquid staking providers)
- hacks/operational issues

⁹⁹ Certain TVL data providers claim to be able to identify funds that are used multiple times and offer “clean” TVL metrics.

¹⁰⁰ BIS, THE CRYPTO ECOSYSTEM: KEY ELEMENTS AND RISKS 17-18 (July 2023), <https://www.bis.org/publ/othp72.pdf>.

- links to addresses known to have received funds from or used funds for illicit activities
- total value of crypto-assets received from illicit addresses
- links to fraud reports
- VC and other early investors

Some metrics that may be useful for analyzing any particular blockchain are:

- TVL
- aggregate flow
- governance structure and operation
- number of validators or miner nodes
- number of unique addresses on a blockchain
- number of active addresses on a blockchain
- number of transactions
- number and types of smart contracts/protocols
- hacks/operational issues
- links to fraud reports
- developer activity/growth
- gas prices/transaction fees
- MEV opportunities and dynamics
- VC and other early investors

Some metrics that may be useful for analyzing the DeFi market more broadly are:

- Retail investor participation
- TVL per protocol type (i.e., DEX, lending/borrowing, aggregator)
- aggregate flow per protocol type (i.e., DEX, lending/borrowing, aggregator)
- interest in crypto-assets over time based on web searches (media coverage)
- Demographic/geographic ownership of crypto-assets
- Market concentration (e.g., using Herfindahl-Hirschman Index¹⁰¹)
- Interest rates offered in DeFi
- Market prices and volatility
- Open crypto-asset derivative positions, long and short

¹⁰¹ Herfindahl-Hirschman Index (HHI) is a measure of market concentration. It can be used to determine the relative concentration of market share in a given market. See U.S. DEPT OF JUST., HERFINDAHL-HIRSCHMAN INDEX, <https://www.justice.gov/atr/herfindahl-hirschman-index>.

- Stablecoin metrics
- Interconnectedness, through metrics on blockchains, protocols, oracles, bridges, etc.
- VC and other early investors

When using any of the metrics above, it is important to keep in mind that the metric may be based on industry reported, unverified data; nevertheless, the metric may be useful in a relative sense or for monitoring purposes, absent the availability of verifiable data sources. Metrics such as these, for example, can be used to rank activities in terms of their usership and growth and can help regulators begin to construct a picture of what is happening in DeFi. This information could help regulators decide how to allocate resources for potential regulatory action.

Data Gaps

Despite that there are DeFi data providers and analytical tools, some of which are open source, there are significant data elements that are not publicly available. The inaccessibility of relevant data increases the challenges to market surveillance and reduces the ability to monitor activity. For example, ownership concentrations of governance tokens may only be partially visible on-chain, as significant amounts may be held by a centralized crypto-asset platform in an omnibus wallet address. In addition, communication and coordination for project governance often takes place on social media, and typically only individuals granted access to the relevant chat groups can observe relevant discussions. The financial resources of a DAO or DeFi protocol can be opaque, for example, part of the resources could appear on-chain, and part could be held off-chain. Fund transfers relating to DeFi activity can take place on private networks. These transfers can occur between DeFi and other crypto-asset market participants and can involve both fiat currencies as well as crypto-assets for the transfer of value. Increasing the ability of regulators to decipher on-chain data and to have access to off-chain data can provide for a more holistic view of a DeFi arrangement or activity, including its interconnectedness with other market participants and activities.

- **Lack of Financial Reporting:** DeFi protocols typically do not publish formal or informal financial data, nor do they typically engage auditors to opine on their operations or internal controls.
- **Lack of Broad Market Data:** DeFi does not have a self-regulatory organization that collects, compiles and disseminates data across protocol types.
- **Failure to Register/License:** Because DeFi protocols generally have not registered or licensed as exchanges, brokers, dealers, hedge funds, swap dealers, asset managers, or other regulated entities, the protocols may be in non-compliance with requirements that would facilitate regulators' ongoing oversight activities that include understanding and scoping the entirety of a protocol's operations. Jurisdictions maintain data sets for entities subject to regulation for particular activities.

Data Providers

Data providers for crypto-asset related data are highly specialized, fragmented in what they offer, and can be expensive. Providers tend to cover different data sets and analyze different aspects of the data. For example, some cover various blockchains and/or crypto-assets. Some focus on transaction analysis on particular blockchains and provide, for example, risk-scoring of entities for AML purposes. Others focus on smart contracts and potential vulnerability analysis. Still others offer more traditional financial data and research, such as pricing, research, and market trends. In addition to vendors, DeFi data can also be accessed through a variety of online interfaces. Use of these tools can require specialized training and significant resources and cost. Accordingly, it may be difficult and costly to arrange comprehensive coverage across the entire DeFi market. It is also important to assess where a particular vendor sources its data to evaluate whether there are risks that the underlying data is incomplete or inaccurate. The following table identifies some, but not all, data needs and potential gaps/challenges for illustrative purposes.

Table: Data Needs and Gaps

Layer	Potential Use Cases for Regulators	Data Needs	Data Availability	Potential Gaps/Challenges
Settlement Layer (including blockchains and Layer 2 solutions)	Assessing compliance with applicable laws and regulations; analyzing consensus mechanisms and activities; analyzing transactions and transactional dynamics; analyzing MEV activities	Blockchain transactional data; mempool data	On-chain data; node peers, client distribution, IP addresses; mempool data; MEV data; online blockchain explorers and other data analytics providers	On-chain data is voluminous, can be difficult to interpret, and requires specialized skills and significant infrastructure costs; mempool data may not be available, is unique to individual nodes, and complex to analyze; transactional information is pseudonymous and can be anonymity enhanced
Asset layer (including tokens)	Assessing compliance with applicable laws and regulations; Analyzing token creation, issuance, distribution,	See above; smart contract code concerning tokens	See above; GitHub/GitLab (central repositories for code underlying many smart contracts); market data from DeFi	See above; there is no assurance that the information available on GitHub/GitLab or through blockchain explorers reflects what occurs on-chain; source code is not always publicly

	and functionality; monitoring fund flows, including proceeds of illicit activity		protocols and off-chain centralized crypto asset platforms; social media and other off-chain sources	available; Market data is not always audited, data standards and aggregation methods are fragmented and lacking
Smart contract layer (including DeFi protocols, DAOs and bridges)	Assessing compliance with applicable laws and regulations; assessing functionality, governance, and vulnerabilities; monitoring systemic importance and interlinkages	See above; smart contract code and other data concerning DeFi protocols	See above; smart contract analysis and assessment tools; governance voting websites; Market data for DeFi protocols, DAOs and bridges assets under management	See above; reading and analysing smart contracts requires a specialized skillset
Application Layer (including user interfaces, websites, aggregators)	Assessing compliance with applicable laws and regulations; monitoring sector developments and growth	See above; website, web extension, or mobile/desktop application of a given user interface or aggregator; information on parties maintaining the user interface or aggregator; code for optimisation, trading and other algorithms	See above; disclosures; VPN blockers; user traffic; integrations with other platforms	See above; the underlying on-chain smart contracts and functionality could be obfuscated

ANNEX D – DEFI GOVERNANCE

Broadly, governance refers to the actions and processes managing the control and direction of an entity. Governance encompasses a number of elements, including the allocation of authority, both legal and operational; the ways that authority can be, and is, exercised; and the broader set of practices, policies and procedures by which an entity is organized and administered. An entity’s governance structure dictates the mechanism through which decisions are made, directions are given, and ultimately, how control and influence are exercised within the entity.

Blockchain “Layer 1” Governance

Governance of the settlement layer (layer 1) of a typical blockchain typically occurs both on-chain and off-chain. For major blockchains today, core developers usually put forth a proposal for debate, largely through an informal process using off-chain social media-based communications among core stakeholders, including protocol developers, node operators and validators. Core developers may consider input from other stakeholders and the proposal may evolve until the core developers propose a final implementation. At that point, adoption of a change to the core protocol of a blockchain will depend upon a majority of validators choosing which version of the core protocol they will run.¹⁰²

This process suggests several observations. First, it is the developers who must code any agreed proposal for it to be implemented. Thus, protocol developers may have outsized influence relative to other stakeholders in the final form any such proposal takes. It is also the case that users and other stakeholders may have limited access to all the information regarding a proposal including its underlying code. Also, whether and to what extent the final outcome is adopted is decided ultimately by the network validators, who determine which version of a layer 1 core protocol to participate in. To the extent that there is disagreement about adoption of a core protocol change, a hard fork may result in a split of participants continuing to transact on two separate networks. Control of validator nodes can be significantly concentrated in major blockchains. This may result in de facto control of a layer 1 blockchain by a small group, i.e., core developers and validators.

Decentralization is a term that can describe various aspects of a DeFi arrangement or activity, such as ownership of an enterprise providing a product or service, voting power over the enterprise or any aspect of it, control of user or investor assets, network design of an underlying blockchain (settlement layer), or off-chain infrastructure such as web servers that provide application components, among others. There is no agreed definition (even among industry participants) of what causes an arrangement or activity to be considered

¹⁰² See ETHEREUM, INTRODUCTION TO ETHEREUM GOVERNANCE, <https://ethereum.org/en/governance/> (providing a summary of how governance for the Ethereum network works, including key stakeholders, process steps, and features).

decentralized, such that there is no concentration of ownership, voting power, or control as to the product or service, enterprise or user assets. While those who offer DeFi products or services may claim to be decentralized, most DeFi arrangements may in reality have a significant level of centralization. For example, founders or other participants may retain control or significant influence over aspects of an arrangement or activity. Even as to protocols and smart contracts that are subject to change through votes of governance tokens, ownership and voting control of governance tokens may be concentrated in the hands of a few and therefore they may continue to be controlled by centralized parties. In some cases, those aspects that are up for vote are not ones that relate to the operation of a project at the enterprise level. Most DeFi arrangements and activities today rely on centralization in one or more areas and are decentralized in name only.

It is worth positing that DeFi products and services are a result of the person(s) and entit(ies) that create, offer and maintain them. These persons and entities typically determine from a project's inception how participants are or can be organized, including whether participants will or can organize as a *DAO*, a foundation, or something else. They also often design ways for participants to influence how certain aspects of a project's protocol will operate in the future, including by giving certain participants the ability to alter smart contracts or other aspects of the project's protocol. These ways can include the use of administrative keys,¹⁰³ multi-sig and time-lock mechanisms,¹⁰⁴ code updates, and voting tokens (often referred to as governance tokens). These entities and individuals in most cases establish the fundamental features of the protocol, such as how decisions will be made, who makes those decisions and for what aspects of the project, and who has access to information concerning those decisions. This section explores how novel organizational structures (*DAOs*) and governance structures (governance/voting tokens) can be analysed for the purpose of determining control or influence.¹⁰⁵

The 2022 Report noted that some DeFi market participants claim that governance is decentralized. DeFi projects may use various mechanisms to distribute governance roles, such as *DAOs* and governance/voting tokens, in order to provide evidence of decentralization. However, there are many different permutations of governance arrangements and the role they play within an enterprise. The fact that elements of a DeFi

¹⁰³ Administrative keys refer to cryptographic key information that permits a holder of that key information to make certain changes to a smart contract including, potentially, by permanently disabling the smart contract. Administrative keys effectively can place ultimate control over a smart contract in the hands of the administrative key holder(s).

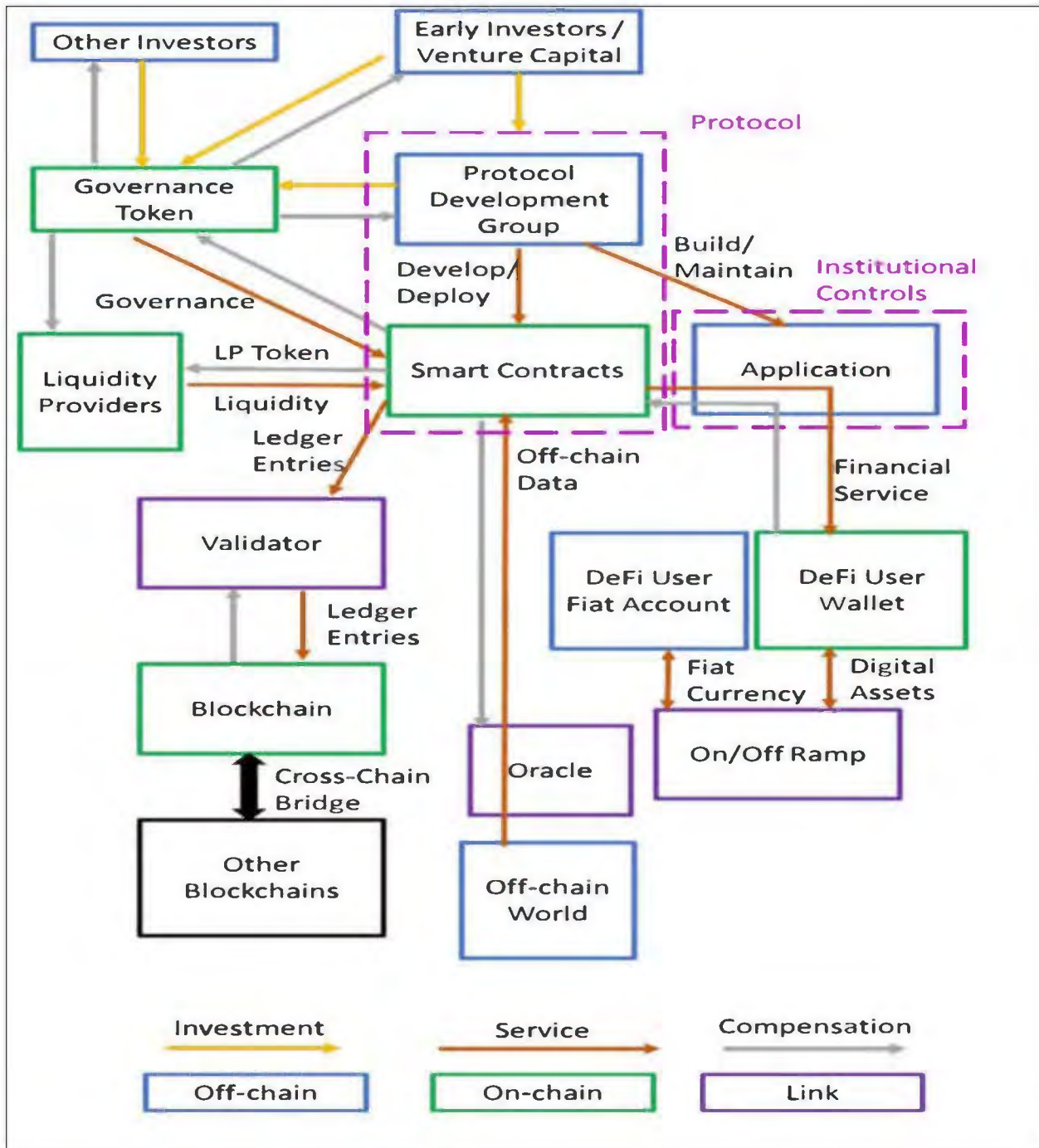
¹⁰⁴ Multi-signature ("multi-sig") refers to smart contracts that require a number of holders of cryptographic key information to agree on an action before it takes place, indicating that agreement through using the key information to "sign" a transaction. Some multi-sig mechanisms require unanimous agreement, while others require a given number of a set of participants to agree to the action. Time-lock smart contracts implement delays in executing a function until a given amount of time has passed. Such delays can allow for additional governance activities (such as deliberations) before the action considered in a time-lock contract is performed.

¹⁰⁵ A *DAO* can, but need not, employ governance or voting tokens. Conversely, a project that uses governance or voting tokens need not be a *DAO*.

arrangement or activity may be viewed as distributed or subject to community vote does not mean that the arrangement or activity itself is decentralized. As discussed below, governance/voting tokens currently may play a limited role in affecting the substance of smart contracts and play almost no role in managing or overseeing the entity and developers of the smart contracts and protocol at the enterprise level. Furthermore, while DAOs are presented as a solution to community governance, DAOs and their development are still in the nascent stages. Additionally, while a particular DeFi protocol may aim to be resistant to censorship or collusive control, there may still be an ongoing dependency of protocol development and functionality on central actors, such as developers or founders. In DeFi, the issue of governance must be evaluated from both the smart contract or protocol level as well as at the enterprise level. Examining DeFi project's governance structure will typically reveal potential regulatory touchpoints.

Enterprise Level - The Big Picture

The 2022 Report noted that the provision of DeFi products and services relies on the contributions of various stakeholders, each of whom has an important role to play and expects to earn a profit through participation. These stakeholders include the developers and promoters of a DeFi project, investors in the project, users, service providers, and blockchain networks. The 2022 Report includes a detailed discussion of the *Big Picture* to assist in analyzing DeFi arrangements and activities at the enterprise level. In particular, persons and entities develop and deploy the software and other components through which DeFi operates. These persons and entities often obtain funding for their development efforts from investors in traditional capital raising and via crypto-asset offerings. As protocols are developed, these persons and entities often create a reserve or treasury to hold fiat currencies or crypto-assets for purposes of funding future refinements and development of the protocol. These persons and entities may either control these reserves themselves or may create a different organization to manage the reserve or treasury. The specific organizational forms that develop and deploy protocols and those that are responsible for ongoing activities can vary. Common types include traditional corporate entities, foundations that often hire others to work on the protocol, and DAOs. DAOs are becoming increasingly an organizational choice for DeFi projects. Whatever organizational form a particular DeFi project takes, and whatever tools it may use to carry out its operations, it is important to focus on the DeFi arrangement or activity at an enterprise level. Often, this viewpoint will reveal who has control or sufficient influence over the operations of the enterprise so as to be responsible for its activities. Below is a reproduction of the Big Picture from the 2022 Report, which contains a detailed explanation and breakdown of each component of the Big Picture: capital formation, development and deployment; use and investment; and settlement.



Decentralized Autonomous Organizations (DAOs)

As the 2022 Report explained, some DeFi market participants experiment with new organizational structures in an attempt to achieve more decentralized systems. A DAO is a relatively new type of organizational structure that purportedly focuses on community, as compared to centralized, governance. There is no agreed definition of what constitutes a DAO, even within the industry. DAOs and their structures are evolving. According to one

industry source, as of August 2023, there are more than 25,000 DAOs controlling treasuries worth \$22.5B.¹⁰⁶

In brief, a DAO typically is a form of coordination for a group of people who coalesce around common goals. DAOs vary in structure and complexity. They can use smart contracts and other technologies to facilitate a number of processes, such as communicating, coordinating, and incentivizing individuals to act collaboratively.

DAOs may have different legal characterizations depending on the particular jurisdiction. In some jurisdictions, a DAO may be recognized as a unique and separate type of legal entity. In others, DAOs may be analyzed under frameworks that already exist for partnerships, joint ventures, associations, limited liability entities, or similar structures.¹⁰⁷ The legal organizational treatment for any particular DAO will depend on the facts and circumstances, including how it is structured, and the applicable law within a jurisdiction in which the DAO has a presence for purposes of any particular authorities' remit. However, to enable the principle of "same activity, same risk, same regulatory outcome," regardless of the legal characterization of a DAO from an organizational standpoint, the focus from a regulatory and supervisory standpoint typically will be on the activity the DAO is engaging in, such as whether the DAO's activities or structure involves a financial instrument, including a security, or related activities, in a particular jurisdiction.

Why are DAOs Claimed to be Decentralized?

DAOs are, at their essence, organizations of humans. DAOs are described as "decentralized" because they may claim that they operate without reliance on centralized management. DAOs are described as *autonomous* because they claim (or aim) to operate in an automated manner in accordance with the rules encoded in self-executing code (smart contracts) rather than in accordance with traditional articles of association or shareholders agreements.¹⁰⁸

The common perception may be that in DAOs, entity level decisions such as what action the DAO takes or changes or alterations to the operation or activities of the DAO are determined by its membership, and are not dependent on, determined by, or controlled by any person or group of persons. In practice, however, the extent of actual voting

¹⁰⁶ <https://deepdao.io/organizations>.

¹⁰⁷ See, e.g., CFTC v. OokiDAO, Case No. 3:22-cv-05416 (N.D. Ca. June 8, 2023), <https://www.cftc.gov/PressRoom/PressReleases/8715-23> (entering a default judgment order against a DAO whom CFTC charged with operating an illegal trading platform and unlawfully acting as a futures commission merchant); Sarcuni v. bZx DAO, Case No. 22-cv-618-LAB-DEB (S.D. Ca. Mar. 27, 2023), <https://casetext.com/case/sarcuni-v-bzx-dao> (finding that plaintiffs stated facts sufficient to allege that a general partnership existed among token holders of a DAO).

¹⁰⁸ Often, token holders will have some ability to participate in certain decisions, such as aspects of a project's protocol, electing working group contributor or leaders for the DAO, or administering the DAO's treasury. Often, in practice, a DAO's creators, or others, will still exercise control or sufficient influence, whether through a concentration of voting power, administrative or other gatekeeping functions, or otherwise.

participation can be low¹⁰⁹ and a DAO's *governance* actions through voting tokens can have a very concentrated distribution, with less than 1% of token holders controlling 90% of voting power of DAOs.¹¹⁰ Moreover, the types of decisions that can be voted on can be quite limited.

Whether and to what extent any particular DAO actually is decentralized or autonomous depends on the facts and circumstances and requires an in-depth examination of how that DAO is structured and how it is operating in reality.

Regulatory Actions Involving DAOs

The DAO Report

In 2016, a project called The DAO launched on the Ethereum blockchain, raising \$150 million in ether from investors in exchange for crypto-assets called DAO tokens, which entitled holders to vote on blockchain-based projects that would receive funding from The DAO. The DAO's plan was to invest funds in such projects, with profits flowing back to DAO token holders. Before the DAO had commenced funding projects, an attacker exploited a bug in the DAO's smart contract code and was able to divert about one-third of the funds held in the DAO's treasury. A period of uncertainty followed, with the members' remaining funds essentially immobilized within the DAO. Ultimately, and controversially, the effects of the attack were reversed (and the funds returned to investors) through a process known as forking, in which the blockchain was essentially split into two separate chains (Ethereum and Ethereum Classic). On the Ethereum chain, DAO funds could be reclaimed by investors. On July 17, 2017, the US Securities and Exchange Commission (SEC) issued a *Report of Investigation Pursuant to Section 21(a) of the Securities Exchange Act of 1934: The DAO* (Exchange Act Rel. No. 81207) (the DAO Report), explaining the application of US federal securities laws to The DAO. The DAO Report explained that The DAO tokens had been offered and sold as investment contracts, and therefore securities, and that the offering should have been registered under the federal securities laws since no exemption to registration applied. The DAO Report also made clear that the US federal securities laws may apply to various activities without regard to the form of the organization or technology used.¹¹¹

¹⁰⁹ Youssef Faqir-Rhazoui, Javier Arroyo & Samer Hassan, *A comparative analysis of the platforms for decentralized autonomous organizations in the Ethereum blockchain*, 9 J. INTERNET SERV. & APPL. 12 (2021), <https://jisajournal.springeropen.com/articles/10.1186/s13174-021-00139-6>.

¹¹⁰ *Dissecting the DAO: Web3 Ownership is Surprisingly Concentrated*, CHAINANALYSIS (June 27, 2022), <https://blog.chainalysis.com/reports/web3-daos-2022/>.

¹¹¹ See Release No. 81207, U.S. Securities and Exchange Commission, Report of Investigation Pursuant to Section 21(a) of the Securities Exchange Act of 1934: The DAO (July 25, 2017), <https://www.sec.gov/litigation/investreport/34-81207.pdf>.

The Ooki DAO

On September 22, 2022, the US Commodity Futures Trading Commission (CFTC) filed an enforcement action in district court against a DAO called the Ooki DAO, alleging that the Ooki DAO was “illegally offering levered and margined retail commodity transactions in digital assets; engaging in activities only registered futures commission merchants (FCM) can perform; and failing to adopt a customer identification program as part of a Bank Secrecy Act compliance program, as required of FCMs.”¹¹² The district court permitted the CFTC to achieve service of the Complaint by alternative means, consisting of providing a copy of the summons and complaint through the Ooki DAO’s “Help Chat Box,” and an online discussion forum on the Ooki DAO’s public website.¹¹³ On June 8, 2023, the district court judge entered a default judgment order that requires the Ooki DAO to pay a civil monetary penalty; orders permanent trading and registration bans; and orders the Ooki DAO, as well as any person or entity acting on its behalf providing web-hosting or domain-name registration services in the US, to shut down the Ooki DAO’s website and remove its content from the Internet. The Court held that the Ooki DAO is a person for purposes of the Commodity Exchange Act and thus can be held liable for violations of the law.¹¹⁴

Different Types of DAOs and their Uses¹¹⁵

Like other organizations, DAOs are heterogeneous, and their goals, scale, and participants can vary widely. DAOs can be organized for various stated purposes, whether charitable, profitable, social or technological. Although most DAOs have been focused on online-

¹¹² See CFTC v. Ooki DAO, Civ. No. 3:22-cv-5416 (N.D. Ca. Sept. 22, 2022), <https://www.cftc.gov/PressRoom/PressReleases/8590-22>.

¹¹³ See CFTC v. Ooki DAO, Civ. No. 3:22-cv-05416-WHO (N.D. Ca. Dec. 20, 2022), <https://storage.courtlistener.com/recap/gov.uscourts.cand.400807/gov.uscourts.cand.400807.63.0.pdf>

(holding that service has been achieved).

¹¹⁴ See Release No. 8715-23, Statement of CFTC Division of Enforcement Director Ian McGinley on the Ooki DAO Litigation Victory (June 9, 2023), <https://www.cftc.gov/PressRoom/PressReleases/8715-23>.

¹¹⁵ Bud Hennekes, *The 8 Most Important Types of DAOs You Need to Know*, ALCHEMY (April 6, 2022), <https://www.alchemy.com/blog/types-of-daos>; Georgia Weston, *Know The Different Types Of DAOs*, 101 BLOCKCHAINS (April 29, 2022), <https://101blockchains.com/types-of-dao/>; *Full 2022 Guide to Different Types of DAOs*, MORALIS WEB3 TECHNOLOGY (2022), <https://moralis.io/full-2022-guide-to-different-types-of-daos/>.

related projects, their presence has been expanding.¹¹⁶ DAOs can be grouped into a number of general categories, each purportedly designed to serve a specific purpose.¹¹⁷

DAO Participants

The following participants are generally involved in a DAO:

- **Developers and Founders:** Developers and/or founders typically create, code, promote and deploy a DAO, including its associated smart contracts. Typically, they establish the structure through which governance will be effectuated.
- **Members:** Some DAOs are set up so that membership is based on the ownership of tokens, often called DAO tokens or governance tokens. These typically provide certain types of voting rights, which may or may not relate to the operation of the DAO or its activities. Others establish their membership in other ways.
- **Employees/Contractors:** DAOs can hire individuals or entities for a wide range of roles, including for accounting and legal services. Whether or not a DAO has a manager or a managing group responsible for hiring and other managerial or administrative duties will depend on the particular DAO.
- **Working Groups:** Many DAOs have adopted a division of labor into working groups (also known as workstreams or subDAOs), each of which may comprise a group of members or other contributors to the DAO. As compensation for serving on such a working group, a contributor typically is paid by the DAO from its treasury. Working groups have focused on such topics as product development, operations, growth and marketing. These groups might manage things like

¹¹⁶ Amir Ghavi et al., *A Primer on DAOs*, THE HARVARD LAW SCHOOL FORUM ON CORPORATE GOVERNANCE (Sept. 17, 2022), <https://corpgov.law.harvard.edu/2022/09/17/a-primer-on-daos/>.

¹¹⁷ Industry reports describe various types of DAOs, including the following: **protocol DAOs** (facilitate operational choices about certain aspects of a DeFi protocol, such as a DEX or borrowing/lending protocol); **grant DAOs** (facilitate funding of projects, typically associated with a DeFi protocol or ecosystem; typically are established by the protocol developers or close affiliate; typically disburse treasury funds to support projects to develop a protocol or ecosystem); **philanthropy DAOs** (support socially responsible initiatives); **social DAOs** (bring together individuals to create communities and working groups around social issues; often form exclusive memberships to organize social events or to provide some other social benefit to members); **collector DAOs** (pool funds to purchase something, often a digital good, such as a 'blue chip' NFT or other digital collectible; each member typically owns a pro rata share of the item purchased, corresponding to their pool input); **investment and venture DAOs** (pool capital to invest, typically in DeFi start-ups and protocols; aim to provide access to investment portfolios that may not be available in traditional finance); **media DAOs** (create media platforms, often aiming to create platforms where content creation is driven by the community and individuals in the network are incentivized to contribute based on the ability to earn profits from participation); **subDAOs** (manage specific functions such as operations or partnerships within the DAO); **employment DAOs** (facilitate matching of human skills with demand; contracts members' skills to other individuals and entities).

upgrades to a protocol, grants programs to incentivize protocol usage, and promotional campaigns, respectively. In addition, DAO collectives have formed to fund and support development.¹¹⁸ These types of organized management are a part of the facts and circumstances analysis when evaluating the treatment of DAOs under applicable regulatory frameworks.

Third-Party Service Providers: DAOs often hire third parties to provide legal, recordkeeping, accounting, banking or other services. There are different mechanisms a DAO may use to engage these entities, many of which may entail human involvement in selection and retention of these third parties. A DAO could authorize, through a governance vote or otherwise, the use of third-party service for a particular purpose. The DAO could also authorize an individual or a group to create and capitalise a traditional corporate entity for the purpose, for example, of entering into a corporate agreement on behalf of the DAO or delegating a scope of decision-making to a particular individual or group. DAOs also use third-party service providers to host forums for discussion and voting, as well as to store code, create open-source projects and build software. Some third-party service providers offer a combination of these services. Third party services are also used to enforce *token-gating* where access to certain information is restricted based on ownership of a token, particularly the DAO's token. The extent to which these DAO activities are initiated or controlled by a person or group of persons is a facts and circumstances determination.

DAO Formation

DAOs are created by persons or entities who typically will sell crypto-assets or otherwise raise capital to further the DAO's stated purpose. The DAO typically will issue crypto-assets in accordance with a plan of distribution put in place by the persons or entities.¹¹⁹ Often the creators of a DAO will deposit the DAO's assets into its treasury and assert that the management of the DAO will take place through the votes of token holders. Treasuries are generally used to fund the DAO's initiatives, and typically comprise tokens from an initial distribution and fees charged to users by a protocol for its use.

¹¹⁸ See, e.g., 5. Pilot: May '22 - May '23, PROTOCOL-GUILD, <https://protocol-guild.readthedocs.io/en/latest/5-initial-pilot.html>.

¹¹⁹ DAO members typically become members by purchasing or otherwise obtaining crypto-assets issued by the DAO (DAO tokens) although, depending on design, some members need not hold tokens. DAO tokens typically can be purchased by anyone interested in joining a DAO, in exchange for other crypto-assets or for some form of contribution or service to the DAO. DAOs distribute DAO tokens in many of the same ways other crypto-asset token issuers distribute them, i.e., through direct distribution to purchasers or users, through initial purchasers who then on-sell them to a broader set of purchasers (akin to underwriting), or through platforms or protocols (who, themselves, could be akin to issuers, brokers or dealers). They may also distribute them through "air drops," often to founders, members who provide services to the DAO, members who have been most actively involved in governance of the DAO, other crypto-asset holders, or users of protocols that the DAO is associated with. DAO distributions can occur through private sales, vesting and liquidity mining, as well. Once issued by a DAO, DAO tokens typically can be traded for other crypto-assets on DEXs, deployed into DeFi protocols, and often are traded on CeFi crypto-asset trading platforms.

In theory, a DAO's governance rules could be encoded in smart-contracts on the blockchain on which it depends and all on-chain activity associated with a DAO could be immutably recorded on the blockchain, providing transparency to observers.¹²⁰ In practice, however, DAOs rely critically on input from human actors for their operation, including through activities that occur off-chain. DAOs often are accompanied by their own foundational documents that describe the goals of the DAO.¹²¹ Some of those foundational documents have been described as constitutions, covenants, manifestos, charters, codes of conduct, and guidelines, among other descriptions.¹²²

As it is costly to record every action to a blockchain, much of a DAO's activities typically occur off-chain. Off-chain communication tools are used to increase efficiency, facilitate onboarding, discuss proposals, and come to an agreement with members to achieve their goals.¹²³ The most popular communication tools used by DAOs today include popular social media platforms. Each of these services have varying terms of service and features. Thus, contrary to widely made assertions, while a DAO may involve elements of governance carried out by smart contracts on a blockchain, it also includes off-chain governance involving human interaction and negotiation.¹²⁴

DEFI VOTING STRUCTURES

A major tenet of DeFi is to eliminate reliance on centralized institutions, including centralized governance structures. Some DeFi entities attempt to effectuate governance in ways that claim to avoid centralized control and to flatten hierarchies. The stated effort is to spread power among a broad participant base. Proponents of DeFi assert that code can be deployed to obviate the need for traditional centralized governance mechanisms. Nevertheless, and notwithstanding new approaches to governance, it has become clear that control and decision-making authority in DeFi projects as a practical matter remain concentrated, and a relatively small number of participants may in reality exercise dominion over a DeFi project or protocol, including the ability to control or influence its operation.

¹²⁰ Some proponents of DAOs proffer that a DAO's activities can be managed completely on-chain so that anyone can observe its activities, audit its smart contract code, and participate - giving both investors and workers greater transparency and involvement into the inner workings of the organization, with the same opportunities to profit or benefit from its operations.

See <https://github.com/metagov/constitution-template/tree/main/constitutions> (a repository of DAO constitutional documents).

¹²² See, e.g., <https://constitutions.metagov.org/article>.

¹²³ Hatice Ugurel, *The best communication and consensus tools for DAOs in 2022*, MEDIUM (Apr. 12, 2022), <https://medium.com/multytude/the-best-communication-and-consensus-tools-for-daos-in-2022-7a8a26134204>.

¹²⁴ BlockScience, *Exploring DAOs as a new kind of institution*, MEDIUM (Mar. 31, 2021), <https://medium.com/block-science/exploring-daos-as-a-new-kind-of-institution-755eb19996b>.

As observed in DeFi as currently operating, governance mechanisms can broadly be described in two categories: social and algorithmic. Social governance mechanisms facilitate organization and communication across networks of people, often using social media tools and fora.¹²⁵ Algorithmic governance mechanisms program rule sets into code, smart contracts and DLT-based protocols, which will be executed by computer nodes performing functions across a DLT network.¹²⁶ In most cases, DeFi governance is carried out by some combination of social and algorithmic mechanisms. However, it is important to note that, while most DeFi projects claim to rely to a varying degree on algorithmic governance mechanisms, code itself is created and deployed by humans and requires ongoing human participation to effectuate maintenance, development and upgrades. The projects themselves also rely on social governance mechanisms.

Also, various activities within these two types of mechanisms – social and algorithmic – can and do occur on-chain and off-chain. For example, a governance proposal for a particular DeFi project may first be introduced to a community off-chain, on a project’s website, or a social media forum. The proposal may then be posted to, discussed and iterated upon in an off-chain forum dedicated to project governance, and may be the subject of informal polling to gauge community sentiment.¹²⁷ In some cases, a proposal may need to secure sufficient support in an off-chain poll or vote in order to proceed further. Once a proposal has gained informal consensus, it may proceed to a formal voting process that can be implemented on-chain, off-chain, or through a hybrid model.

Governance (Voting) Tokens

DeFi projects often attempt to distribute governance through the use of crypto-assets that confer certain voting rights. These are often referred to as *governance tokens* or simply *voting tokens*. As described in more detail in the 2022 Report, DeFi projects – whether or not they are organized as DAOs – attempt to argue that the existence of these governance or voting tokens provide decentralized governance. Such claims, however, must be examined to determine how a particular protocol actually is managed and what voting rights any of the governance or voting tokens provide, and whether at the entity or at the smart contract level. The following section describes how governance tokens are being used

¹²⁵ See *Governance of Web3 Networks & Other DAOs*, GITHUB.COM, <https://github.com/sherminvo/TokenEconomyBook/wiki/Governance-of-Web3-Networks-&-Other-DAOs> (“Social governance refers to the human decision-making process over when and how to conduct potential protocol upgrades in a Web3 network or in the smart contract code of a DAO. It deals with the institutionalized decision-making process of how stakeholders in the network receive necessary information to make educated decisions about future protocol upgrades.... However, navigating in a sea of information, and evaluating the authenticity and credibility of that information and signaling is difficult.”).

¹²⁶ 2022 Report, *supra* note 5, at 3 (for a discussion of “smart contracts”).

¹²⁷ DeFi project sponsors may provide a forum for participant discussion and community feedback. Many projects use a template/white label forum service hosted under a specific project URL. See, e.g., <https://www.discourse.org>. Project sponsors may also take the lead in soliciting feedback, coding specific proposals, requesting votes, and promoting adoption.

in DeFi. It identifies their role and uses, the technical aspects of how they function and their limitations, and also highlights potential risks that arise from their use.

As described in the 2022 Report, governance (or voting) tokens purport to confer certain voting rights on their holders (or a holder's delegated persons, if the voting rights can be delegated). Typically, voting tokens entitle their holder to participate in certain aspects of governance (e.g., to make proposals to be submitted to a vote of the members and to vote on proposals made by other members) and/or to share in any profits the project generates (typically through the use of the governance token in the protocol in some way).¹²⁸

When a project determines it will use voting tokens, it can establish the rules of voting in several respects, including the type of voting structure. Voting tokens confer voting rights that may be exercisable only by the token holder or that may be delegable by the holder to another. Voting power may be proportionate to the number of tokens held, can be one vote per participant, or there can be some other form of voting structure, such as a representational or delegated voting structure, to combat a lack of continued interest in governance among many participants. Whatever the structure used, it is important to focus on what types of decisions vote holders can actually vote on, among other factors discussed above. Some common approaches to voting structures have emerged and are described in industry reports.¹²⁹

First, ownership of governance tokens for any given project can be highly concentrated, either because the project initially distributed the tokens in a way that placed large concentrations in a single person or a group of persons, or because, due to the transferability of such tokens, certain entities then acquired significant shares of tokens, or voting rights relating to such tokens. Based on on-chain data, it appears that, for many DeFi projects, much of the voting power resides in a few wallets. Data also shows that governance token holders tend to be inactive in governance voting. The participation for most of the proposals reportedly involved less than 10% of the total outstanding supply of tokens.

¹²⁸ In order for a project that uses governance tokens to do this, at a minimum, the governance tokens must be widely distributed among project participants and grant them the actual ability to participate in the management of a project, and a dispersed community of those participants must actually participate in the management of the project through community voting. Examining publicly available data regarding current DeFi projects indicates that this is not achieved in practice and there are practical limitations to its achievement.

¹²⁹ Some of these structures are referred to as **quorum** (requiring a certain threshold of voters); **permissioned relative majority** (no minimum voting requirement); **quadratic** (modified form of ranked choice voting); **conviction** (based on the aggregated preference weighted by time); **multi-sig** (voters signal on proposals while a committee votes); **liquid democracy** (participants delegate their votes). See e.g., Eric Arsenault, *Voting Options in DAOs*, MEDIUM (Dec. 15, 2020), <https://medium.com/daostack/voting-options-in-daos-b86e5c69a3e3>; *DAO Voting Mechanisms Explained [2022 Guide]*, LIMECHAIN (May 23, 2022), <https://limechain.tech/blog/dao-voting-mechanisms-explained-2022-guide/>.

Second, a project can have voting tokens that allow the voting rights associated with the tokens to be delegated, lent, or otherwise assigned, such that someone other than the token owner may, in fact, exercise the power to vote that token. Thus, regardless of voting token ownership concentration, voting power itself, through delegation, can be concentrated in a single person or a group of persons that may or may not have a direct financial ownership or other interest specific to that project.

Third, the types of decisions that can be voted upon with respect to any particular project vary and may be limited to those that do not significantly impact the management of the project, or the management of the entity creating or involved with the project. Certain fundamental features of a project's protocol may be fixed in the original protocol code and not subject to change or may be subject to the control of a single person or a small group of persons. Further, token holders and their votes may be treated as advisory guidance to a controlling person(s) rather than as a binding decision. Votes may merely ratify or accede to actions already taken that impact a DeFi protocol or project. It may be the case that a protocol's core developers, operators or other select participants retain the sole ability to change core aspects of a protocol, and that the scope of proposals that governance token voters can vote on is limited. In fact, the project organizers may minimize governance intentionally so as to ensure that a protocol's fundamental operation is not subject to change. This is a concept that has been referred to as "governance minimization" where protocols are designed to reduce the chance that a core aspect of the protocol will change in order to enhance the long-term dependability of the protocol, especially if it is "composable" (i.e., compatible) with other protocols or elements in the DeFi ecosystem. As composability is a feature of DeFi, allowing for developers to build upon open-source code and integrate with other protocols, a project may design its protocol so as to minimize ways that the core code of the protocol can be changed. In other words, in order to "trust" a particular protocol, a user typically would want to know that the protocol acts reliably, predictably and that someone would be accountable for any deviation. Governance minimization may also help protect a protocol from certain types of attacks. If, for example, governance token voters could use their power maliciously to access funds locked in smart contracts or change core terms to exploit a protocol, this would reduce the security and resilience of the protocol.

Fourth, a number of factors, apart from the ownership concentration, voting power distribution and the aspects subject to change by vote, may diminish the degree to which governance is decentralized. These include policies and procedures that have been set regarding the process for proposing project changes, voting on such changes (e.g., quorum requirements, nature of the vote, timing, etc.), and implementing those changes.

Analyzing Governance Structures

When analysing a DeFi project's governance structure -- whether or not it is organized as a DAO -- it is critical to understand who can change which aspects of the project and how. Determining how governance works in any particular DeFi project requires a careful assessment. In analysing governance/voting token structures, it is useful to determine, among other things:

- who issued the governance/voting tokens and how were they offered, sold and/or distributed, including to the core team, investors and the community, and whether there were any limitations to voting, such as by time-locks, thresholds, or other means;
- who controls the governance/voting token issuer and what type of entity is that issuer;
- who controls the funds of the issuer and how;
- what type of legal entity, if any, is used to enter into agreements, contracts and capital raises;
- which aspects of a project can be altered by token vote, and whether there are some aspects that only select individuals can alter (i.e., assigning and revoking powers delegated to the operator/core development team, creating budgetary proposals, changing core protocol parameters);
- who decides which aspects of the project can be altered by token vote, and whether and how this can be altered;
- whether there is a minimum threshold of token ownership or voting power for proposing a governance change, voting on a proposal, or passing the proposal;
- whether governance/voting requires additional technical functions, i.e., delegation or locking into smart contracts or *staking*;
- whether there are any limitations on who can vote on a proposal (all users/token holders, only governance/voting token holders, other token holders, or only the operator/core development team);¹³⁰
- whether there are any individuals with any gatekeeping function, i.e., veto power, power over whether a proposal is put to vote, power over whether a proposal, if approved, actually is implemented;
- what is required to implement a particular proposal, i.e., whether the alteration is effected automatically on-chain or requires select individuals to implement, i.e., with an administrative key;
- whether there are aspects of the project that can be changed unilaterally by the operator/core development team (e.g., through an administrative key);
- in reality, how concentrated is the proposal, voting, and implementation power of decision-making; is the decision-making spread across a large group of disparate persons or is a smaller group of persons exerting actual control;
- What role do founders and/or developers play;
- Are any services being used to facilitate governance; and
- How are processes and the implementation of decisions automated.

In the use of governance/voting tokens for DeFi governance currently, there is significant interplay between an on-chain and off-chain governance processes, as they are not mutually exclusive and often are used in combination. For example, in a common scenario of DeFi governance: a high-level proposal is introduced and discussed in off-chain

¹³⁰ In certain DeFi protocols, besides a governance/voting token, there can be one or more other tokens used for its business and operations, such as an LP token, or a stablecoin.

communications on social media; an initial proposal is posted and discussed on an off-chain governance forum; a “signaling vote” is conducted off-chain (usually with no token required); if the proposal passes the signaling vote, the proposal is posed to, for example, Snapshot for a vote off-chain (a token may be required to participate); if passed, a final vote is conducted on-chain (token is required to participate).¹³¹ Thus, during a typical voting process, off-chain voting may or may not require that a voter hold a voting token, while on-chain voting usually permits only those with the private key associated with each of the tokens the ability to cast a vote, usually in proportion to the quantity of governance token held (unless voting power has been delegated to another).

DeFi governance generally is not self-implementing and human involvement typically is necessary to effectuate governance decisions. At a minimum, proposals to make any changes to a project’s protocol, smart contracts or code must be translated into usable code and implemented, so those with governance control often must rely on others with technical control and skill (i.e., administrative access and requisite technical capability).¹³² ¹³³ Even for pre-programmed governance actions that are programmed to be implemented autonomously by means of a smart contract or other code, intervention by those with administrative keys may still be necessary. Those with an administrative key may retain the power to intervene or halt pre-programmed actions that have been approved by the voting community. In addition, with respect to ongoing governance through a community proposals process, some DeFi projects may use governance facilitators, who act as gatekeepers for advancing any new proposal to an on-chain vote. Depending on who these individuals are, how they are selected, and what accountability they may have, the use of governance facilitators may result in de facto centralization of control.

Finally, where a token holder keeps their token can impact their ability to vote. For example, if a token holder deposits their tokens into a certain hosted wallet or smart contract, the holder may lose their ability to use the tokens to vote while they are in the wallet or smart contract.

Common DeFi Governance Proposal Characteristics

The following lists typical characteristics of common DeFi governance proposals. The list does not necessarily describe any particular DeFi arrangement in operation today; rather,

¹³¹ See *What is Blockchain Governance: On-Chain vs. Off-Chain*, PHEMEX ACADEMY (Oct. 13, 2021), <https://phemex.com/academy/what-is-blockchain-governance> (describing the Ethereum Merge, noting potential impacts that Proof of Stake (PoS) may have on use and implementation of governance tokens and suggesting that on-chain process may become more formalized as it is easier to do in PoS model).

¹³² In some cases, proposals can be “pre-programmed”, and by means of a smart contract, may execute if a vote succeeds. Even here, however, power may be reserved by an entity with technical control to nullify a proposal or otherwise stop its implementation.

¹³³ Conceptually a smart contract could be deployed to monitor governance votes and then automatically implement the will of the community. In practice, however, fully automated governance is unlikely as governance issues may not be foreseeable.

it is drawn from features of existing DeFi arrangements and seeks to capture and illustrate common and prevalent features and activities pertaining to the listed categories.

Characteristics of Proposal Origination:

- Project Change Process
 - On-chain
 - Off-chain
 - Hybrid
- Eligibility of Proposals
 - Direct proposing
 - Approval by community poll
 - Chaperoned by project or community representative
- Eligibility to Proposing
 - No restrictions
 - Token gated online forum access
 - Token ownership threshold
- Proposal Vetting
 - None
 - By community in online forum
 - By selected committee or project leadership

Characteristics of Voting Rights:

- Eligibility to Vote
 - Token ownership
 - Token delegation
 - Token staking
 - Address whitelisting
- Vote Mechanism
 - Assigned to an address based on token ownership
 - Assigned to an address based on token delegation
 - Assigned to an address based on token staked
 - Assigned to an address based on whitelisting
- Weighting of Voting Power
 - No weighting
 - Weighting based on type of token owned
 - Weighting based on balance of tokens owned
- Location of Vote
 - On-chain
 - Off-chain
- Major Holders (As % of total token supply held by a single address)
 - e.g., 25% to >40%
- Treasury Tokens (As % of total token supply)
 - e.g., 8% to >30%

Characteristics of Voting Process:

- Voting window
 - Total number of votes
 - Quorum threshold
 - Time limited
- Proposal Execution
 - On-chain, automatic
 - On-chain, automatic with time-lock
 - On-chain, manual with multi-sig
 - Off-chain, manual with development
 - Off-chain, manual with committee approval
- Quorum requirement
 - None
 - e.g., 2% to 20% varying on type of change
- Observed typical participation rates
 - e.g., 0% to <20%
- Emergency approval process
 - None
 - Emergency shut down or freeze
- Number of Proposals Voted on
 - e.g., 0 to >500

Characteristics of Vote Impact:

- Stated intent of vote
 - Non-binding
 - Temperature check
 - Signaling
 - Ratification
 - Binding
- Time-lock before execution
 - None
 - e.g., 1 to 7 days
- Emergency shutdown
 - None
 - Yes, through voting
 - Yes, through multi-sig
 - Yes, through admin or guardian rights

Characteristics That Can Be Voted On:

- Protocol parameter changes
 - Interest rates
 - Fees
 - Supported assets

- Changes to tokenomics
 - Upgrades to the codebase
- Project operations
 - Key personnel
 - Committee structures
 - Multi-sig ownership
 - Deployment to new blockchains
 - Deployment of supporting infrastructure
- Treasury
 - Distribution of funds for operations
 - Distribution of funds for grants
 - Distribution of funds for individual use

Characteristics of Proposal Implementation Gatekeeping:

- On-chain
 - Time-locks
 - Admin and guardian rights
 - Deployment of new smart contracts
 - Disbursement of funds if digital asset
- Off-chain
 - Manual development
 - Appropriate development repository access
 - Disbursement of funds if fiat currencies

ANNEX E – UPDATE TO RISKS AND CONSIDERATIONS RELATING TO DEFI ACTIVITIES

The 2022 Report set forth many of the risks relating to DeFi activities, which persist today. This Annex highlights and gives more detail into certain risks that have been prominently illustrated by recent events and trends.

Risks Associated with DeFi Governance Structures

Specifically, since the publication of the 2022 Report, DeFi governance structures have continued to evolve, as discussed further in ANNEX D. Below are some of the key risks to investor protection and market integrity that arise as a result of common DeFi governance structures, in particular DAOs and governance/voting tokens, used individually or in combination.

Pseudonymity/Anonymity

The pseudonymity and anonymity¹³⁴ that are enabled through the use of DLT pose several unique risks when using DeFi arrangements and services that employ distributed governance mechanisms. These include:

- **Unknown counterparties and affiliates:** Typically, anyone can engage with DeFi protocols by purchasing or otherwise acquiring tokens, and token holders are not required to verify their identity, through anti-money laundering (AML)/know your customer/client (KYC) procedures or otherwise. As such, participants' real-world identities are not generally known to one another. As a participant in a DeFi governance mechanism through, for example, membership in a DAO or holding voting rights through governance/voting tokens, the participant may not be able to verify with whom they are interacting, which may put them at risk in terms of engaging with illicit finance actors, among other risks.
- **Lack of visibility into actual control:** The pseudonymity of blockchain transactions and the opacity into off-chain communications make it difficult if not impossible for investors or users to know exactly who controls a specific DeFi project and how decentralized that control is.¹³⁵ What might appear to be dispersed activity

¹³⁴ Typically, transactions occurring on public and permissionless blockchains are pseudonymous, that is, public blockchain addresses may be known and transactions associated with a particular address may be observable using blockchain explorer and analytical software, but the identity of the persons engaging in transactions is not known without additional attribution information. This pseudonymity is possible because of the public/private key cryptography that underlies public blockchains. Furthermore, certain anonymity enhancing technologies, such as anonymity-enhanced crypto-assets, mixers, and other techniques, are sometimes employed to make those persons and/or their transaction details unknowable.

¹³⁵ Governance/voting tokens typically are traded on centralized crypto-asset platforms, and therefore significant amounts of them may be held in omnibus wallets belonging to the platform. Thus, it is impossible to know through public address analysis alone the level of concentration among holders

could in fact represent the actions of a single actor or a group of coordinated actors. The ownership and voting of governance/voting tokens, including those of DAOs, typically are unknown to the broader collective of voters and/or members.¹³⁶

- **Voting rights and the actual ability to participate in the governance of a DeFi project may be illusory:** Aside from ownership and votership concentration, the ability to participate in governance through voting relies upon a number of factors that essentially depend upon how the issuer has established the governance mechanism, including determining which aspects of the enterprise are up for vote, and the policies and procedures around voting. This includes whether a central actor(s) has any *gatekeeping* role over the governance process, such as through holding an administrative or guardian key. In some cases, governance proposals may be required to be submitted in coded form, creating significant barriers to participants who are unable to do so.
- **Conflicts of Interest and Collusion:** Due to pseudonymity, it is difficult to verify what conflicts of interest exist between various market participants, what conflicts have been disclosed, or the effect of conflicts on other market participants. As a result, it is difficult to ascertain whether large voters – who may or may not have an ownership interest in a project and are voters by virtue of delegation – are acting in their best interest or in the interest of the project. Further, there may be off-chain, privately communicated efforts to influence token holders and voting delegates. There is also a lack of transparency when it comes to the delegation of voting power where large token holders (whales, venture capitalists (VCs), institutional investors, voting consortia) can have concentrated voting power and can obfuscate their voting activity and control.

Information Asymmetries

Information asymmetries in the context of governance/voting mechanisms, regardless of which technological tools DeFi projects use to coordinate and communicate, can arise from a lack of even-handed communication among members, such as through the

of such tokens. In addition, voting rights may be separable from a governance/voting token ownership such that ownership alone is not a proxy for voting distribution. Further, depositing a governance/voting token in a smart contract or on a platform may mean that it cannot be voted. Furthermore, off-chain activity, such as private communications, could obfuscate concentrations of power, such as through outsized influence of particular actors or collusion, as it would not be visible for participants to monitor. Thus, what seems like community-driven voting could in fact be centralized management. This can occur if, among other reasons, governance/voting tokens are held by a concentrated actor or actors, if voting power is held by a concentrated actor or actors, if a majority of those with voting power are not in fact voting (voter apathy), or if a central actor or actors has control or sufficient influence.

¹³⁶ While on-chain data does provide some information with respect to public addresses that hold governance/voting tokens, it is impossible to know – without additional attribution data -- who the beneficial owners of addresses are or whether certain addresses belong to the same beneficial owner or related parties.

restriction of access to communication channels.¹³⁷ Information asymmetries could result in the non-disclosure of important information to all governance/voting token holders, enabling potential insider- and self-dealing, and fraud or misappropriation of assets.¹³⁸

Cyber Exploits/Attacks

In addition to general cyber risks involving the use of DLT, risks to governance could also occur due to code vulnerabilities or exploits. For example, attackers have used “flash loan attacks” (see the 2022 Report and ANNEX B) to obtain a majority of a DAO’s voting tokens in order to drain some or all of the assets from the DAO. Administrative keys that control certain functions of smart contracts can be leaked or “hijacked.” Poor logic or coding errors in a protocol have been exploited.¹³⁹ As noted in the 2022 Report, there could be a “Sybil attack” in which certain individuals with advanced knowledge of a governance/voting token “airdrop” could generate multiple pseudonymous addresses to obtain control over a concentration of airdropped tokens to gain influence over a project. In each of these scenarios, the governance process of a DeFi project can be impacted. Even in the absence of an attack on a particular DeFi project, as DeFi is blockchain-based, any disruption or failure of a blockchain that underpins a particular DeFi product or service -- including any congestion, forks, attacks or nefarious activity -- likely will directly impact the operation of a DeFi governance structure. Furthermore, if fees increase on a particular blockchain (e.g., due to congestion), this can impact the practicality of voting for some participants.

Legal Compliance

DeFi projects may be operating outside of, or in non-compliance with, legal frameworks that apply to the activities they are conducting, such as applicable securities and other financial markets laws. As a result, investors and users in DeFi projects, including those involving governance tokens, are not getting the protections that those legal frameworks provide. These protections include protections against fraud and manipulation. Furthermore, investors and users may not have any claim or redress for improper conduct under private rights of action. Legal uncertainty and risk of loss is exacerbated by the cross-border nature of DeFi arrangements.

Governance Token Proposal and Voting Risks

Unlike traditional corporate structures with legally clear lines of responsibility, the legal obligations of participants in structures such as DAOs may be unclear in many jurisdictions. As a result, in any particular jurisdiction, it may be unclear what recourse there could be for any particular token holder for the action or inaction of other token

¹³⁷ Restriction of access can occur through settings of on-chain communication platforms or through restrictions to off-chain communication platforms based on token ownership (token-gating) where software verifies token ownership in a wallet prior to granting access to information.

Spencer Graham, *Community Contribution Opportunity*, HAUS PARTY, Jan. 4, 2022, <https://daohaus.substack.com/p/community-contribution-opportunity>.

¹³⁹ See, e.g., Greg Noone, *Can DAOs survive an onslaught of cybercrime?*, TECHMONITOR, July 21, 2022, <https://techmonitor.ai/focus/daos-cybercrime-dao-hacks>.

holders, or of the DAO. For example, there may be no obligation of managers or others holding significant amounts of governance tokens to act for the benefit of other holders or any limitations on their use or sale of governance tokens. Moreover, once developers monetize their investment through, for example, the sale of their own governance/voting tokens, they may lack the incentive to continue to develop and maintain the protocol.

In addition, a voter who may hold voting rights only through a voting delegation (and not ownership rights) could thereby influence the protocol without any interest in the long-term prospects of the protocol. In any event, a voting community could become polarized over voting decisions, which could lead to significant disruption, forks or network splits, or losses in confidence – all posing risks to holders of governance tokens or participants in the DeFi ecosystem.

Implementation Risks

There are also risks relating to implementation of software code changes approved through governance actions. DeFi protocols are, at least in part, software code. Software typically requires consistent maintenance and upgrade in order to perform optimally. Without such upkeep, software can fail due to compatibility issues, code vulnerabilities, hacks or other operational problems. The code of a protocol and its associated smart contracts may not function as intended or may react in unexpected ways over time as new circumstances emerge that were not anticipated. This raises some key risks relating to governance/voting token structures.

For example, in the event of a software issue, the viability of a DeFi project (and safety of user assets) may depend upon the ability of project participants to identify the issue, develop and code a solution, and marshal the voting apparatus and consensus around necessary protocol changes, often in an expeditious manner. This process is dependent upon many factors, including humans with the technical skills required to propose and code the upgrade, and voter interest and participation to follow through with what is required to approve and implement the proposal. An absence of participants who possess the technical capability, skills and know-how in relation to the coding of a protocol, or an inability to obtain required votes, each raise questions about the timeliness and effectiveness of governance processes. These issues also raise questions of key-person risk, and also that of accountability (e.g., who is responsible for untimely and ineffective governance resulting in failure of a protocol or harm to its users or others).

Risks Associated with Levered Strategies in DeFi

Highly levered products currently are being marketed to and are available to investors through DeFi projects. As a result, investors, including retail investors, are exposed to a number of risks:

- Access to leverage that is higher than on regulated markets, with the potential to magnify losses beyond which the investor can bear;
- Increased exposures to speculative assets that may lack fundamental value (i.e., do not contribute to broader social or economic function and, relatedly, reduction in investment to those that do);

- Substantial product complexity given the terminology used to describe such products (e.g., perpetual futures) and the magnitude of leverage offered;
- Automated liquidation of positions;
- Increased speed by which a position can be liquidated due to the magnified leverage;
- Significant collateral commitment, particularly as leverage increases;
- The potential for traders to access unlimited leverage via leveraging spirals on a lending protocol;¹⁴⁰
- The use of protocol-issued tokens that can then be used as collateral for levered positions, resulting in a form of self-collateralization and encouraging the creation of ‘asset bubbles’; and
- Amplification of the high price volatility of the underlying asset due to high leverage and interlinkages resulting in procyclicality.

Excessive leverage can increase both volatility of asset prices and risks for financial stability overall by amplifying procyclicality. To mitigate against default risk, DeFi protocols rely on over-collateralization of positions and automated liquidations in the event that the position held by the trader breaches margin requirements. If these products were developed and used at large enough scale, there are potential systemic impacts arising from liquidation risk as automatic liquidations triggered by price volatility (or a shock to one part of the DeFi ecosystem) can have a procyclical impact on prices, impacting other DeFi protocols or crypto-asset markets generally. Unlike regulated derivative markets there are no countercyclical buffers for DeFi protocols.

Further, the interoperability and interconnectedness of DeFi projects and protocols allows highly levered actors to use their debt as collateral in other protocols, which spreads risk across the system and creates an inherent risk of a system-wide run on assets.

Risks Associated with Liquid Staking

The use of derivatives and risks associated therewith are covered in the 2022 Report. One type of derivative that has emerged since the 2022 Report results from *liquid staking*. Typically, in proof of stake (PoS) network, staked tokens cannot be used for anything else while enabling a validator to participate in the PoS consensus mechanism for the opportunity to earn staking rewards. Liquid staking has developed as a way for holders of crypto-assets that are locked up in PoS consensus activities to continue to be able to use their tokens in other DeFi activities such as trading, lending, or as collateral. Specifically, liquid staking is marketed as a way of participating in PoS validation activities while addressing the lost opportunity cost of locking up staked tokens and, in some cases, overcoming the various thresholds to staking, which can include factors such as minimal amount of tokens to activate a validator, costly hardware, or technical IT expertise. Liquid staking service providers often offer a user the ability to earn multiple tranches of rewards,

¹⁴⁰ For example, a user can pledge ETH in one DeFi lending protocol in exchange for the protocol’s stablecoin which he or she can then pledge on another DeFi protocol in exchange for a different stablecoin, and the process can be repeated indefinitely and is only limited by the level of the collateralization ratio of the lending protocol for assets pledged as collateral.

including a portion of block rewards, transaction fees, and any maximal extractable value (MEV) generated through participation. According to one blockchain analytics firm, liquid staking is the most popular method for participating in Ethereum staking, the largest PoS blockchain network.¹⁴¹

In liquid staking, a crypto-asset holder deposits their crypto-assets with a liquid staking service provider in exchange for another crypto-asset commonly referred to as a *liquid staking derivative* (LSD, also sometimes referred to as a *liquid staking token* or LST or *wrapped staked tokens*). In many arrangements, the LSD token can be transferred freely to be used in other DeFi activities such as for trading or collateral in another DeFi protocol for lending or borrowing activities to continue to earn yields and eventually can be used to redeem the staked asset if redemptions are available.

Liquid staking providers can also lower the threshold amount of crypto-assets needed to participate in PoS validation activities if minimal thresholds are required. The most common example is overcoming the 32 ETH minimal threshold to activate a validator on the Ethereum PoS network. Liquid staking providers can enable users to deposit less than 32 ETH into the protocol which then pools customer funds together and divides them into 32 ETH batches to activate validators. Liquid staking has grown significantly since Ethereum's Merge event that changed Ethereum from a proof of work (PoW) consensus to PoS consensus blockchain network. Since the Merge event in September 2022, there has been significant growth in the DeFi liquid staking market, growing from approximately 4.6M ETH on September 15, 2022 to approximately 9.4M ETH in June 2023.¹⁴²

The mechanics and governance of liquid staking can change depending on the service provider and whether the service is provided through a centralized trading platform (CEX) or a DeFi platform. CEXs can provide LSDs in various manners, either restricted to use on the CEX platform or transferable off of the platform to be used in other activities such as DeFi activities mentioned above and are not likely subject to the DAO governance structure challenges described above. CEXs may or may not require the use of smart contracts to pool and manage users' deposits and withdrawals, deposit funds to node operators, determine fees, manage LSD token supply and other operational activities.

DeFi liquid staking services can also be organized and governed as DAOs and subject to the DAO governance structure challenges described above. DeFi platforms and related DAOs may rely on one or more smart contracts that typically pool and manage users' deposits and withdrawals, deposit funds to node operators, determine fees, manage LSD token supply and other operations activities. In addition, smart contracts can contain a full list of node operators, their public keys, and reward distribution records.

¹⁴¹ <https://dune.com/21co/ethereum-staking-and-withdrawals>

¹⁴² See id.; <https://21shares.com/research/onchain-insights->

Liquidity Staking Token Designs

In exchange for depositing staked assets into liquid staking protocols, the protocols issue users another liquid token, an LSD, representing their claim on the staked assets. The liquid asset commonly comes in two different token designs: (1) rebasing assets and (2) value-accruing assets.

- Rebasing LSD assets are typically minted at a 1:1 ratio with the deposited crypto-asset. In order to match the underlying deposit plus any accrued rewards or deducted penalties, the token balance updates or *rebases* every day, via an oracle, to calculate rewards and penalties. The daily rebase occurs regardless of where the LSD is acquired; whether it is directly acquired from the protocol, a DEX, or another holder. A wrapping service, similar to Wrapped ETH, is used to enable interoperability of rebasing LSDs with other DeFi protocols.
- Value-accruing LSD assets are typically minted at a 1:1 ratio with the deposited crypto-assets. In order to match the underlying deposit plus any accrued rewards or deducted penalties, the exchange rate between the LSD and the underlying funds changes over time. The value-accruing LSD tokens typically have rights to the underlying staked assets plus rewards minus fees and rely on redemptions of the underlying assets to realize the accrued value. Value-accruing LSD tokens typically do not need wrapping services to be used in DeFi activities.

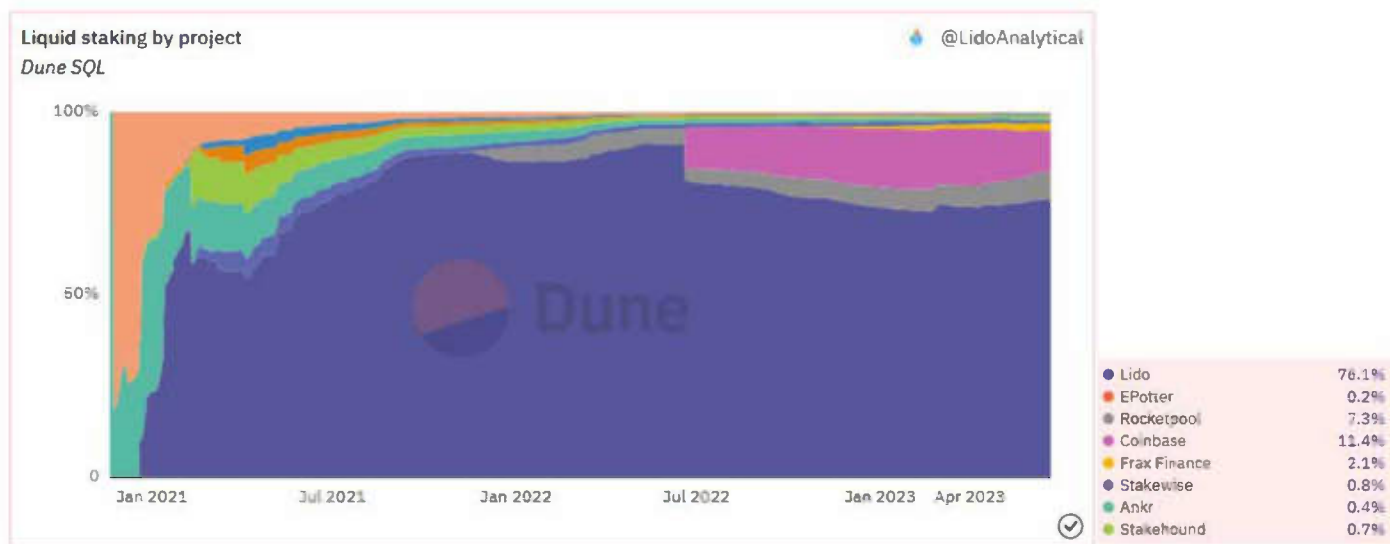
There are a number of risks that arise in liquid staking, some of which are not unique to DeFi or liquid staking activities. These risks include, but are not limited to, the following:

Liquid Staking Concentration of Validators Risk

Liquid staking concentration risks can occur at the validator node operator level where validation of transactions occurs, introducing risks to a PoS blockchain and risks to the users and protocols using the PoS blockchain. Some DeFi liquid staking protocols select a set of node operators that will be responsible for validating transactions using users' deposited crypto-assets that have been pooled by the protocol, in an off-chain process, sometimes decided by a committee. An opaque, off-chain selection process by a committee or a small group can create centralization and possible collusive, manipulative, or censorship behaviors. Concentration of validator nodes can impact the functionality of a PoS blockchain and represent significant consensus risks of a PoS blockchain if a single liquid staking protocol was able to exceed critical consensus thresholds, such as 33% of a network's validators, for an extended period of time. More specifically, an Ethereum researcher recently expressed concerns that if a liquid staking protocol reached critical consensus thresholds, controlling as little as one third of validator nodes, the liquid staking protocol managers could achieve outsized profits compared to other node participants via

coordinated MEV extraction, block-timing manipulation, and/or censorship of block space.¹⁴³

Lido currently dominates the liquid staking market for Ethereum holding more than 75% of the total market share.¹⁴⁴



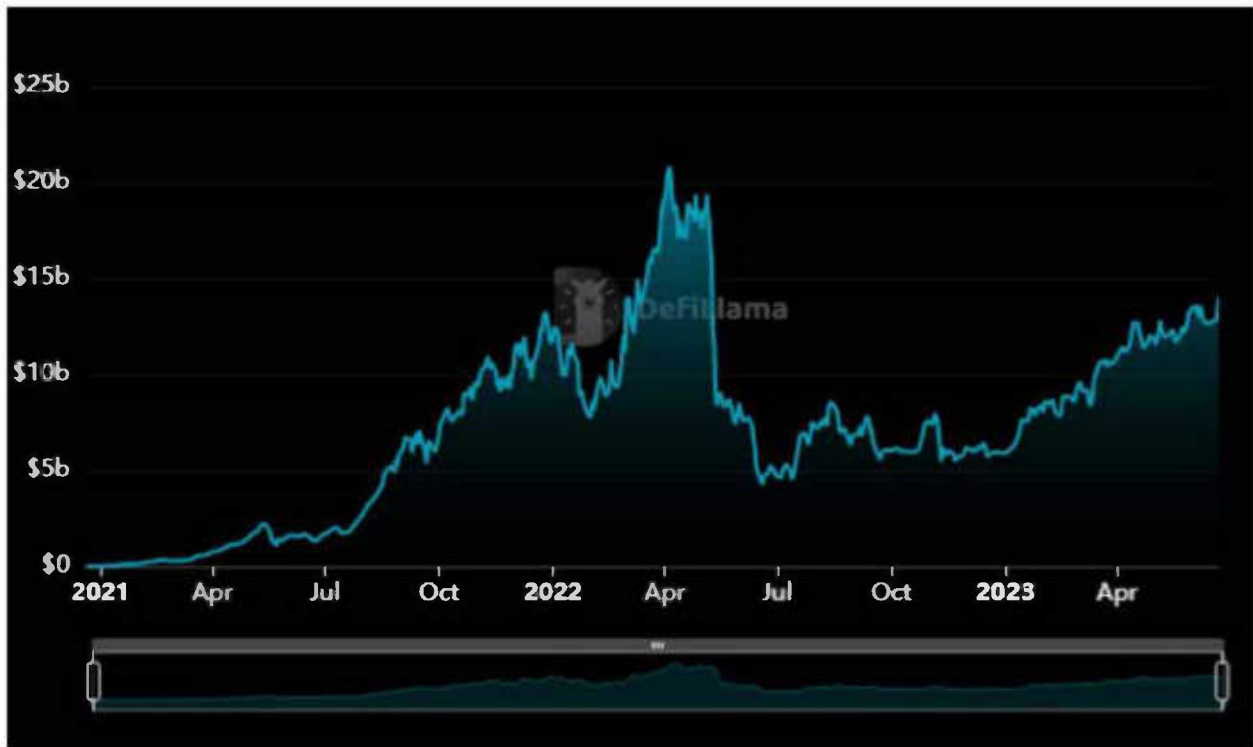
Source: Dune Analytics

Lido's TVL, in excess of \$14B, is greater than the TVL of the second and third largest DeFi protocols, MakerDAO and Aave, combined.¹⁴⁵

¹⁴³ *The Risks of LSD*, ETHEREUM, <https://notes.ethereum.org/@djrtwo/risks-of-lsd>.

¹⁴⁴ <https://defillama.com/protocols/Liquid%20Staking>.

¹⁴⁵ <https://defillama.com/chain/Ethereum?tv=true>.



Source: DeFi Llama

Smart Contract Risk

Smart contracts add additional risk to the underlying IT operational risks inherent to running validator nodes. Many liquid staking protocols rely on smart contracts to facilitate their operations, LSD tokens, and governance. These smart contract operations can include functionality such as pooling users' funds, batching users' funds, sending users' funds to validators, issuing LSDs, managing LSD token supplies, redeeming LSDs for deposited assets, setting protocol fees, managing node operators, and managing certain governance mechanisms via a DAO.

These smart contract-facilitated operations can introduce previously discussed smart contract risks such as code errors, private key compromises and reentrancy attacks, among others. Even to the extent users' staked assets are locked in a smart contract, a provider could still have access to those assets through, for example, a private key with elevated administration rights. Even if there is no such key, the user is exposed to the risk that assets may be lost through a failure or attack on the underlying protocol or smart contract. These risks can exist at the smart contract level, protocol operational level, LSD token issuance level, and at the governance level if there is a DAO.

DAO Governance Risk

Many liquid staking protocols are organized as or governed by DAOs, offering associated governance tokens and voting structures to determine the direction of the protocol the DAO controls. DAO governance tokens can commonly be bought and sold on both CEX and DEX venues. DAO governance tokens can be susceptible to concentrations of voting power and control by a small number of early and/or large investors who own a significant supply of governance tokens or are delegated voting rights, if enabled by the governance token. Other risks of DAO governance are discussed above.

Redemption Value and Counterparty Risks to User

As with CEX liquid staking arrangements, users participating in a DeFi liquid staking arrangement are subject to redemption risk stemming from a variance in value between the LSD and the value of the staked crypto-asset, the exchange rate, which could impact a user when the user redeems the liquid staking token for the staked token.¹⁴⁶ This can occur if, for example, there is a decline in the value of the liquid asset relative to the staked asset (as it may have less liquidity or less uses, e.g., it cannot be used to pay gas fees). It could also result in an arbitrage event, where the price of a LSD is worth more than the underlying staked assets and redemptions or withdrawals are available.

Counterparty risk also exists to the other DeFi protocols that support LSDs as collateral for lending, trading markets, or other activities. For example, the top four usages of Lido's LSD token, *stETH*, occur in other DeFi protocols offering lending, collateralized debt positions, and swapping at, for example, MakerDAO, Aave and Curve Finance.¹⁴⁷ As observed in reports concerning the collapse of Terra Luna and crypto-asset hedge fund Three Arrows Capital (3AC), LSDs used as levered collateral in other DeFi arrangements can result in liquidations and contagion if the redemption value diverges from its 1:1, or more in the case of a value accrual token, ratio. In some cases, DeFi protocols reportedly have taken emergency action, using elevated administration rights to manage potential contagion risks. It is important to note that many liquid staking providers are CEXs and therefore a user is still exposed to various counterparty and other risks when depositing assets with a provider.

¹⁴⁶ For example, in June 2022, Lido's *stETH* deviated from the price of *ETH* due to a liquidity crisis in crypto-asset markets that led 3 Arrows Capital (3AC) reportedly to withdraw 80,000 *stETH* from DeFi protocols and convert back nearly 39,000 *stETH* at around 5% discount from *ETH*.

¹⁴⁷ <https://defillama.com/tokenUsage?token=steth>.

STETH usage in protocols		
Name	Category	Amount
1 MakerDAO	CDP	\$2.02b
2 AAVE V2	Lending	\$1.71b
3 AAVE V3	Lending	\$749.47m
4 Curve DEX	Dexes	\$537.57m

Source: DeFi Llama

Risks Associated with Other Emerging Derivative Protocols

Several additional derivative protocols have gained popularity since the 2022 Report, presenting significant risks to retail investors to whom the protocols are marketed.

Perpetual Swaps:

A perpetual swap contract allows an investor to gain synthetic levered exposure to a reference asset, such as bitcoin or ether, without expiry of the contract. Perpetual swap contracts have become popular with some crypto-asset investors, as they seek high degrees of leverage and adequate liquidity through decentralized exchanges. A primary concern with these swap contracts is counterparty risk; decentralized platforms aim to obviate this risk by using automated market makers.

Automated market makers create liquidity pools of popular crypto-assets that allow users to purchase long or short perpetual swaps by connecting a crypto wallet. Decentralized exchanges offer a variety of crypto perpetual swaps, or futures, assuming adequate liquidity pools can be established. In addition, decentralized exchanges offer different levels of leverage, sometimes in excess of 30 times margin. Decentralized exchanges may rely on oracles to generate pricing or use an order book that allows buyers and sellers to generate price discovery.¹⁴⁸ Trading in an order book may require users to pay or receive a funding rate to incentivize participation on each side of the market (i.e., long and short).

Investors in perpetual swaps face significant risks, including:

- Complexity of the transaction and exchanges, given the differences in exchanges offering such contracts, and the varied terminology used in marketing such arrangements. For example, perpetual swaps or futures can be liquidated much more quickly than many futures terms given their heightened leverage and the volatility of the underlying reference asset.

¹⁴⁸ See DYDX TRADING, DECENTRALIZED, <https://dydx.exchange/>.

- Leverage on swap contracts that may prohibit users from holding a contract for a period of more than a few minutes¹⁴⁹ without the possibility of full loss depending on the volatility of the reference asset.
- Deviation of contract pricing from the reference asset's spot market depending on the accuracy of the oracle or depth of the order book.
- Fee transparency is difficult to ascertain given the diversity of exchange structures;
- Significant fees associated with maintaining a position or associated with the funding rate, depending on the depth of the order book.
- Significant collateral commitment, particularly as leverage increases.

Synthetic Crypto-assets:

Decentralized exchanges offer synthetic crypto-assets or fiat currencies to users via derivative tokens. These synthetic assets may be used for a variety of purposes, including trading with leverage, for deposit into a pool to earn yield, or to collateralize options.

Investors in synthetic crypto-assets or fiat currencies face significant risks, including:

- Deviation of pricing from the reference asset spot market depending on supply and demand of the synthetic instrument.
- Counterparty risk to the issuer of the synthetic crypto-asset.
- Platforms are designed to allow the creation of synthetic assets that combine derivative positions.
- Procyclicality of derivative instruments referencing the underlying performance of derivative instruments.

Options on Crypto-assets:

Certain protocols use AMMs to offer options in crypto-assets, such as ETH or wBTC, to users. Users are offered a variety of puts and calls to buy or sell at different strike prices and expiration dates. Liquidity is maintained in the pool by liquidity providers who deposit crypto-assets to a market-maker vault; these liquidity providers earn fees when options are traded.

Investors in options on crypto-assets face significant risks, including:

- Complexity in crypto-asset option markets, including the historically strong variance between spot and futures prices.¹⁵⁰
- Reliance on oracles to determine pricing at expiry.
- Liquidity providers may be subject to withdrawal risk in which they must wait for their funds until adequate liquidity is achieved in a specific pool.
- Unexpected or unanticipated interactions between traders and liquidity providers. For example, a sustained win rate for traders might result in losses for liquidity providers.

¹⁴⁹ *Id.*

¹⁵⁰ Maik Schmeling et al., *Crypto carry*, (BIS Working Paper No. 1087, Apr. 2023), <https://www.bis.org/publ/work1087.pdf>.

Risks Associated with Oracles

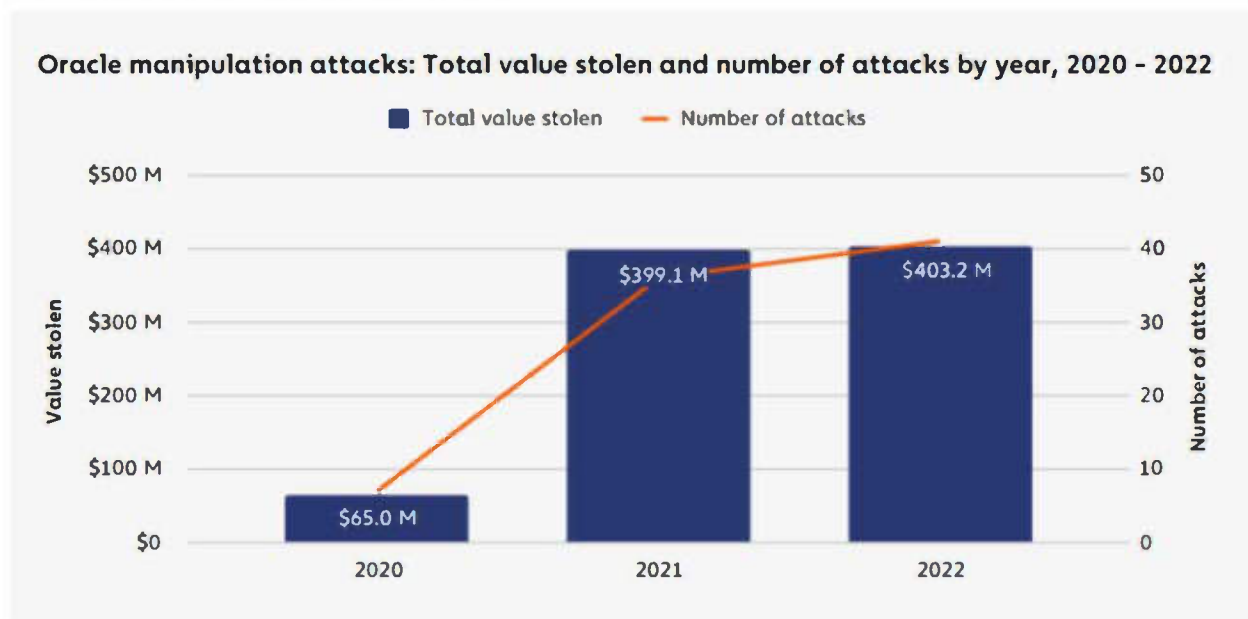
When a protocol relies on an oracle for data, such as pricing data, there is significant risk if the data is inaccurate – whether due to manipulation, deprecation, or other reasons.

Risk of Manipulation

DeFi protocols often use pricing oracles to provide information to trigger margin calls, liquidations or to settle positions. These pricing oracles can be centralized or they can claim to be decentralized. A centralized oracle is controlled by a single entity and can be the sole source of information for the DeFi protocol. Centralized oracles have a single point of failure which can mean these protocols are vulnerable to corruption and attack.

An asserted decentralized oracle typically sources information from multiple nodes across the oracle network to confirm the underlying source data. The source data can be market data from one data source, such as a centralized crypto-asset trading platform, or data from multiple centralized crypto-asset exchanges, e.g., for the market price of a crypto-asset. As is the case for centralized derivative protocols, there is potential for decentralized oracle data to be manipulated by bad actors. The effect of oracle price manipulation is comparable to benchmark manipulation and can result in harm to users of the protocol. In addition, the decentralized oracle is established by code, and subject to the same issues and risks as other code used in DeFi protocols.

One blockchain analytics firm estimates that DeFi protocols lost \$386.2 million in 41 separate oracle manipulation attacks.¹⁵¹



Source: Chainalysis – The 2023 Crypto Crime Report.

¹⁵¹ CHAINALYSIS, *supra* note 21.

Typical Oracle Attack

A typical oracle attack is based on the following steps and involves the use of a flash loan:

1. **Preparation of funds** – the attacker borrows a large number of crypto-assets via lending protocols.
2. **Raising the price of target assets** – the attacker manipulates the price of target assets (i.e., by exchanging many tokens back and forth between different liquidity pools). The oracle(s) relied upon by a DeFi protocol pass the manipulated price data to the DeFi protocol.
3. **Profiting** – the attacker exchanges the target asset for crypto-assets borrowed from the lending protocols. As the attacker inflates the price of the target asset, it can exchange the target asset for a larger amount of other assets.
4. **Loan repayment** – the attacker restores the assets in the liquidity pool to their initial state to avoid losses caused by price slippage and repays crypto-assets borrowed from lending protocols.

An oracle attack reportedly occurred on the bZx protocol when an attacker used a flash loan to inflate the value of a stablecoin (sUSD) on a decentralized exchange. The stablecoin was deposited into bZx as collateral at an inflated price, as bZx utilized pricing oracles from the decentralized exchange for the exchange rate of sUSD/ETH. This allowed the attacker to open an undercollateralized position utilizing the inflated value of the stablecoin as collateral and close out the position to withdraw more ETH than they otherwise would have been able to.¹⁵²

Mispricing Risks

There is a risk of price divergence when the pricing data provided by an oracle diverge from the market price of the underlying asset. For example, price divergence could occur when there are market price dislocations on spot exchanges that feed into oracles or if the protocol does not update the pricing of its products in a sufficiently timely manner. High levels of volatility may exacerbate this risk as it may be inefficient for DeFi protocols to fetch pricing data from oracles on a real time basis due to transaction costs (i.e., gas costs) incurred¹⁵³ and block validation times¹⁵⁴. In contrast, in traditional financial markets data feeds are normally provided on a near real-time basis.

¹⁵² *The bZx attacks explained*, PALKEO (Feb. 18, 2020), <https://www.palkeo.com/en/projets/ethereum/bzx.html>.

¹⁵³ Oracles (or their node operators) may charge fees to provide data. *See, e.g.*, <https://ethereum.stackexchange.com/questions/87473/is-chainlinks-price-reference-data-free-to-consume>.

¹⁵⁴ For example, the protocol offered by Synthetix updates the smart contract pricing at fixed intervals (currently 3 minutes) based on the pricing oracle Chainlink, but only if any prices have moved above a particular amount.

Discrepancies between the oracle price or the price of the relevant crypto-asset and the unverifiable spot price of underlying assets, may result in a product not performing to the expectations of the user. There is also a risk that front-running attacks can be carried out by a user that pays a higher transaction fee so that their transaction is executed prior to the oracle price update.

Risks Associated with the use of Automated Liquidation Mechanisms

As noted above, many DeFi protocols, including lending and borrowing protocols and those that provide direct derivatives exposures, rely on over-collateralization and automated liquidations to manage default risk on crypto-assets issued. The effectiveness of the liquidation mechanisms used by these protocols is therefore paramount to the fair compensation of counterparties in the event of default.

Certain characteristics of the DeFi ecosystem can hamper the effectiveness of these mechanisms. For one, most smart contracts cannot liquidate collateral without an external party instigating the transaction. Protocols must either operate bots (automated programs) or incentivize market participants to purchase the collateral from them or otherwise instigate the liquidation process. These bots can be deployed to identify and profit from arbitrage opportunities if they identify deviations between the price quoted by the smart contract and the market price.¹⁵⁵ These mechanisms must be robust to a variety of market conditions. Any discount offered to market participants to incentivize liquidation must exceed any potential price depreciation of the collateral asset. This can be difficult as, in times of volatility, rising gas prices and elevated transaction volume can increase congestion on the network, meaning the prices at which the discount is calculated can be stale. Additionally, network congestion can result in gas prices exceeding the default tolerance that liquidation bots are configured to use, meaning that the transactions sent by the bots are not committed to the network. Some market participants and protocol operators have expressed concerns that a large enough collateral liquidation could prevent the entire underlying blockchain from processing transactions for some time.¹⁵⁶

¹⁵⁵ See 2022 Report, *supra* note 5, at 15.

¹⁵⁶ ALEX MELIKHOV & PETER SERGEEV, EQUILIBRIUM WHITE PAPER 3 (2022), https://equilibrium.io/docs/zh/Equilibrium_WP.pdf.

ANNEX F – MAPPING OF IOSCO PRINCIPLES TO DEFI ACTIVITIES

Introduction

The 2022 Report detailed the operation of the DeFi ecosystem, discussing the technology components used, the various DeFi protocols for participants to engage in crypto-asset activities, the products and services provided in connection with such protocols, and the various participants in the DeFi ecosystem. The purpose of the mapping in this report is to examine and identify how typical DeFi products, services, arrangements, and activities implicate IOSCO Standards.¹⁵⁷

This mapping is intended to identify how the IOSCO Principles should apply with respect to DeFi products, services, arrangements, and activities, based on a current understanding of the facts and circumstances, including the economic realities of activities in the DeFi ecosystem, first discussed in the 2022 Report.

In those jurisdictions where many DeFi participants are acting in non-compliance with existing laws, regulators can use this mapping to identify the activities and participants that already fall within the scope of their regulatory remit and to help assess how to apply their existing regulatory regime. In jurisdictions where existing securities and other relevant laws may not apply, this mapping can assist regulators as they consider ways to address any potential gaps in their regulatory regime. In both instances, the IOSCO Principles provide a sound basis for how to approach regulation of such activities and participants and avoid regulatory arbitrage between traditional financial activities and participants on the one hand, and DeFi activities and participants on the other. The mapping is not intended to accept existing arrangements and activities as static, without any ability or necessity for change. In fact, it is more likely that to comply with existing or new laws in jurisdictions, DeFi activities and participants may need to alter their operations. In addition, as most DeFi protocols operate cross-border it will be important for jurisdictions to cooperate as they assess the operation of the activities and participants in the DeFi ecosystem to avoid conflicting analyses and determinations regarding the application of IOSCO Principles.

A. Principles relating to the Regulator

1. ***The responsibilities of the Regulator should be clear and objectively stated.***
2. ***The Regulator should be operationally independent and accountable in the exercise of its functions and powers.***

¹⁵⁷ For all references to the IOSCO Principles in this report, see OICV-IOSCO, THE OBJECTIVES AND PRINCIPLES OF SECURITIES REGULATION (May 2017), <https://www.iosco.org/library/pubdocs/pdf/IOSCOPD561.pdf>. For further background on the IOSCO Principles, see OICV-IOSCO, METHODOLOGY FOR ASSESSING IMPLEMENTATION OF THE IOSCO OBJECTIVES AND PRINCIPLES OF SECURITIES REGULATION (May 2017), <https://www.iosco.org/library/pubdocs/pdf/IOSCOPD562.pdf>.

3. ***The Regulator should have adequate powers, proper resources and the capacity to perform its functions and exercise its powers.***
4. ***The Regulator should adopt clear and consistent regulatory processes.***
5. ***The staff of the Regulator should observe the highest professional standards, including appropriate standards of confidentiality.***
6. ***The Regulator should have or contribute to a process to identify, monitor, mitigate and manage systemic risk, appropriate to its mandate.***
7. ***The Regulator should have or contribute to a process to review the perimeter of regulation regularly.***
8. ***The Regulator should seek to ensure that conflicts of interest and misalignment of incentives are avoided, eliminated, disclosed or otherwise managed.***

All of these IOSCO Principles relating to the regulator should apply with respect to DeFi activities and participants. A key consideration of the Principles relating to the regulator with respect to DeFi is whether the regulator has the appropriate resources – including knowledge, data and tools – to evaluate DeFi activities and participants. In addition, a significant challenge for a regulator in applying IOSCO Principles to DeFi is the limited availability and interpretability of verifiable data relating to many DeFi activities, and the resulting lack of transparency into those activities. Lack of transparency exists, in part, because information off-chain can be difficult to obtain and information on-chain can be difficult to interpret. For those activities that involve financial instruments, including securities, application of the regulator’s existing regulatory regime will help address these transparency issues, as application of requirements will typically enhance recordkeeping and reporting. To the extent a jurisdiction may determine that the existing regulatory regime does not apply, the regulator could consider other ways to address data gaps.

B. Principles for Self-Regulation

9. ***Where the regulatory system makes use of Self-Regulatory Organizations (SROs) that exercise some direct oversight responsibility for their respective areas of competence, such SROs should be subject to the oversight of the Regulator and should observe standards of fairness and confidentiality when exercising powers and delegated responsibilities.***

If there is any entity that operates or, in the future will operate, as a SRO for participants in the DeFi ecosystem, then such entity (whether or not incorporated) should be subject to the IOSCO SRO principle.

This Principle covers regulatory systems that make use of SROs that exercise some direct oversight responsibility for their respective area of competence. DeFi activities and participants, to the extent that they involve financial instruments, including securities, may already, depending on the jurisdiction, be subject to a jurisdiction’s regulatory framework and perimeter, even if they are not currently operating in a manner compliant with the jurisdiction’s regulatory framework.

The following are non-exclusive examples of types of DeFi activities that may be within the scope of activity covered by an SRO in certain jurisdictions, either currently or in the future, and to the extent not, these are the activities that could be the focus of addressing any gaps:

- Aggregators and Decentralized Exchanges (DEXs) involving crypto-assets that are financial instruments, including securities. These activities may be exchange, broker, dealer or adviser activity.
- Borrowing and lending activities involving crypto-assets that are financial instruments, including securities. These activities may be broker or dealer activity.
- Derivatives activities.

C. Principles for the Enforcement of Securities Regulation

10. The Regulator should have comprehensive inspection, investigation and surveillance powers.

11. The Regulator should have comprehensive enforcement powers.

12. The regulatory system should ensure an effective and credible use of inspection, investigation, surveillance and enforcement powers and implementation of an effective compliance program.

Regulators should have comprehensive inspection, investigation, surveillance and enforcement powers over DeFi activities subject to securities laws. The above Principles are to be interpreted broadly to ensure regulators have a variety of measures to detect, deter, enforce, sanction, redress and correct violations of securities laws.

The following are non-exclusive examples of types of DeFi activities that could involve securities activities subject to regulation in certain jurisdictions, or are similar to such activities in others, either currently or in the future:

- Aggregators, DEXs and Automated market makers (AMMs);
- Trading/Lending/Borrowing/Derivative products and activities;
- The offer and sale of interests in DeFi products and services, including the offer and sale of tokens or other crypto-assets in exchange for the deposit of crypto-assets or borrowing of crypto-assets from any product;
- The offer and sale of governance tokens;
- Collective investment schemes, hedge funds and other private investment vehicles and investment pools;
- Providing investment advice about crypto-assets or crypto-asset trading activities, whether directly or indirectly;
- The activities of investors, collective investment schemes (retail/non-retail), hedge funds or other private investment vehicles, and others, in DeFi products, including in trading directly or through aggregators, DEXs, lending and borrowing activities.

D. Principles for Cooperation in Regulation

13. The Regulator should have authority to share both public and non-public information with domestic and foreign counterparts.

14. Regulators should establish information sharing mechanisms that set out when and how they will share both public and non-public information with their domestic and foreign counterparts.

15. The regulatory system should allow for assistance to be provided to foreign Regulators who need to make inquiries in the discharge of their functions and exercise of their powers.

As most DeFi activities occur cross-border, there is a need for regulators to cooperate as they evaluate the operation of such activities and participants in the DeFi ecosystem. The Principles for cooperation can serve as the basis for approaches to international cooperation and information sharing among regulators with respect to DeFi activities. Cooperation will allow regulators to minimize the likelihood that compliance programs, investigations and enforcement activities will be impeded by jurisdictional boundaries. Regulators should consider what cooperation tools are available for cross-border cooperation and information sharing.

E. Principles for Issuers

16. There should be full, accurate and timely disclosure of financial results, risk and other information which is material to investors' decisions.

17. Holders of securities in a company should be treated in a fair and equitable manner.

18. Accounting standards used by issuers to prepare financial statements should be of a high and internationally acceptable quality.

The Principles for issuers concern the information that issuers should disclose to investors when they invest in securities and on an ongoing basis. Full, timely and accurate disclosure of financial and non-financial information for DeFi projects would provide investors with information about the issuer, its management and ownership, the risks of investing in a particular security backed by a specific issuer and financial results or other information specific to the project.

Potential Issuers of Financial instruments, Including Securities: The following are non-exclusive examples of types of DeFi products, services, arrangements, and activities that could involve the issuance of financial instruments, including securities, in certain jurisdictions, or are similar to such activities in others, either currently or in the future:

- Aggregators and DEXs, offering and selling their own crypto-assets, including governance tokens, LP tokens or other crypto-assets;
- Lending/borrowing products or services that offer and sell interests in their pools in exchange for crypto-assets. In these cases, market participants “deposit” crypto-assets into pools in exchange for an interest in the pool. These pool interests are represented by other crypto-assets or tokens that represent the depositor’s *pro rata* value of the lending pool. The holder of the pool interest represented by the token can obtain value from it by trading it in secondary

markets, borrowing against it, or by presenting it to the pool for redemption of the crypto-asset deposited and all accrued *pro rata* income.

- Lending/borrowing products or services that offer and sell other crypto-assets, such as governance tokens, that may give the holder particular rights, whether to vote on aspects of the lending/borrowing product or service, or other economic interests in the lending/borrowing product or service.
- An AMM or other liquidity pool that offers and sells interests in the pool of crypto-assets that is the AMM. As with the borrowing and lending product tokens that are issued in exchange for crypto-assets deposited in the pools, AMM tokens are also redeemable by the holder for the crypto-asset plus the *pro rata* income from the pool.
- A developer, founder or promotor of DeFi protocols also may directly offer and sell crypto-assets, including in the form of governance tokens, or other crypto-assets. These offers and sales may occur at the initial funding of the protocols or may occur on an ongoing basis with sales of crypto-assets from the “treasury” of these protocols.
- Aggregators and DEXs also may be involved in offering and selling crypto-assets or tokens of other issuers, thereby participating in distributions of financial instruments, including securities. This may occur through the aggregator or DEX’s operations or offerings through which creators or operators of DeFi protocols may distribute governance tokens or other crypto-assets, including crypto-assets that are placed in “treasury” for distribution.
- The issuance of derivatives, including derivatives/synthetics on traditional financial instruments, as well as the issuance by a cross-chain bridge, wrapping of a token, or in connection with liquid staking.

F. Principles for Auditors, Credit Rating Agencies, and Other Information Service Providers

19. ***Auditors should be subject to adequate levels of oversight.***
20. ***Auditors should be independent of the issuing entity that they audit.***
21. ***Audit standards should be of a high and internationally acceptable quality.***
22. ***Credit rating agencies should be subject to adequate levels of oversight. The regulatory system should ensure that credit rating agencies whose ratings are used for regulatory purposes are subject to registration and ongoing supervision.***
23. ***Other entities that offer investors analytical or evaluative services should be subject to oversight and regulation appropriate to the impact their activities have on the market or the degree to which the regulatory system relies on them.***

DeFi activities and participants can involve auditors (whether due to laws and rules applicable to issuers or other participants providing audited financial statements or

financial information or other types of auditor involvement), credit rating agencies (whether or not identified as such), and other information service providers (including index and pricing information providers).

The following are non-exclusive examples of types of DeFi activities to which the IOSCO Principles could apply, either currently or in the future:

- Any DeFi project providing audited financial information, including without limitation audited financial statements;
- Any DeFi project that provides any type of credit score may be viewed as a credit rating agency subject to principle 22. If a DeFi project posts or provides the credit ratings of an independent credit rating agency, then the principle applies to the independent credit rating agency.
- Some DeFi projects may offer analysis or evaluative services on their user interface or promote the result(s) of such services for a variety of reasons, including increasing investor engagement in the project or increasing investment in the protocol.
- Many DeFi projects rely on “oracles” to provide pricing information necessary to the operation of the projects. These oracles would likely be considered information service providers and subject to the IOSCO principle 23.¹⁵⁸ These oracles provide off-chain pricing information to smart contracts on an ongoing basis.

G. Principles for Collective Investment Schemes

24. *The regulatory system should set standards for the eligibility, governance, organization and operational conduct of those who wish to market or operate a collective investment scheme.*
25. *The regulatory system should provide for rules governing the legal form and structure of collective investment schemes and the segregation and protection of client assets.*
26. *Regulation should require disclosure, as set forth under the Principles for issuers, which is necessary to evaluate the suitability of a collective investment scheme for a particular investor and the value of the investor’s interest in the scheme.*
27. *Regulation should ensure that there is a proper and disclosed basis for asset valuation and the pricing and the redemption of units in a collective investment scheme.*
28. *Regulation should ensure that hedge funds and/or hedge funds managers/advisers are subject to appropriate oversight.*

¹⁵⁸ It is likely these oracles are also subject to IOSCO principles for financial benchmarks. See OICV-IOSCO, PRINCIPLES FOR FINANCIAL BENCHMARKS (July 2013), <https://www.iosco.org/library/pubdocs/pdf/IOSCOPD415.pdf>.

Potential Collective Investment Schemes: DeFi products, services, arrangements, and activities may fall within the scope of collective investment schemes (retail/non-retail), hedge funds and other private investment vehicles. Further, DeFi activities and participants that involve operation, marketing, management and advising with respect to these funds may be subject to laws that apply to such activities in many jurisdictions. The following are non-exclusive examples of types of DeFi activities that could involve collective investment schemes (retail/non-retail), hedge funds or other private investment vehicles, and those who operate, market, manage and advise with respect to such funds in certain jurisdictions, or are similar to such activities and participants in others, either currently or in the future:

- Certain aggregators and DEXs may be creating collective investment schemes, hedge funds or other private investment vehicles through the use of AMM arrangements. For example, AMMs typically provide a means for participants to deposit two or more crypto-assets into a smart contract (or liquidity pool) and receive a crypto-asset representing the interest in the pool (and income therefrom). Market participants are then able to use aggregators, DEXs and other service providers to engage in trading activities with the pools. The pools may constitute collective investment schemes. While some of this activity may involve broker or dealer activity, the activity can also include the provision of investment advice. For example, some aggregators provide services that offer investment opportunities to users, such as by obtaining for users the best prices for crypto-assets.
- Lending/borrowing protocols also may involve collective investment schemes, funds and other private investment vehicles. Lending products are pools of crypto-assets deposited by holders in exchange for another token representing the interest in the pool. The lending product then enables other crypto-asset market participants to borrow the crypto-assets in exchange for interest payments. The pooled nature of these lending products may satisfy the definition of collective investment scheme in many jurisdictions. Operators of lending and borrowing protocols also may be viewed, depending on their structures, as investment advisors or sponsors of the collective investment scheme. Initially at least, these operators set the terms of the smart contract arrangements, such as the crypto-asset pairs available to trade, maintain the algorithm to update interest rates, set utilization rates, and address instances of default, including maintenance of a reserve factor.
- Some DeFi products may be structured and operate as hedge funds (or other private funds, or retail/non-retail collective investment schemes), depending on applicable laws. For example, vaults are a mechanism for retail investors to participate in allegedly on-chain hedge funds by deploying capital into single or multi-strategy pools run by smart contracts. The sale of the interests in these pools may be collective investment vehicles as they are offered to the public or, if limited to institutions, may be hedge funds. There are also hedge funds that invest or interact with DeFi activities, products and services and the IOSCO Standards applicable to hedge funds would apply to these hedge funds as well.

H. Principles for Market Intermediaries

29. *Regulation should provide for minimum entry standards for market intermediaries.*
30. *There should be initial and ongoing capital and other prudential requirements for market intermediaries that reflect the risks that the intermediaries undertake.*
31. *Market intermediaries should be required to establish an internal function that delivers compliance with standards for internal organization and operational conduct, with the aim of protecting the interests of clients and their assets and ensuring proper management of risk, through which management of the intermediary accepts primary responsibility for these matters.*
32. *There should be procedures for dealing with the failure of a market intermediary in order to minimize damage and loss to investors and to contain systemic risk.*

Potential Market Intermediaries: There are many DeFi products, services, arrangements, and activities that involve market intermediary participants or activities. This includes exchange, broker, dealer, investment advisor, custodian, clearing agency, transfer agent, and settlement activities, as well as providers of other services including proxy advisory and credit rating services. The following are non-exclusive examples of types of DeFi arrangements that could involve market intermediary activities in certain jurisdictions, or are similar to such activities in others, either currently or in the future:

- Aggregators, DEXs, and other products and services facilitate the exchange of crypto-assets. DEXs can involve order book exchanges, through which DEXs are performing functions typically associated with exchanges. DEXs can also use AMMs, also known as liquidity pools, which provide liquidity for trading markets. AMMs may be seen to be acting as liquidity providers or market makers and thus engaging in buying and selling activities like brokers or dealers.
- Aggregators and DEXs also provide services to users to enable them to trade with multiple AMMs. These activities are akin to broker or dealer activity as well.
- The operation of lending/borrowing products also may involve broker or dealer activity, particularly to the extent that the crypto-assets in the pool are financial instruments, including securities, and the lending product is engaging in lending activities with respect to the crypto-assets that are financial instruments, including securities.
- Each of the AMMs and the lending products may also be engaging in custodial activities and acting as counterparties, due to the manner in which the products engage in holding customer crypto-assets and trading customer crypto-assets. Whether these products and protocols may be acting as custodians of crypto-assets may depend, in part, on how the crypto-assets are transferred to the smart contracts.
- Aggregators enable users to seek the most favorable terms across a variety of protocols. Aggregators allow users to source bids and offers, monitor prices and

execute transactions across multiple protocols and trading platforms from a single interface. These activities likely involve exchange, broker or dealer, or investment advisor activity, depending on the particular facts.

- Yield aggregators are platforms of investment opportunities which, depending on how they are structured, provide the functions of either or both a broker and/or an investment advisor. Some yield aggregators provide a type of asset management which has similar characteristics to automated investment or robo-advisory services.
- Portfolio aggregators' primary functionality gives investors visibility into their current positions and allows them to execute transactions from the aggregator's interface thus providing the functions of a broker or dealer.
- Aggregators specializing in governance protocols may centralize proposals and voting across various DAOs, providing recommendations on how to vote on certain proposals. In this capacity, these types of aggregators may be acting as proxy advisors, if voting is delegated to the protocol. Investors may exchange their voting right(s) for compensation in such arrangements.
- Promoters of DeFi products or services.

I. Principles for Secondary and Other Markets

33. *The establishment of trading systems including securities exchanges should be subject to regulatory authorization and oversight.*

34. *There should be ongoing regulatory supervision of exchanges and trading systems which should aim to ensure that the integrity of trading is maintained through fair and equitable rules that strike an appropriate balance between the demands of different market participants.*

35. *Regulation should promote transparency of trading.*

36. *Regulation should be designed to detect and deter manipulation and other unfair trading practices.*

37. *Regulation should aim to ensure the proper management of large exposures, default risk and market disruption.*

Potential Exchange/Trading Systems: There are DeFi products, services, arrangements, and activities that could involve exchange and trading system activity. This includes exchange and over the counter activities, both in cash (spot) crypto-asset and derivatives markets. The following are non-exclusive examples of types of DeFi activities and participants that could involve exchange and trading system activity subject to regulation in certain jurisdictions, or are similar to such activities in others, either currently or in the future:

- Aggregators and DEXs facilitate the exchange of crypto-assets. DEXs can involve order book exchanges, through which DEXs are performing functions typically associated with exchanges. DEXs can also use AMMs, also known as liquidity pools, that provide liquidity for trading markets.

- Aggregators and DEXs facilitate the trading of crypto-assets. These activities can involve exchange and trading system activities, and also may operate as an issuer or primary distribution mechanism for new tokens or crypto-assets.
- Aggregators and DEXs also may be acting as a market for derivatives. These kinds of derivatives trading activities include providing protection or selling protection against loss (similar to swaps activities), selling synthetic exposures based on the value of other assets (which could include securities), and engaging in *perpetual futures* trading activity.
- Certain lending/borrowing products may act as exchanges or trading systems depending on the particular structure.
- Many protocols enable automated, and often high-speed, trading, often by sophisticated, well-capitalized entities. Algorithmic trading is common in the DeFi space, and bots are employed to run various trading strategies or identify arbitrage opportunities. Oracles and bridges offer connectivity with off-chain data and between DeFi protocols.

J. Principles Relating to Clearing and Settlement

38. Securities settlement systems, central securities depositories, trade repositories and central counterparties should be subject to regulatory and supervisory requirements that are designed to ensure that they are fair, effective and efficient and that they reduce systemic risk.

Certain DeFi activities and participants involve clearing and settlement services and the existing IOSCO Principles for clearance and settlement, securities depositories, trade repositories, and central counterparties could apply.

Potential Clearing and Settlement Entities: The following are non-exclusive examples of types of DeFi activities and participants that could involve clearing and settlement activity subject to regulation in certain jurisdictions, or are similar to such activities in others, either currently or in the future:

- Aggregators and DEXs use DLT to transfer ownership of crypto-assets. Depending on the particular protocol, these crypto-assets may be held within an associated smart contract, nominally on behalf of the user of the protocol. Changes in ownership of crypto-assets within DEX and AMMs likely involve clearing and settlement activity.
- Lending/borrowing protocols, as with DEXs and AMMs, generally rely on associated smart contracts to hold crypto-assets and to effectuate transfers of crypto-assets in associated lending pools. Changes in ownership of crypto-assets lending/borrowing protocols likely involve clearing and settlement activity.
- The activities of certain types of aggregators may also be viewed as clearing and settlement activity. For example, yield aggregators are platforms of investment opportunities which, depending on how they are structured, can provide the functions of either or both a broker and/or an investment advisor while potentially acting as a central counterparty. These activities may also operate as

settlement systems, depositories, or central counterparties depending on their structure.

- Layer 1 blockchains could themselves be carrying out clearing and settlement activities.

ANNEX G – SUMMARY OF UPDATED SURVEY RESULTS AND OUTREACH

In November 2022, the IOSCO Fintech Task Force (FTF) Decentralized Finance Working Group (DeFi WG) issued a survey to members of the IOSCO FTF to obtain information regarding their current and planned regulatory approaches to DeFi and to inform the ongoing work of the DeFi WG (the *Survey*). The Survey requested information regarding, among other things: the regulatory treatment of DeFi within IOSCO member jurisdictions; DeFi activities, including challenges, risks, and trends, within IOSCO member jurisdictions; and regulatory engagement with DeFi market participants, stakeholders, academics, and researchers.

Regulatory Treatment of DeFi within IOSCO Member Jurisdictions

(a) Overview of the current regulatory treatment of DeFi activities

The Survey asked respondents to provide an overview of the current regulatory treatment of DeFi activities within their jurisdictions. All respondents stated that they do not have separate regulatory frameworks specifically dedicated to DeFi activities at this time. Most of the respondents noted that DeFi activities are currently viewed through the same regulatory frameworks that apply to other traditional financial products, services, and activities subject to financial regulation. Some respondents shared that they are currently reviewing their regulatory approaches in relation to DeFi and exploring ways to incorporate DeFi activities into those other regulatory schemes.

Some respondents noted that efforts are underway in their jurisdictions to create new regulatory frameworks specific to crypto-assets, and that those regulatory frameworks, while not specifically targeting DeFi, might in some instances apply to DeFi activities, e.g., where there are centralized issuers or service providers engaged in activity covered by those other regulatory frameworks. For example, while the EU's Market in Crypto Assets (MiCA) regulation does not specifically apply to DeFi, EU-based respondents indicated that MiCA could apply to DeFi where a regulated service/activity is performed/provided/controlled, directly or indirectly, by an identifiable natural/legal person and/or other undertakings, including when part of such activity or service is performed in a decentralized way.

Respondents acknowledged that it may sometimes be difficult to identify the centralized actors involved in DeFi arrangements, which could present enforcement challenges (discussed further below), but in general, those actors would be subject to these regulatory frameworks, as appropriate. Likewise, a purported lack of centralized authority or use of algorithmic rules/processes would not itself exempt such activities from existing financial regulations. Respondents also emphasized that a lot of DeFi activities appear to be “decentralized” in name only.

(b) Recent developments relating to regulatory treatment of DeFi

In addition to an overview of the current regulatory treatment of DeFi activities, the Survey sought information regarding any updates or developments relating to the regulatory treatment of DeFi activities, including, among other things, proposed legislation or regulations relating to DeFi, licensing or registrations relating to DeFi activities, supervisory or enforcement actions relating to DeFi, or other published guidance relating to DeFi.

(i) *New or proposed legislation or regulations relating or specific to DeFi activities*

The majority of respondents stated that their jurisdictions did not have any new or proposed legislation or regulations specific to DeFi activities, but reiterated that, in general and depending on the facts and circumstances, existing regulatory frameworks that apply to other traditional financial products, services, and activities could apply to DeFi. In addition, and as noted above, some respondents stated that there are currently efforts to create new regulatory frameworks specific to crypto-assets and crypto-asset service providers (e.g., MiCA in the EU), and that those frameworks could also apply to DeFi activities, where appropriate. For example, if a form of central authority/beneficiary is identified for a DeFi activity, then existing or upcoming rules might apply.

One respondent noted several ongoing initiatives in the EU relating to the development of a regulatory framework for DeFi, including an EU pilot project for the development of a technical solution to collect data on a blockchain, with a view to developing a supervisory approach for DeFi activities,¹⁵⁹ and the publication of a report by the EU Commission raising considerations for policymakers when thinking of an approach to the regulation of DeFi.¹⁶⁰

(ii) *Licensing or registrations relating to DeFi activities*

Respondents generally stated that they do not have specific licensing or registration frameworks relating to DeFi activities, but that, consistent with the approach described above, existing licensing and registration frameworks could apply to certain DeFi activities and that the entities involved in those activities would generally be expected to comply with those existing frameworks. Most respondents stated, however, that there have not been any entities or persons licensed specifically in relation to DeFi activities in their jurisdictions.

(iii) *Supervisory or enforcement actions relating to DeFi activities*

¹⁵⁹ See https://commission.europa.eu/publications/commission-implementing-decision-financing-implementation-pilot-project-embedded-supervision_en (“The result of the pilot project should help to inform and prepare the application of new legislative instruments for decentralised finance.”).

¹⁶⁰ See <https://op.europa.eu/en/publication-detail/-/publication/f689e5b2-4f55-11ed-92ed-01aa75ed71a1/language-en/format-PDF/source-272370364>.

Several respondents noted that they have brought public enforcement actions related to DeFi activities under their existing regulatory frameworks, including the U.S. SEC¹⁶¹ and CFTC¹⁶², Quebec AMF¹⁶³, and SC Malaysia¹⁶⁴. Another respondent noted that after investigating a DeFi protocol offered in its jurisdiction, the respondent requested that the DeFi protocol stop such activity since it was considered a regulated activity (asset management).

Apart from the above, most respondents stated that there have not been supervisory or enforcement actions focusing on DeFi activities, but a few respondents noted that they are continuing to conduct regulatory activities, including investigations, relating to certain DeFi activities, and that despite the absence of public actions to date, DeFi activities may be subject to existing regulatory frameworks and, where appropriate, regulatory, supervisory or enforcement actions.

(iv) *Guidance and other assistance for DeFi market participants*

The Survey asked whether respondents have provided DeFi participants with any of the following: guidance related to regulatory requirements and the supervisory approach; warnings or statements over DeFi risks; assistance with licensing or registration; relaxation of, or waivers or exemptions from, certain regulatory requirements; product trial/testing frameworks; or trialing certain technologies with the authority.

A few respondents have published reports or guidance specific to DeFi. One respondent published guidance on DeFi that included a description of DeFi and associated risks and a discussion on the potential applicability of existing regulations to DeFi.¹⁶⁵ Another respondent published a report advising those who would use a Decentralized Autonomous Organization (DAO) or other distributed ledger or blockchain-enabled means for capital raising to take appropriate steps to ensure compliance with applicable securities laws.¹⁶⁶

¹⁶¹ See <https://www.sec.gov/news/press-release/2021-145>; <https://www.sec.gov/news/press-release/2018-258>.

¹⁶² See <https://www.cftc.gov/PressRoom/PressReleases/8478-22>; <https://www.cftc.gov/PressRoom/PressReleases/8590-22>.

¹⁶³ See Décision - Autorité des marchés financiers c. Change Marsan inc. - 2021 QCTMF 43 (soquij.qc.ca);
Décision - Autorité des marchés financiers c. Hope - 2021 QCTMF 48 (soquij.qc.ca);
 see also Décision - Autorité des marchés financiers c. CreUnite - 2018 QCTMF 8 (soquij.qc.ca)
 (action taken against an issuer of crypto-assets that were qualified as securities (ICO), distributed (among other means) through a DEX).

¹⁶⁴ See <https://www.sc.com.my/resources/media/media-release/sc-takes-enforcement-actions-on-binance-for-illegally-operating-in-malaysia>.

¹⁶⁵ See BaFin - Decentralised finance (DeFi) and DAOs.

¹⁶⁶ See <https://www.sec.gov/files/litigation/investreport/34-81207.pdf>.

Another respondent published a primer explaining smart contract technology and related risks and challenges (as part of a broader body of guidance/information relating to the crypto-asset marketplace).¹⁶⁷ Other respondents noted that although they have not published any guidance specific to aspects of DeFi, they have published guidance relating to crypto-asset activity more generally, including regarding the applicability of their regulatory frameworks to crypto-asset activities and associated risks, which may also apply to DeFi.¹⁶⁸ A number of respondents have also issued public warnings relating to DeFi risks.¹⁶⁹

In addition to public guidance, a number of respondents noted that they provide informal feedback to written and oral inquiries on matters involving crypto-assets and other financial technology, including those that may involve DeFi, often through an “innovation hub” or the equivalent. These respondents stated that they may engage with entrepreneurs and market participants and assist them, to varying degrees, with questions relating to the applicability of relevant regulatory requirements, including licensing and compliance issues. One respondent also noted that their innovation hub has a specific intake form for inquiries related to DeFi. Several respondents also noted the availability of a “sandbox” or other type of product trial/testing framework in their jurisdiction relating to FinTech more broadly, as well as some development activity relating to DeFi specifically.¹⁷⁰

Finally, one EU-based respondent noted that it engages with market participants as part of its regulatory horizon scanning and has gathered positive feedback regarding the proposed regulation of DeFi. That respondent noted that market participants have expressed an interest for a coordinated international approach to DeFi regulation, in light of the cross-border nature of DeFi activities.

DeFi Activities within IOSCO Member Jurisdictions

(a) DeFi activities

¹⁶⁷ See <https://www.cftc.gov/PressRoom/PressReleases/7847-18>.

¹⁶⁸ See, e.g., <https://www.cftc.gov/PressRoom/PressReleases/8336-20>; <https://asic.gov.au/regulatory-resources/digital-transformation/crypto-assets/>; <https://www.osc.ca/en/securities-law/instruments-rules-policies/2/21-329/joint-canadian-securities-administratorsinvestment-industry-regulatory-organization-canada-staff>; <https://www.bancaditalia.it/media/approfondimenti/2022/cripto/Comunicazioni-della-Banca-d-Italia-DLT-cripto.pdf>; <https://www.sfc.hk/en/News-and-announcements/Policy-statements-and-announcements/Statement-on-regulatory-framework-for-virtual-asset-portfolios-managers>; <https://apps.sfc.hk/edistributionWeb/gateway/EN/circular/intermediaries/supervision/doc?refNo=18EC77>; <https://apps.sfc.hk/edistributionWeb/gateway/EN/circular/intermediaries/supervision/doc?refNo=22EC10>.

¹⁶⁹ See <https://www.moneysense.gov.sg/articles/2022/10/defi-what-you-need-to-know>; https://www.esma.europa.eu/sites/default/files/library/esa_2022_15_joint_esas_warning_on_crypto-assets.pdf

(focusing on crypto-assets generally but mentioning DeFi).

¹⁷⁰ See, e.g., <https://www.mas.gov.sg/news/media-releases/2022/first-industry-pilot-for-digital-asset-and-decentralised-finance-goes-live>.

The Survey sought information regarding the following DeFi activities or business models observed in IOSCO member jurisdictions: DAOs; stablecoin offerings and use; credit/lending; decentralized exchanges/trading; liquidity or investment-type pooling; automated market marking; mining/staking/pooling; yield farming; insurance/risk management; asset management; and derivative and other synthetic product offerings. Several respondents said that they have observed all of the above activities within their jurisdiction. Most of the respondents said that they have observed some, but not all, of the activities. Some respondents noted that they have not observed any of the aforementioned DeFi activities within their jurisdictions.

Several respondents noted that based on publicly available sources, it appears that DeFi activities may originate from and/or be available in their jurisdictions, but due to the pseudonymous or anonymous nature of blockchains, it is difficult to identify exactly where the activity is and whether it does involve persons in their jurisdictions. It appears that most DeFi activities are open to participation by all persons, including retail investors, across borders.

One respondent noted that they have evaluated the types of persons and entities who participate in DeFi. Based on that respondent's initial observations, including anecdotal information, there are a variety of persons and entities that have a current or future interest in DeFi, including: (i) brokers, dealers and investment advisers; (ii) token issuers, including through the use of smart contracts; (iii) token distributors; (iv) investors (including institutions and venture capital firms); and (v) developers.

One respondent also noted that due to the lack of transparency in the DeFi "market", there is a lack of data about the level of activity of each of the participants at any particular level of DeFi structure, platform, or layer. The ability to evaluate each type of current DeFi product, service, arrangement and activity is therefore limited. However, based on a review of some of the more active DeFi platforms, that respondent has observed that there often are multiple components and a combination of different types of activities. Thus, while that respondent has observed market activity in each of the types of DeFi activities listed in the Survey, such activity may not be engaged in on a standalone basis, but instead may be part of a larger arrangement. For example, a single entity may create a decentralized trading platform, offer what is termed a *governance token*, may create a derivative product, and may use a crypto-asset termed a *stablecoin*. In addition to the lack of transparency in, and the constantly evolving nature of, DeFi structures, in some cases the project's public statements may not fully or accurately describe how the structure actually operates and what is being offered.

Respondents reported observing the following specific types of DeFi activities in their jurisdictions:

- Stablecoin offerings and use. A number of respondents said that they are aware of various types of stablecoins that are in circulation. These stablecoins have varying characteristics. For example, the stablecoin may be *pegged* or *linked* in some way to a reference asset, which could be fiat currencies, another crypto-asset, a real asset,

or some combination of assets. Certain stablecoins claim to provide holders a 1:1 direct redemption right against an issuer or reserve of assets while others do not.¹⁷¹ In addition to the use of stablecoins on crypto-asset trading platforms, participants in DeFi structures may use stablecoins as one side of the trade in DeFi transactions. An example would be the use in purchase and sale transactions with AMMs that often allow for stablecoins to be deposited into smart contracts formed as liquidity pools. In these transactions, a combination of stablecoin and some other crypto-asset is deposited through a smart contract into a pool of crypto-assets. Market participants could exchange one token for the other at an exchange rate set by an AMM that typically uses a mathematical formula driven by the relative proportion of the two types of crypto-assets in the pool to determine the exchange rate. Stablecoins also are often used in DeFi structures as collateral deposited into a protocol to support lending and borrowing activities. A number of DeFi structures also issue their own stablecoins.

- Credit/Lending. Respondents have observed arrangements that appear to provide for a lending structure in return for a payment. In these structures, crypto-asset trading platforms, smart contracts, or other market participants create a credit/lending pool. They borrow crypto-assets from clients or other market participants and lend these crypto-assets to other market participants in return for a fee. In a number of the smart contract structures, participants may deposit one type of crypto-asset as collateral and in return, borrow a different crypto-asset from the credit/lending pool. To date, many credit/lending pools (including smart contracts establishing such pools) or lending platforms require, as a condition to participation, that borrowers provide an amount of crypto-asset collateral well in excess of the value of the crypto-assets borrowed.
- Decentralized Exchanges/Trading. Respondents have observed entities that claim to have set up DEXs that purportedly allow for the trading of crypto-assets (referred to as *tokens*) between parties, including tokens that appear to be securities, by both retail and institutional investors. Initially, these DEXs used an order book structure and used the *ox* protocol as the underlying technology. This enabled any person to list orders, but trading was relatively slow and expensive with gas fees of \$50-100 [per transaction]. Although *order book* DEXes now face competition from the AMMs discussed below, there are innovations, including DEXes that claim to offer high-speed, on-chain order books.
- Liquidity or Investment-type Pooling / Automated Market Making. Respondents have observed arrangements involving the creation, through smart contracts, of *liquidity pools* or AMMs. AMMs generally hold two types of crypto-assets and offer users the ability to trade one of the crypto-assets in the pool for the other at a price

¹⁷¹ One respondent referenced the IOSCO stablecoin report, FSB stablecoin reports, and US PWG stablecoin reports for further information.

determined by a *constant product* function. Users that deposit tokens to the AMM, providing liquidity, often receive another crypto-asset called a *liquidity provider token*, that may entitle the holder to a portion of fees generated through the use of the AMM. AMM protocols can also issue governance token. Traders can transact with the pools directly or through entities that provide *routers* that seek to find the best prices across many AMMs. Many of these smart contracts and structures are copies of or based on code written originally by Uniswap. The liquidity/AMM pools appear to be funded (or *capitalized*) by market participants who seek a return based on the trading profits of the AMM. Sometimes, participants share in fees generated by the AMM/liquidity pool as part of the trading activities, often through liquidity provider tokens, governance tokens and also through secondary trading on crypto-asset trading platforms of the liquidity provider tokens and governance tokens.

- Governance Tokens. Governance tokens are issued, directly or indirectly, by an entity establishing a particular platform or system and are issued in different manners and for different purposes. For example, in some cases governance tokens are issued to persons participating in transactions on an entity's blockchain or through their platform or system or upon presentation of another crypto-asset issued through their platform or system. Others may be issued as additional consideration for equity and other investments in an entity's platform or system, and these governance tokens could be issued as rewards to developers or employees. These tokens may be associated with certain voting rights over certain aspects of a DeFi protocol.
- Yield Farming / Asset Management. Respondents have observed arrangements that involve what is called *yield farming*. Generally, yield farming involves a series of transactions, involving borrowing and lending crypto-assets, in which the party attempts to start purchases and sales with one asset and through a *daisy-chain* engages in a series of purchases and sales that result in a profit on each one. For example, this can involve a person holding *Token A* who lends that to a *lending/credit* pool to get *Token B*, and then they deposit *Token B* in a liquidity pool and get *Token C*. This transaction enables potential returns at each level. One respondent has observed yield farming arrangements that offer to manage borrowing and lending of client or market participants (including retail investors) crypto-assets using multiple lending pools and multiple platforms. For example, some yield farming entities offer to take crypto-assets from another market participant (including retail investors) in return for a promise of a return, and then will deploy these assets in various DeFi structures and arrangements. The types of uses may involve collateral for crypto-asset loans to the yield farming operator, or as deposits into AMM/liquidity pools.
- Insurance/Risk Management. Respondents have observed arrangements that appear to incorporate DeFi components in order to pay a counterparty for losses related to DeFi transactions. For example, people sell digital tokens that purport to

entitle the holders to receive money if an event occurs. Often, these arrangements require off-chain assessments and inputs, provided by humans and/or oracles. One respondent has seen examples of insurance coverage that would be triggered by oracles that identify: (1) a bug in a smart contract; (2) customer losses due to theft from a crypto-asset trading platform that holds customer crypto-assets; or (3) a flight being delayed or cancelled. One respondent noted that while these protocols state that they are insurance products, it does not appear that the entities offering the insurance are regulated insurance companies.

- Derivative & other Synthetic Product offerings. Respondents have observed DeFi structures that offer digital tokens, through smart contract pools, that are marketed as providing synthetic exposures to other financial instruments, including securities and commodities. For example, some entities claim that they have issued crypto-assets and created systems (through their smart contracts) that will cause the value of the crypto-asset to rise, and fall based on the performance of a referenced asset or index, such as a stock or commodity. It is not clear what type of derivative exposures these asserted synthetic crypto-asset structures provide, such as whether they provide total return exposure (payments based on the performance of the linked asset, including any payments on such assets, such as dividends or payments on common stock) or event exposures (payments based on the occurrence of an event).

Other services or activities. Respondents have also observed the following:

- One respondent has observed DeFi offerings of what appear to be crypto-asset notes (borrowing by an entity and lending by a market participant) that are stated to have a return based on an investment in physical assets. There may be elements of liquidity or creditor pools involved in these structures. These types of crypto-asset structures also could involve other types of investment activities and offer profit sharing based on the performance of the investments.
- One respondent has observed DeFi prediction markets that allow *bets* to be made through the creation of smart contract pools. These include structures that offer the ability for a user to create an event contract that will pay off based on future events, for example the outcome of an election or economic events. The participants creating that event contract will receive a fee and for purchasers of the crypto-asset representing the contract exposure, they may trade the crypto-asset during the life of the contract and, at the end of the contract, the holder winning the bet will be paid through a smart contract.
- In addition to the various categories of DeFi activity, several respondents noted that they have observed an increasing role by centralized intermediaries (whether platforms or other types of FinTech companies) facilitating retail consumer access to DeFi protocols, which may indicate increasing interlinkages between DeFi and CeFi.

(b) Challenges in regulating or attempting to regulate DeFi activities

Respondents highlighted a number of challenges in regulating or attempting to regulate DeFi activities, including the following:

- Determining how existing regulatory frameworks should be applied to DeFi activities. Respondents noted that determining whether DeFi activities, including new/emerging types of services, fall within existing regulatory frameworks can be challenging. Respondents attributed these challenges to a few different factors. One respondent noted that the inner workings of DeFi protocols may not be very transparent or easy to understand, such that determining how existing regulations should be applied can be difficult and time consuming. And although some DeFi activities are similar in risks and economic substance as existing regulated activities, they may not fall so neatly within existing legal definitions because of the way they are structured or offered, e.g., using smart contracts. In addition, there may be challenges in determining which transactions and participants and which entities facilitating the transactions are subject to existing regulations. This challenge implicates questions such as which activities of software developers of smart contracts would require registration as a regulated entity, and how decentralization of a project potentially complicates application of regulatory requirements.
- Lack of, or difficulty identifying, central actors to whom existing regulation should apply. Respondents noted that there may be limitations in exercising existing regulatory and enforcement authorities due to the potential absence of, or inability to identify, a central actor who can be held accountable. Given the alleged lack of central authority (i.e., due to distributed governance and/or distributed code development and maintenance), it can be challenging to attribute the provision of DeFi services, and responsibility for compliance, to a responsible party or appropriate stakeholders (e.g., who is responsible for operating or implementing changes to a given protocol). Respondents indicated that this uncertainty on who should be held accountable for DeFi activities is exacerbated given that smart contracts run autonomously to provide services and that governance may be decentralized to varying degrees and involve the use of governance tokens and / or DAOs. Thus, even when an authority determines that a certain DeFi activity falls within its regulatory perimeter, there may not be identifiable persons or legal entities to hold responsible or engage on an ongoing basis in relation to complying with the applicable regulations. One respondent noted that “true DeFi” (if it exists), where all actors would be unknown, might create insurmountable challenges in terms of who should be in charge of ensuring compliance with the regulatory requirements. Business continuity, market integrity, and investor protection concerns might also be exacerbated in such circumstances.
- Lack of information. Related to the above, respondents noted a general lack of transparency and/or reliable information relating to DeFi activities, including a lack of data on the size and scope of DeFi activities in jurisdictions, which leads not only

to difficulties in applying existing regulations (as noted above), but also to other issues, including challenges in supervising such activities and legal and evidentiary challenges when trying to enforce regulations relating to those activities. Respondents noted that the lack of data and transparency on the developers and operators behind the DeFi protocols, i.e., pseudonymity, makes it hard to monitor DeFi activities or gather information and evidence against bad actors. This presents particular challenges for enforcement agencies to prove a case, as it may be difficult to identify stakeholders and to determine the “victims.” Related to that, respondents noted that there is a need to build up crypto-asset enforcement capabilities, as record-keeping is done on public blockchains and within smart contracts. Respondents noted that the prevailing pseudonymity in DeFi also makes it very challenging to assess financial risks such as credit, liquidity and leverage risk, as well as the interconnectedness with the traditional financial system and other segments of crypto-asset markets (e.g., CeFi) and also with third-party technology providers.

- Technological complexity of DeFi. Respondents also cited difficulties in understanding the details of DeFi activities, which are technical and complex, noting that available descriptions of DeFi activities (where they exist) are often basic and insufficient for a comprehensive legal assessment. In certain cases the ability to read and understand smart contracts may be required, as many protocols publish only rudimentary information and descriptions. Related to this, respondents noted a lack of resources and know-how to monitor and interpret these activities, and that existing information gathering tools and methods may not be effective in analyzing and monitoring DeFi activity, especially given the pseudonymous nature of the parties and information. Respondents noted that even if data is available on public blockchains, the capabilities to aggregate, read, and analyze such that may be limited. The quick pace of innovation exacerbates this and other challenges, making it difficult for regulators to keep up with DeFi market developments.
- Cross-border issues. Respondents noted that the owners and operators of DeFi products and services may be based in multiple jurisdictions and providing their offerings on a cross-border basis, such that regulatory cooperation is essential. In the absence of such cooperation, it would be difficult to identify the applicable jurisdictions and pursue enforcement actions against responsible parties located abroad. In addition, given the borderless nature of DeFi activities, there may not always be a regulatory nexus to assert jurisdiction over the activities. For instance, where investors in one country access a DeFi platform on a permissionless blockchain and trade digital tokens, the regulators may have challenges enforcing that jurisdiction’s regulations against the platform where there is no presence or solicitation in the country. Respondents indicated that the borderless nature of DeFi activities calls for a globally coordinated approach to regulation, including better international cooperation among regulators to strengthen surveillance, develop consistent regulations, and enhance information gathering.

- Consumer protection challenges. Respondents noted that although the code that facilitates DeFi transactions is often open source, most consumers do not take the time or have the expertise to review the code and instead rely on other factors when deciding to trust that transactions will process as expected. There have been numerous instances over the years of the economic incentives and the smart contract security of DeFi protocols being exploited and leading to individual or network-wide economic loss. Accordingly, respondents noted concerns with consumer protection/lack of awareness of risk related to such transactions.

(c) Developments or trends in DeFi market

Respondents were asked to describe developments or trends in the DeFi market that require particular attention from a regulatory and supervisory perspective. Some of the respondents reiterated some of the same aforementioned challenges in regulating or attempting to regulate DeFi as issues that require attention from regulators. In addition, respondents noted the below developments or trends:

- The speculation, embedded leverage, re-hypothecation of collateral, and interconnectedness that exist within the DeFi ecosystem (see, e.g., the Terra's UST/Luna collapse), and the lack of data / transparency on such interconnections;
- The financial stability implications arising from the interconnectedness within the DeFi and crypto-asset ecosystems, as well as between DeFi and TradFi;
- The emergence of centralized intermediaries, which purport to make it easier for retail clients to overcome technical barriers to access DeFi;
- As an example of some of the above, crypto-asset service providers offering attractive, and likely unsustainable, yields for customers that hold crypto-assets with them, where the returns are generated through staking and lending activities (where the service providers participate in unregulated DeFi protocols using customers' crypto-assets);
- Sources of vulnerability specific to DeFi allowing attack vectors, such as governance attacks (manipulation of DeFi protocol design parameters to steal liquidity from deposits in the protocol) or flash loans (transactions allowing users to borrow an asset without providing any upfront collateral);
- Market integrity issues within the DeFi ecosystem, e.g., price oracle manipulation, front-running transactions, and other types of market manipulative activities; and
- Investor protection concerns arising from the increasing number and scale of successful cyber attacks, as well as frauds and scams, involving DeFi protocols.

(d) Organizational structure to responding to DeFi, development of tools and techniques, and internal expertise related to DeFi

The Survey sought information regarding who within respondents' organizations take the lead in responding to DeFi. Most of the respondents noted that DeFi issues or developments are monitored and assessed in the first instance by a centralized team, whether it be an innovation or FinTech-focused hub, department, unit, or coordination

team, and then referred to other subject matter experts within the organization as appropriate (e.g., for licensing/registration, enforcement, policy development, etc.). The respondents indicated that these teams generally take the lead in responding to DeFi related questions, tracking DeFi market developments and reviewing academic and other source materials. A few respondents stated that they are also in contact with other subject matter experts, such as those in academia and industry, and have attended trainings to develop internal expertise related to DeFi, blockchain analytics, smart contract audits, and other relevant topics.

The survey responses indicate that respondents generally have not developed their own tools or techniques to obtain data on the level of DeFi activities and models. One respondent noted, however, that in addition to its innovation group, the respondent has a dedicated supervisory technology office, which has been conducting research to gain a better understanding of areas like crypto, blockchain, DeFi and web3.o. That group is exploring relevant tools, data sources and information sources that can contribute to the understanding, and engaging external researchers, industry players, and DeFi experts to understand the latest technology, products, trends and risks. They also support knowledge sharing with other departments and organize courses to improve the organization's knowledge in crypto/DeFi area.

(e) Risks to and protection of participants, stakeholders, and markets

The Survey asked respondents to describe risks that they have observed to participants, stakeholders, and markets related to DeFi. A few of the respondents reiterated some of the same challenges discussed above relating to the regulation of DeFi, including issues relating to the applicability and effectiveness of existing laws for DeFi, the anonymous and pseudonymous nature of DeFi activities, a lack of understanding and information relating to DeFi activities, the cross-border nature of DeFi activities, and the extremely fast pace development.

In addition to those challenges, one respondent noted that in general, the risks that arise in traditional securities markets, such as counterparty risk, liquidity risk, and risk of fraud and loss of investor funds, may be implicated in the DeFi market as well. In addition, to the extent that DeFi markets and DeFi market participants, such as intermediaries, fail to comply with applicable laws and regulations, investors and other market participants will generally lack investor protections and other protections, and are subject to greater risk that they may be defrauded, with limited ability for redress, either through private means or government enforcement. In addition, to the extent that DeFi market participants engage in activity that is subject to regulation, the failure to comply with regulatory requirements puts investors and connected markets, including securities markets, at risk.

Respondents also noted other risks for participants, stakeholders, and markets related to DeFi, including:

- Governance risks, including opaque governance structures, concentration of governance tokens, and differences between perceived and actual levels of decentralization

- Lack of prudential measures for certain DeFi services, which could result in investor losses
- Technology and cybersecurity risks and vulnerabilities, including code hacks or key theft, *smart contract risk* (i.e., the technical level of security of the smart contract code), coding errors within the smart contracts or underlying protocols, and other technical malfunctions
- Inadequate technology and cybersecurity controls and business continuity planning and disaster recovery procedures
- Lack of information on and availability of identifiable responsible operators in case of malfunctions, legal disputes, etc.
- Inadequate disclosures to / lack of awareness by investors of, among other things, how DeFi protocols operate, the underlying risks of a DeFi service, product or activity, and other information, such as the business model, services offered, related parties, and conflicts of interest of DeFi market participants
- Market manipulation and fraud, including code or oracle exploits, rug pulls, protocol back doors, and fraudulent platforms
- *Wrapping complexity*, where derivatives of tokens are repeatedly created, giving rise to new risks and interconnections between different protocols
- AML risks, including the movement of hacked / stolen funds and the potential lack of legal responsibility for DeFi protocols due to automation
- Reliance on third-party information providers or validators, such as oracles and other outside data sources, could potentially increase risks if those third-party sources produce faulty information—either because it is inaccurate or it has been manipulated

The Survey also asked whether jurisdictions have evaluated opportunities for DeFi arrangements to comply with regulations that aim to ensure protection of market participants, stakeholders, and markets. In general, respondents underscored that their innovation/FinTech hubs welcome discussions with DeFi market actors about product development (and in some cases, have engaged in such discussions), and that the general expectation would be for DeFi activities to comply with existing/planned regulatory frameworks, as appropriate. One respondent noted that given the permissionless nature of most DeFi arrangements, these arrangements would likely encounter difficulties in attempting to comply with certain regulatory requirements. Along those same lines, another respondent stated that a key requirement to ensure compliance with existing laws and regulations would likely be the presence of an accountable natural/legal person identifiable as responsible for the performance of the relevant activities.

One respondent noted that a registered firm in its jurisdiction plans to offer a private fund that will engage in DeFi activities (including staking, lending, and participation in liquidity

pools). Terms and conditions were imposed on the fund manager to address the risks of those activities, and the terms and conditions are publicly available.¹⁷²

(f) Fraud, code exploits and operational risks related to DeFi

The Survey sought information from respondents regarding publicly reported details of fraud, code exploits and operational risks related to DeFi activity in their jurisdictions. Respondents acknowledged public reports of frauds, code exploits, and operational risks involving DeFi, with one respondent noting that public reports indicate that fraud is common in DeFi.¹⁷³ Apart from the enforcement actions discussed above, however, most respondents did not identify any specific instances or details of fraud, code exploits, or operational risks relating to DeFi in their jurisdictions. Several respondents explained that for most publicly reported cases, it is unclear which jurisdiction(s) are impacted as DeFi platforms typically operate cross-border/globally.

Regulatory Engagement

The Survey sought information regarding which jurisdictions have been engaging directly with DeFi market participants and stakeholders, as well as academics, researchers, or others aside from DeFi market participants or stakeholders, to evaluate DeFi and monitor market trends. A number of respondents noted that they have, through their innovation or FinTech hubs, engaged with participants involved in the DeFi space in an effort to better understand its structure, scope, and implications. This includes developers, investors and other interested parties, including academics, researchers, and other non-industry members of the public, to varying extents, ranging from engagement at industry events to bilateral meetings.

Respondents gave a number of examples of such engagement, including:

- One respondent held a DeFi workshop with participants from the financial industry, industry associations, business consultants, and law firms. That respondent has also discussed DeFi projects with supervised entities and new projects on a bilateral basis.
- One respondent is carrying out a joint research project with a prominent business school with the goal of measuring interconnections between crypto-assets and traditional financial assets and identifying the primary main transmission channels, the output of which will be contagion risk indicators that will be published in a report.

¹⁷² See <https://info.securities-administrators.ca/nrsmobile/nrssearch.aspx> (search for “AQN Asset Management LTD” under “Firm,” click on the name of the firm underlined in blue, and then scroll under Ontario, Terms & Condition 1. “Click for Details”).

¹⁷³ See, e.g., Theodore Claypoole, *Ubiquitous and Creative Fraud is Regular Feature of Defi*, NAT’L L.REV., Apr. 27, 2022, available at <https://www.natlawreview.com/article/ubiquitous-and-creative-fraud-regular-feature-defi>; CHAINALYSIS, *supra* note 21; ELLIPTIC, THE STATE OF CROSS-CHAIN CRIME (Oct. 2022), available at <https://www.elliptic.co/resources/state-of-cross-chain-crime-report>.

- One respondent noted that its jurisdiction has established a committee, composed of lawyers, academics, and other qualified individuals, that is currently conducting work in relation to the DeFi space.
- One respondent noted that it has established a FinTech advisory group, composed of experts from academia, consulting firms, the central bank, and industry, which has been regularly providing input to on FinTech matters, including DeFi, for several years.
- Several respondents noted that they have engaged some subject matter experts, such as blockchain analytics companies and law firms, to better understand DeFi and DeFi market trends, including the different types of DeFi and how they are structured.
- Several respondents noted that they also include academic and other source materials in their horizon scanning of developments in the DeFi space.

Respondents noted several challenges that they have encountered in engaging with DeFi market participants. One of the challenges noted by multiple respondents is the decentralized nature of DeFi activities, which appears to result in a lack of legal entities or offices and anonymity. Further, some respondents commented that it could be difficult to fully understand and keep track of the DeFi market due to its complex structures, business models, products, and technologies, which are constantly evolving. Another challenge that was noted (and also discussed above) is the difficulty in finding reliable sources of data, e.g., on Total Value Locked, the number of DeFi protocols, and DeFi volumes, to enable such engagement.

To: [redacted]@usdoj.gov
From: Hirsch, David L
Sent: 2023-04-12T14:01:49Z
Subject: Congrats!
Received: 2023-04-12T14:01:56Z
[SSRN-id4411448.pdf](#)
[SSRN-id4187752.pdf](#)

Hey [redacted]
It was great meeting you in person! Thanks for hosting. I saw the news on [redacted] Well done. I had a couple questions about that. If you've got a minute to discuss, could you please give me a call? Sorry, I don't appear to have your number. Also, here are a couple of interesting MEV articles. Still getting through the one ending 1448.

Best,
Dave
[redacted] (desk)
[redacted] (mobile)

BLOCKCHAIN TRANSACTION ORDERING AS MARKET MANIPULATION

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***Abstract:** On public, permissionless blockchains like Ethereum, space is scarce and crypto traders must compete to use it for executing their transactions. That means those who control this space in the form of blocks resemble landlords who can extract rent. “Maximal Extractable Value” (MEV) refers to trading strategies that exploit the ability to decide what transactions go into a block. Those who control the contents of a block (validators) can obtain rents not only for including transactions in a block, but also for ordering them in profitable ways—say, by letting transactions “front-run” others. Since rising to prominence in 2019, MEV has quickly become a major market phenomenon, generating \$600 million in profit between 2020 and 2022 alone, while affecting tens of billions of dollars in transaction value.*

MEV is often condemned. Techniques like “sandwich attacks” which involve trading ahead of other users’ trades, have been described as toxic, fraudulent, manipulative – even theft. However, this broad denunciation of MEV is too quick, as the technical nuances of how each kind of MEV extraction operates are determinative of the legal risk it entails. The legality of MEV extraction under U.S. financial laws has yet to be subject to sustained scholarly analysis, and the present Article aims to fill this gap. We undertake the first systematic analysis of how U.S. securities and commodities law, particularly the broad anti-manipulation rules wielded by the SEC (Rule 10b-5) and CFTC (Rule 180.1), apply to core MEV extraction techniques on Ethereum.

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In so doing, the Article confronts how basic notions of fairness and trust play out differently in a world of discretionary transaction ordering in crypto markets compared to the first-come first-serve world of traditional finance. Behaviors that might seem outrageous off-chain look very different when examined in light of how blockchains actually work.

Nonetheless, this Article argues that some forms of MEV extraction entail a significant risk of market manipulation liability. Focusing on sandwiching in particular, we provide novel arguments showing that there is a route for courts that adopt a moralized lens, focused on behavior that exploits privileged control over financial infrastructure, to find sandwiching impermissibly manipulative. We argue, further, that the legal hazards are even greater when it comes to sandwiching private transactions, which more clearly involves a heightened trust relationship, as well as disruptive schemes like oracle manipulation, wherein MEV is part of an independently manipulative strategy. Nonetheless, we argue, this alone does not mean a sweeping ban on these forms of MEV is necessarily a desirable policy. It remains unclear whether a strict ban on MEV sandwiching, for instance, would be prudent, given the unknowns about the net effects of MEV extraction and behavioral impact that a ban on MEV sandwiching would entail.

I. INTRODUCTION	3
II. WHAT IS MEV EXTRACTION? TECHNICAL AND ECONOMIC BACKGROUND.....	10
A. <i>The Journey of an Ethereum Transaction</i>	11
1. From wallet software to “the mempool”.....	11
2. Block production.....	12
B. <i>What is MEV?</i>	13
C. <i>The MEV Extraction Ecosystem</i>	15
D. <i>The Importance of Order Flow: Publicness vs. Exclusivity of Ethereum Transactions</i>	16
E. <i>Strategies for Generating Profit through MEV</i>	18
F. <i>The Techniques for Executing MEV Strategies</i>	20
III. THE LAW OF MARKET MANIPULATION.....	21
A. <i>Scope of Legal Analysis</i>	21
B. <i>Anti-Market Manipulation Rules</i>	22
1. Price Manipulation	23
2. Fraud-Based Manipulation	26
C. <i>Insider Trading</i>	31
D. <i>Front-running</i>	33
IV. LEGALITY OF MEV EXTRACTION.....	34
A. <i>Sandwiching Public Transactions</i>	35
1. Price Manipulation.....	36

2023-02-03]	BLOCKCHAIN TRANSACTION ORDERING...	3
2.	Fraud-Based Manipulation.....	37
	(i) First simple theory: the sandwiched user is at least recklessly misled	39
	(ii) Second simple theory: the market is at least recklessly misled	41
	(iii) More sophisticated theory: artificial effect on prices created at least recklessly	44
	(iv) Rejoinders	49
	(v) Front-running	53
B.	<i>Sandwiching Private Transactions</i>	54
	1. Explicit Private Order Flow	55
	2. Non-Explicit Private Order Flow and Payment For Order Flow	60
C.	<i>Other Ways to Extract MEV: Oracle Manipulation</i>	62
	1. Oracle manipulation to create loan liquidation opportunities	63
	2. Fraud-based manipulation liability	64
V.	A NOTE OF CAUTION ON THE POLICY QUESTION.....	65
VI.	PROPOSALS AND CONCLUSIONS	68

I. INTRODUCTION

Applying the assumptions of traditional finance to the radically different infrastructure of crypto markets is risky business. On February 16, 2022, an Ethereum user we will call 0x61 (based on her address) appears to have noticed a profit opportunity. Since the beginning of February, the price of ETH¹ (the native token of the Ethereum blockchain) had recovered somewhat from a prior drop, and 0x61 likely decided that the recovery wouldn't last much longer. 0x61 used the decentralized exchange Uniswap V2 to sell 79 ETH, then worth around \$250,000, in exchange for DAI (roughly put, 1 DAI corresponds to 1 dollar), and logged off perhaps feeling content about the day's work.² Little did 0x61

¹ Strictly speaking, this was Wrapped Ethereum (WETH). *See, e.g.,* Ivan Cryptoslav, *What Is Wrapped Ethereum (WETH)?*, COINMARKETCAP.COM ALEXANDRIA (2022), <https://coinmarketcap.com/alexandria/article/what-is-wrapped-ethereum-weth> [<https://perma.cc/BK23-W2NC>].

² 0x61's transaction can be viewed on Etherscan, the Ethereum blockchain explorer: <https://etherscan.io/tx/0x9760b7dedcbfbc37e6feb491a9bdf33c98c99d8d339fde49f2c3e97828cd4b6b>. The transaction can also be analyzed on ZeroMEV: <https://www.zeromev.org/block?txh=0x9760b7dedcbfbc37e6feb491a9bdf33c98c99d8d339fde49f2c3e97828cd4b6b>.

know that others were watching in the “dark forest”³ of Ethereum’s public “mempool,”⁴ where submitted transactions sit waiting to be executed by being built into blocks and recorded on the blockchain. It is only once the submitted transaction is executed in this way that 0x61’s effort to capitalize on the profit opportunity she saw would be complete.

However, things did not turn out exactly as 0x61 may have expected. A few minutes after pressing the button on her transaction, it became clear that someone else had interfered in her plans. The transaction she likely had thought would provide her about \$225,000 (adjusted for \$25,000 in transaction fees) in DAI, ended up garnering just \$179,000.⁵

Where did the extra \$46,000 that 0x61 expected go?⁶ It had been captured by what has become known in the crypto community as a *MEV extractor*.⁷ “MEV” stands for Maximal Extractable Value⁸ and paradigmatically involves the direct or indirect exploitation of the ability to control the order in which transactions are executed, a power which is possessed by those who construct the blockchain on which crypto assets are traded.⁹ Despite its very recent formalization in 2019,¹⁰ MEV extraction has quickly become a major market phenomenon, with a conservative estimate at roughly \$600 million in profit between 2020 and 2022 alone, while affecting tens of billions of dollars in transaction value.¹¹

More specifically, what happened to 0x61 was a *sandwich*,¹² the classic example of MEV extraction. Upon spying her transaction pending in the

³ Dan Robinson & Georgios Konstantopoulos, *Ethereum is a Dark Forest*, PARADIGM.XYZ (2020), <https://www.paradigm.xyz/2020/08/ethereum-is-a-dark-forest>.

⁴ See *infra* Section II.A.

⁵ See *supra* note 2.

⁶ Had 0x61 not been front-run by the bot’s trade, they would have ended with \$46,083-worth more of DAI. For the source of that calculation see the Ethereum block 14217123 in the Zeromev explorer: <https://www.zeromev.org/block?num=14217123>.

⁷ *Maximal Extractable Value*, <https://ethereum.org/en/developers/docs/mev/> (last accessed, 31 Jan., 2023).

⁸ *Id.*

⁹ Philip Daian et al., *Flash boys 2.0: Frontrunning, transaction reordering, and consensus instability in decentralized exchanges*, (2019), <https://arxiv.org/abs/1904.05234>.

¹⁰ *Id.*

¹¹ See Raphael Auer et al., *Miners as intermediaries: extractable value and market manipulation in crypto and DeFi*, BIS BULLETIN (2022), <https://www.bis.org/publ/bisbull58.pdf>; EIGENPHI RESEARCH, *Flash Boy’s Gain, Everybody’s Pain: 2022 Mid-Year Report of Sandwich MEV on Ethereum*, (2022), <https://eigenphi.substack.com/p/flash-boys-gain-everybodys-pain..>

¹² Sandwiches have been widely discussed. See, e.g., Lioba Heimbach & Roger Wattenhofer, *Eliminating Sandwich Attacks with the Help of Game Theory*, in PROCEEDINGS OF THE 2022 ACM ON ASIA CONFERENCE ON COMPUTER AND COMMUNICATIONS SECURITY 153 (2022), <https://doi.org/10.1145/3488932.3517390>; Kshitij Kulkarni, Theo Diamandis & Tarun Chitra, *Towards a Theory of Maximal Extractable Value I: Constant Function Market Makers*, (2022), <https://arxiv.org/abs/2207.11835>; Julien Pict, Jaiden Fairoze & Nicholas Weaver, *Extracting God!*

mempool, an automated “searcher bot” (our metaphorical “lurker” in this case) sniffed out the potential profits exploitable from 0x61’s trade. That is, the bot employed its algorithm to simulate the transaction’s execution, finding that it would produce an increase in the price of DAI relative to that of ETH on the decentralized exchange. The searcher bot then knew precisely what to do: get there first. While 0x61’s trade was still pending, waiting in the mempool to be executed by being included in a block, the searcher swooped in and was able to influence a block builder to execute the bot’s own trade first, which swapped 850 ETH for 2.27 million DAI before 0x61’s trade went through.¹³ As a result, the price of DAI against ETH increased, and so 0x61 failed to realize as much value from her trade as anticipated. This loss, however, became the searcher’s gain. It purchased the DAI low, and then when its trade plus 0x61’s trade moved the price of DAI against ETH upwards, it sold high. Specifically, it used its new 2.27 million DAI to purchase 868 Ethereum, netting a profit of 18 ETH (worth over \$56,000).¹⁴

On a natural way of thinking, this might seem *outrageous*. Someone in 0x61’s position – whose trade ended up being tens of thousands of dollars less profitable than expected due to someone who effectively “cut in front” of her to trade first – might be forgiven for alleging that the searcher *stole* some of the profits she reasonably believed were coming her way.

But appearances can be deceiving. Careful analysis is needed before jumping to the conclusion that sandwich attacks, or other forms of MEV, are unfair, manipulative or fraudulent – as is sometimes claimed.¹⁵ This, we will argue, is because the intuitions and expectations derived from traditional finance, which naturally fuel the criticisms of MEV as “toxic,” unfair or manipulative, do not automatically carry over to crypto trading, which operates in fundamentally different ways than traditional finance. This Article seeks to explain why. It is the first to systematically analyze the legality and broader normative defensibility of the main questionable MEV extraction techniques employed on public, permissionless blockchains like Ethereum today.

[sic] *from the Salt Mines: Ethereum Miners Extracting Value*, (2022), <https://arxiv.org/abs/2203.15930>.

¹³ See *supra* note 2.

¹⁴ For the purpose of clarity, we assume here that the searcher bot was operated by a validator-proposer, meaning that it would net all 18 ETH as its own profit. Yet, as we will soon discuss, in Section II.C., if the searcher were *not* operated by a proposer, it would have to give some of those profits up to validators in exchange for the ability to have its own transactions ordered directly before and directly after that of 0x61.

¹⁵ Ari Juels, Ittay Eyal & Mahimna Kelkar, *Miners, Front-Running-as-a-Service Is Theft*, COINDESK (2021), <https://www.coindesk.com/markets/2021/04/07/miners-front-running-as-a-service-is-theft/>; IOSCO, *IOSCO Decentralized Finance Report. Report of the Board of IOSCO*, 37 (2022), <https://www.iosco.org/library/pubdocs/pdf/IOSCOPD699.pdf>; U.S. TREASURY DEPARTMENT, *Crypto-Assets: Implications for Consumers, Investors, and Businesses*, 36 (2022), https://home.treasury.gov/system/files/136/CryptoAsset_EO5.pdf; Auer et al., *supra* note 11.;

What might seem outrageous based on the first-in-time (first-come first-serve) method of transaction execution that pervades traditional finance is far more complicated when analyzed within the context of the “timeless” method of transaction ordering on Ethereum,¹⁶ which obeys a logic all its own. On blockchains like Ethereum, transactions are ordered in a manner distinct from that familiar to legacy finance. Most fiat-based electronic trading takes place on continuous limit order books, which process transactions in the order of the time when they were submitted. However, transaction processing systems, like continuous limit order books, which operate on a first-in, first-out model, inherently privilege traders located physically *closer* to the ultimate location of transaction execution. This is because those traders have the lowest *latency* – they receive and can transmit transaction information faster than other market participants.

By contrast, public blockchains are meant to operate globally in a decentralized fashion that does not privilege particular locations. As such, time-based transaction processing has been eschewed for blockchain systems like Ethereum, which have sought a different approach to transaction ordering, in which constructors of blocks on the blockchain (known as validators) can determine transaction order in a variety of ways.¹⁷ Accordingly, there is *no natural ordering* of transactions within this space, no first-in-time queue that operates by default to determine who trades first. This means that claims that MEV extractors jump the queue to “steal” some of the profits of the affected trades are much too simple and not obviously defensible – even if they also are psychologically understandable for traders like 0x61. To get to the bottom of these issues, this Article explores the complex machinery through which trading operates on Ethereum and we unpack how its fundamental differences with traditional finance impact the legality under existing US financial law of the main MEV techniques.

Despite the rapidly growing importance of MEV, there has so far been no in-depth analysis of the legality specifically of MEV extraction in the legal literature.¹⁸ This is the gap our Article aims to fill. We undertake the first systematic analysis of how US securities and commodities law, particularly the

¹⁶ We focus our analysis in this Article on Ethereum, as this is where MEV extraction is most prevalent and most discussed. With this said, much of our analysis is likely to apply to other public, smart contract-enabling blockchains (e.g., Solana).

¹⁷ See *infra* Section II.

¹⁸ There have been valuable analyses of how securities law applies to fraud and other forms of abuse in crypto markets in general, although they do not discuss MEV techniques like sandwiching or oracle manipulation, which we confront in depth. See, e.g., Menesh Patel, *Fraud on the Crypto Market*, FORTHCOMING IN HARVARD J. L. & TECH. (2023). Moreover, there have also been quick comments on the legality of MEV, though these only scratch the surface and do not systematically examine the depth of technical and legal nuance that these issues present; see, e.g., Auer et al., *supra* note 11; Mikołaj Barczentewicz, *MEV on Ethereum: A Policy Analysis*, INTERNATIONAL CENTER FOR LAW & ECONOMICS WHITE PAPER 2023-01-23 (2023), <https://ssrn.com/abstract=4332703>.

broad anti-manipulation rules that figure centrally in the regulatory arsenals of the Securities Exchange Commission and Commodities Futures Trading Commission (*i.e.* SEC Rule 10b-5 and CFTC Rule 180.1), apply to core MEV extraction techniques on Ethereum. The topic is especially ripe for exploration because MEV extraction raises numerous legal and policy questions of first impression, which courts, regulators and lawmakers will need to address.¹⁹ Our Article contributes insights about the novel phenomenon of MEV to the growing body of scholarship about the regulation of decentralized finance (DeFi) in general²⁰ and contributes to lively literature on how the law of market manipulation is evolving to keep pace with rapidly changing trading practices.²¹

In assessing what sorts of liability under existing US financial law are risked by MEV extractors, a cluster of important but unsettled questions arise about the importance of the special forms of control over key financial infrastructure that MEV extractors exploit – especially the essential function of transaction processing through block building. Transactions on Ethereum are not ordered via a first-in-time principle but the matter sits within the control of block producers (especially: validators), as rational and self-interested agents. It is thus predictable that they will *extract rents* from those who need to use their block-production-controlling services to execute their trades – much like rents charged for one’s control of a piece of limited physical space. In the highly competitive environment of crypto markets, we can expect that advantages will tend to be exploited – including by those who control the system infrastructure itself. This suggests that MEV may be understood as the extraction of rents by those who control “blockspace,” extracted from traders who require access to that space to be able to trade.

This peculiar set-up, we will argue, carries its own distinctive legal and ethical hazards, which impact not only the legal risks that MEV extractors face under US financial law but also the policy responses that legislators may wish to pursue in response to MEV extraction. As we will see, users *trust* blockchain validators to verify and process transactions added to the blockchain and, in order to accomplish this task, validators possess the privileged role (from which

¹⁹ For example, MEV is mentioned in the crypto-regulation bill introduced by Senator Elizabeth Warren: *Digital Assets Anti-Money Laundering Act of 2022*, S.5267, 117th Cong. §3(a) (2022).

²⁰ See, e.g., Kristin N Johnson, *Decentralized finance: Regulating cryptocurrency exchanges*, 62 WM. & MARY L. REV. 1911 (2021); Chris Brummer, *Disclosure, Dapps and DeFi*, 5.2 STAN. J. OF BLOCKCHAIN L. & POL’Y 137 (2022); Dirk A Zetzsche, Douglas W Arner & Ross P Buckley, *Decentralized finance*, 6 J. OF FIN. REG. 172 (2020); Proceedings of the 2021 Spring Conference: The Impact of Blockchain on the Practice of Law, 17 NYU J. OF L. & BUS. 681 (2021).

²¹ Gina-Gail S Fletcher, *Legitimate yet manipulative: The conundrum of open-market manipulation*, 68 DUKE L. J. 479 (2018); Tom CW Lin, *The new market manipulation*, 66 EMORY L. J. 1253 (2017); Jakob Arnoldi, *Computer algorithms, market manipulation and the institutionalization of high frequency trading*, 33 THEORY CULT. SOC. 29 (2016); MERRITT B FOX, LAWRENCE GLOSTEN & GABRIEL RAUTERBERG, *THE NEW STOCK MARKET: LAW, ECONOMICS, AND POLICY* (2019).

they can extract rents) of ordering and including transactions.²² Thus, the central question we confront in this Article is whether the sort of rent extraction MEV arguably involves, flowing from privileged control over or access to key financial infrastructure in which users place their trust, might make it count as a form of manipulation.

We argue in Section IV that there are narrow contexts in which MEV extractors plausibly can be seen as occupying a position of heightened trust and thus we contend that existing anti-manipulation law would be violated by some forms of MEV. But especially because of the differences from traditional finance, we also find that much MEV extraction – especially when carried out through open market trades at arms’ length – fit within familiar economic rationales that the courts widely accept as legitimate within legacy finance. Furthermore, we argue in Section V, at a policy level, that because of the open empirical questions about whether MEV behavior has a net positive impact on the efficiency of crypto markets (*e.g.*, through properly incentivizing essential financial functions on which all crypto market participants rely), regulators and lawmakers should be very careful about introducing blanket MEV prohibitions. We argue that prohibitions are likely to be defensible, if at all, only in narrowly circumscribed cases such as those involving i) express representations that are false or misleading,²³ ii) a special relationship of trust between MEV extractors and particular traders (such as when private order flow is involved),²⁴ or iii) harmful kinds of benchmark manipulation (known as “oracle manipulation,”²⁵ and which DOJ, CFTC, and SEC are already prosecuting²⁶).²⁷

MEV extraction thus forces us to re-examine the normative assumptions and principles underlying market manipulation law in order to determine

²² For instance, blockchain users rely on validators to maintain the integrity of the network by ensuring that “double spending” does not occur. *See, e.g.*, Satoshi Nakamoto, *Bitcoin: A Peer-to-Peer Electronic Cash System*, (2008), <https://bitcoin.org/bitcoin.pdf>.

²³ *See generally infra* Section IV.

²⁴ *See infra* Section IV.B.

²⁵ *See infra* Section IV.C; an “oracle” is essentially a communication channel which provides external data to closed blockchain systems. While this data can come from on-chain or off-chain sources, price oracles in decentralized finance—the focus of our discussion here—are a specific kind of oracle which pull data exclusively from on-chain sources to determine prices for DeFi protocols. For more information regarding oracles *see* Cryptopedia, *Blockchain Oracles Explained: Decentralized Oracles in DeFi* (Feb. 4, 2022), <https://www.gemini.com/cryptopedia/crypto-oracle-blockchain-overview#section-inbound-versus-outbound-oracles> (discussing oracles which bring off-chain data to blockchain systems).

²⁶ Press release, *CFTC Charges Avraham Eisenberg with Manipulative and Deceptive Scheme to Misappropriate Over \$110 million from Mango Markets, a Digital Asset Exchange*, COMMODITY FUTURES TRADING COMMISSION (Jan. 9, 2023), <https://www.cftc.gov/PressRoom/PressReleases/8647-23>; Press release, *SEC Charges Avraham Eisenberg with Manipulating Mango Markets’ “Governance Token” to Steal \$116 Million of Crypto Assets*, SECURITIES AND EXCHANGE COMMISSION (Jan. 20, 2023), <https://www.sec.gov/news/press-release/2023-13>.

²⁷ *See infra* Section IV.C.

whether the effects of MEV extraction are legitimate and compatible with market integrity or whether they fall afoul of basic notions of fairness and well-ordered markets. In our analysis, the key ends up being to determine the extent to which various types of MEV extractors, involved in different types of trading strategies and techniques, can be said to occupy positions of trust that carry special responsibilities to avoid interfering with the reasonable expectations of other market participants.²⁸ A core contribution of this Article thus is to frame the central legal and normative questions to be answered – whether by courts, regulator or legislators – and we argue for an approach to this question that takes a holistic look at the costs and benefits of MEV extraction and allocates legal duties on that basis.²⁹

The remainder of this Article will proceed as follows. Section II introduces the technical background necessary for a legal understanding of MEV. We explain the process of transaction validation on Ethereum and show how it allows MEV extraction. We describe the most common forms of MEV extraction, including sandwiching, arbitrage, and liquidations. Section III introduces relevant aspects of US law governing market manipulation in securities and commodities markets. Beyond sketching the statutory and regulatory backdrop of anti-manipulation law, we discuss the law’s treatment of particularly salient categories of manipulative trading like open market manipulation, insider trading, and front-running.

In Section IV, we apply the law of market manipulation to core cases of MEV extraction. We begin with MEV sandwich trades targeting public transactions, addressing the main arguments for and against market manipulation liability for this practice. We provide novel arguments showing that a court drawing on moralized conceptions of market fairness may have a route to concluding that the sandwiching of public transactions is manipulative in violation of CFTC Rule 180.1 or SEC Rule 10b-5 on the grounds that a sandwicher at least recklessly creates an artificial price effect by unfairly exploiting their position of privilege and control over essential financial infrastructure. That said, we note that the practical hurdles for succeeding with this cause of action make it unlikely to be pursued as a high regulatory priority in the near term. Turning then to sandwiching of *private* transactions, we find that a broader scope for market manipulation liability exists here as actors trusted to act in confidence are more likely to end up behaving in misleading ways when handling private transaction information. Finally, we examine trading strategies that involve MEV only incidentally or as a means to further increase the profitability of other schemes, including harmful oracle manipulation. As we will argue, a number of these techniques are likely to attract market manipulation liability.

Section V then moves from analyzing liability for MEV under existing law to considering the policy question of how to respond to such practices. We

²⁸ See *infra* Section IV.

²⁹ See *infra* Sections V and VI.

caution that it remains far from clear that a flat ban on questionable forms of MEV sandwiching would be good policy. There are at present too many unknowns about the net impact on market efficiency and social welfare of MEV sandwiching, as well as the behavioral effects that a sweeping sandwiching prohibition would have, to be confident that this is a desirable way forward at present. More empirical research on the issue is imperative. We conclude in Section VI by offering four recommendations to policymakers, courts, researchers, and the Ethereum community. In these ways, we hope to shed light on the dark art of MEV extraction on Ethereum.

II. WHAT IS MEV EXTRACTION? TECHNICAL AND ECONOMIC BACKGROUND

Referenced by many as a “dark forest,”³⁰ Ethereum’s mempool³¹ is home to lurking monsters, attacking other forest dwellers and particularly visitors not well-versed with the ways of the forest. These metaphorical “monsters” are strategic network participants on Ethereum who monitor pending transactions to find and extract value from profitable MEV opportunities—instances where the inclusion, ordering, or censoring of pending transactions turns them a profit. As we shall see, these actors “attack” ordinary, likely unsuspecting network users because, in many cases, their profit is correlated with another user’s financial loss.³²

Blockchain networks like Ethereum rely on validators (or miners) to verify and process user transactions, and these validators are privileged with a temporary monopoly power over a block, to discretionarily include, order, and censor transactions.³³ Network users place differing degrees of value on the certainty, speed, and placement of their transactions, meaning that validators can charge rents for the exercise of their power to control transaction ordering in a manner that aligns with a party’s execution preferences. The maximal possible revenue that a validator can earn through their ability to control the contents and sequencing of Ethereum blocks – either independently or by collecting rents from searchers – is known as “Maximal Extractable Value” or MEV.³⁴ It is worth noting that MEV refers to *extractable* value, and not all MEV gets

³⁰ Robinson and Konstantopoulos, *supra* note 3.

³¹ See *infra* Section II.A.

³² Daian et al., *supra* note 9; Liyi Zhou et al., *Sok: Decentralized finance (defi) attacks*, CRYPTOLOGY EPRINT ARCHIVE (2022); Piet, Fairoze, and Weaver, *supra* note 12.

³³ A “block” is an ordered batch of transactions which is added to a blockchain. Ethereum Organization, *Blocks* <https://ethereum.org/en/developers/docs/blocks/> (accessed 1 Feb 2023). Ethereum, like all blockchains, is essentially a chain of such blocks which are created and validated by the nodes of the Ethereum blockchain. *Id.*

³⁴ See *supra* notes 7-9.

extracted in reality – we refer to the portion of MEV which is in fact extracted as *extracted* MEV.

In this section, we will describe the technical and economic mechanics of MEV extraction on Ethereum and provide a taxonomy of MEV extraction practices, making distinctions along legally relevant lines.

A. *The Journey of an Ethereum Transaction*

MEV only arises because Ethereum users have things they want to do on the blockchain (transfer or exchange various crypto assets, “mint NFTs,”³⁵ and so on) and because the space in which those things can be done, “the blockspace,” is scarce. Users express their preferences as to what they want to do on the blockchain using “transactions.” What makes things slightly complicated is that Ethereum is not simply a single program, running on a single computer, but a distributed, even global, network, with many participants performing various roles – a network meant to perform its functions in the conditions of limited trust among the participants, or even impossibility of legal recourse if something goes awry. This is, of course, what distinguishes public, permissionless blockchains from other forms of human interaction through technology. It requires a bit of patience to understand how it is that users get to do the things they want to do but is essential for the legal analysis to come.

1. From wallet software to “the mempool”

To express their preference with a transaction, a user first needs to construct this transaction, which would be rather tedious to do with a pen and paper, hence users typically use “wallet software.” Wallet software allows users both to query what is happening on the blockchain (“the blockchain state”) and to prepare their own interactions with the network, *e.g.*, by assembling a transaction in which the user will transfer 1 ETH from their account to someone else’s account.³⁶ Once the user authorizes and directs their wallet software to submit the transaction, the transaction begins its journey into the dark forest. Later in this section, we will introduce an important complication about what exactly may happen with the transaction at this stage. But for now, let’s assume that it follows the “standard,” “public” way.

³⁵ Amber Group, *Extractable Value*, AMBER GROUP (2022), <https://medium.com/amber-group/extractable-value-7b0d4356a843>.

³⁶ Our description omits a large amount of technical detail not immediately required to understand the mechanisms of MEV extraction. For more technical detail *see, e.g.*, Daian et al., *supra* note 9; Zhou et al., *supra* note 32.

The user's transaction is thus received by an "RPC operator,"³⁷ who – in our standard picture – is a full "node" of the Ethereum peer-to-peer network. Note, that we are still quite far from the *blockchain*. The dark forest is the peer-to-peer network where transactions travel until they reach their final destination: the validator who will "propose" a block including this transaction, hopefully resulting in the addition of this transaction to the blockchain. Network nodes keep all pending transactions they receive, either directly from users, or from other nodes (this is how transactions propagate in the network: through "gossiping"³⁸) in their local "mempools."³⁹ It is common to speak of "the mempool," though this is just an abstraction referring to transactions that are in the mempools of some significant number of nodes in the peer-to-peer network.

What is key for us to know about "the mempool" is that transactions that travel in the peer-to-peer network can be seen, in principle, by anyone.⁴⁰ Setting aside the issue of cost, anyone can either operate a node (preferably multiple, just to be sure they get as many transactions and as early as possible), or to pay one of the service providers who give access to data feeds with information on pending transactions.

2. Block production

Transactions only manage to become effective on the blockchain if they make their way there. Once a transaction becomes a mempool transaction (is in "the mempool"), then it can be spotted by a block producer. Since Ethereum's transition from "proof-of-work" to "proof-of-stake" in September 2022,⁴¹ there are two kinds of block producers looking for transactions: validators-proposers and specialist block builders.

The most straightforward case is that of a validator-proposer. Each Ethereum "epoch" (lasting just over six minutes), a new set of proposers is randomly selected from among validators (around 500,000).⁴² Epochs are

³⁷ "RPC" stands for "remote procedure call." See, e.g., *JSON-RPC API*, Ethereum.org, <https://ethereum.org/en/developers/docs/apis/json-rpc/>.

³⁸ See, e.g., Lucianna Kiffer et al., *Under the hood of the ethereum gossip protocol*, in FINANCIAL CRYPTOGRAPHY AND DATA SECURITY: 25TH INTERNATIONAL CONFERENCE, FC 2021, VIRTUAL EVENT, MARCH 1–5, 2021, REVISED SELECTED PAPERS, PART II 25 437 (2021).

³⁹ Strictly speaking, in Go Ethereum (geth) software they are called "transaction pools." See generally Blocknative, *What is the Mempool?*, Blocknative (2020), <https://www.blocknative.com/blog/mempool-intro> [<https://perma.cc/P3ND-F94N>].

⁴⁰ *Id.*

⁴¹ Mikhail Kalinin, Danny Ryan & Vitalin Buterin, EIP-3675: Upgrade consensus to Proof-of-Stake, (2021), <https://eips.ethereum.org/EIPS/eip-3675>; Ulysse Pavloff, Yackolley Amoussou-Guenou & Sara Tucci-Piergiovanni, *Ethereum Proof-of-Stake under Scrutiny*, ARXIV PREPRINT ARXIV:2210.16070 (2022).

⁴² *Id.* at 5. Every validator needs to be a "staker." "Staking" is the means through which network users participate in the validation process (as validators) of Proof of Stake (PoS) blockchains like

divided in 12-second “slots,” and in every slot one specific proposer has the power to tell the network what the next block should be.⁴³ If she decides to construct the block on her own, then she assembles as many transactions from the mempool as will “fit” in the block, maybe adding some of her own transactions.

However, the proposer has an option of outsourcing the block-building process to specialist block builders. Those block builders also monitor the mempool and also can submit any transactions they want from outside the mempool. Typically, block builders do not have direct relations with proposers—both sides rely on an intermediary, a “relay.”⁴⁴ The relay process, popularized by the Flashbots organization,⁴⁵ involves two auctions. First, block builders compete for their block to be chosen by a relay as the one block the relay will submit to the second auction. Second, relays compete for their block to be chosen by the proposer, so that the proposer declares that this block is to be added to the blockchain. In both auctions, to win one must offer the highest fee.⁴⁶

Whoever produces a block can decide not only *which* transactions will be included, but also in *what order* will they be executed.⁴⁷ Both of those things can be valuable, because many profitable opportunities – like the example of sandwiching introduced at the beginning of this Article – depend on the order of transactions.

B. What is MEV?

This brings us to the question: what is MEV? One way to think about it is that MEV is like maximal extractable ground rent, but for blockspace. Because the validator-proposer controls her piece of blockspace (a block), and because users have rivalrous, valuable uses for the scarce space, the proposer can charge users proportionately to the value they attach to what can be done in the space. Note, that the power of the proposer is not only to choose which transactions will be included in a block, but also in what order. And both inclusion and

Ethereum. On Ethereum, any network participant who seeks to become a validator must lock up (*stake*) 32 ETH in a sort of escrow account in order to propose blocks to the rest of the network. See *Proof-of-stake (POS)*, Ethereum.org, <https://ethereum.org/en/developers/docs/consensus-mechanisms/pos/>.

⁴³ *Id.*

⁴⁴ *Introduction - What is MEV-Boost*, Flashbots Docs, <https://docs.flashbots.net/flashbots-mev-boost/introduction>. The main relays are include those operated by Flashbots, BloXroute, Blocknative, and Eden. Both block builders and block proposers can connect to multiple competing relays. Anish Agnihotri, MEVBOOST.ORG, <https://www.mevboost.org/> (last visited 1/23/2023).

⁴⁵ *Id.*

⁴⁶ *Id.*

⁴⁷ Daian et al., *supra* note 9.

ordering constitute sources of value that may accrue to the proposer. Consider the following example of *arbitrage*.

Ethereum is the largest public permissionless blockchain by market capitalization to enable smart contract⁴⁸ functionality. This has given rise to a vibrant ecosystem of decentralized applications (dApps) on Ethereum but is also largely the cause of MEV on Ethereum. To illustrate, consider a smart contract which stores multiple crypto assets and provides Ethereum users with automated crypto asset exchange services. This describes a popular kind of dApp called a decentralized exchange (DEX). Notably, DEXs are magnets for MEV extraction.⁴⁹ There are many such DEXs operating on the Ethereum blockchain (as well as other blockchains), and the prices of a particular crypto asset on different DEXs may diverge. Accordingly, arbitrage opportunities arise where it becomes profitable for a strategic actor to buy the crypto asset on one DEX which offers it for a lower price and sell the crypto asset on another DEX which offers it for a higher price. This describes a common MEV extraction strategy known as “DEX arbitrage,” in which the arbitrageur earns a riskless profit because of a cross-DEX price discrepancy.

Given that, on its face, this profitmaking strategy seems independent of transaction ordering and inclusion, one may wonder what exactly makes DEX arbitrage a form of MEV extraction. In a blockchain ecosystem with many sophisticated users, arbitrage opportunities have become very competitive.⁵⁰ Accordingly, in practice, multiple arbitrageurs will almost always be competing for a particular arbitrage opportunity. Because competition for a particular profit opportunity necessarily implicates transaction ordering and inclusion, it is the existence of competition that transforms an otherwise ordinary trading practice into a form of MEV extraction. To put it simply, only those who can process their arbitrage transactions earliest will be able to exploit the price discrepancy before others erase it through similar trades. Accordingly, the transaction ordering characteristic of MEV becomes necessary to exploit arbitrage opportunities. Thus, one way to look at MEV is as the theoretical maximum profit that a block proposer can extract through the strategic ordering and placement of transactions in a block.⁵¹

⁴⁸ Smart contracts are segments of code and data used to program money to autonomously perform functions or series of transactions upon the occurrence of predefined conditions. Smart contracts can even be grouped or linked together to execute increasingly complex transaction chains and/or create decentralized applications (dApps).

⁴⁹ See, e.g., Jiahua Xu et al., *SoK: Decentralized Exchanges (DEX) with Automated Market Maker (AMM) Protocols*, ACM COMPUT. SURV. (2022), <https://doi.org/10.1145/3570639>; Kaihua Qin, Liyi Zhou & Arthur Gervais, *Quantifying blockchain extractable value: How dark is the forest?*, in 2022 IEEE SYMPOSIUM ON SECURITY AND PRIVACY (SP) 198 (2022).

⁵⁰ See, e.g., Amber Group, *supra* note 35.

⁵¹ Alejjo Salles, *On the Formalization of MEV*, Flashbots Docs (March 21, 2021), <https://writings.flashbots.net/formalization-mev/> (noting the shortcomings of most formalized definitions of MEV, and concluding that an appropriately generalized definition of MEV must

Multi-block MEV. The discussion so far focused on MEV extraction opportunities that arise if an agent controls a single block. However, one validator may control more than one block in a short time span, or – even if they do not – they may cooperate with others who control other single blocks.⁵² This may give rise to a different class of multi-block MEV opportunities. As we discuss later, this may allow manipulation of benchmark prices that, *e.g.*, on-chain lending systems rely on.⁵³

C. The MEV Extraction Ecosystem

We already met three key players in the MEV extraction ecosystem: validators-proposers, specialist block builders, and relay operators intermediating between the first two. Given that many MEV extraction opportunities can be spotted, in principle, by anyone looking in the mempool, there are also Ethereum users, who are not block producers, but who extract MEV. Those users are known as “searchers.” The category of searchers includes both sophisticated hedge funds and amateur solo players who are able to identify profitable MEV opportunities.⁵⁴ A searcher’s difficulty is that they need to get their transactions included, usually in a specific place in a block, without being able to control block production.

What ensues is a competitive game among searchers and other MEV extractors, especially block builders. The competition is to spot valuable opportunity the fastest, and to execute them in the most efficient way. But also, it is to induce those further up in the supply chain (block builders, relays, the proposer), to include the searcher’s transactions precisely at a position when they need to be executed. The last aspect of the game happens through transaction fees, either using Ethereum’s in-built fee mechanism for inducing block builders to include one’s transactions in their next block,⁵⁵ or outside of this formal mechanism.⁵⁶ In essence, these transaction fees play the ordering role of

incorporate both permissionlessness and the potential for a MEV opportunity to require some amount of initial capital).

⁵² In proof-of-stake Ethereum it is known some time in advance who will have the right to propose (control) which block in a given “epoch,” which may facilitate either cooperation or single-actor strategies. According to Barzentewicz: “To be randomly selected as a proposer of two consecutive blocks once a month may currently require running around 1,250 validators—i.e., staking 40,000 ETH (over \$53 million);” Barzentewicz, *supra* note 18 at 13–14.

⁵³ See *infra* Section IV.C.

⁵⁴ Jeff Kauflin, *The Secretive World Of MEV, Where Bots Front-Run Crypto Investors For Big Profits*, FORBES, October 11, 2022, <https://www.forbes.com/sites/jeffkauflin/2022/10/11/the-secretive-world-of-mev-where-crypto-bots-scalp-investors-for-big-profits/>.

⁵⁵ See, *e.g.*, Daian et al., *supra* note 9.

⁵⁶ See, *e.g.*, Flashbots, *Flashbots Auction Overview*, FLASHBOTS DOCS, <https://docs.flashbots.net/flashbots-auction/overview>.

transaction “send time” in the continuous limit-order books of fiat-based finance.

The issue of transaction fees paid outside of the standard mechanism is closely connected with the final piece of the ecosystem puzzle: what we will call “privacy RPCs.” Remember that users submit their transactions, through their wallet software, to RPC operators. In our “standard” case, RPC operators then forward transactions to “the mempool.” But if a transaction is made public this way, then anyone can, *e.g.*, sandwich it – like in the example from the beginning of this Article. Avoiding this risk is one of the main rationales of privacy RPCs.⁵⁷ A privacy RPC is a service that accepts transactions and promises to forward them only to select operators, *e.g.*, select block builders.⁵⁸ Privacy RPCs may be free or paid, public or permissioned.

D. The Importance of Order Flow: Publicness vs. Exclusivity of Ethereum Transactions

We began this section by describing the “standard” case, where a transaction submitted by a user lands in the public mempool. We then noted that users may protect their transactions from becoming public by submitting them to privacy RPCs. It is now time to discuss possibly the darkest of the paths of the dark forest: where a seemingly ordinary, non-private RPC treats a transaction – even if for a very short time – as their exclusive possession. We will treat these actors, namely (i) RPC operators briefly keeping private control of transactions meant to be immediately made public, together with two other kinds of actors who may have privileged access to and control over user information⁵⁹: (ii) operators of RPCs used to query the blockchain (*e.g.*, wallet software providers) and (iii) operators of off-chain applications (websites, mobile applications) who facilitate access to on-chain applications, *e.g.*, internet-based “front-ends” for smart contracts.⁶⁰

Given their privileged position, these three groups may be able to analyze the trading preferences associated with their users’ pending transactions faster and/or more accurately than other node operators or validators, meaning that they are in a superior position to extract MEV from their users’ transactions.

⁵⁷ The other one is bundle atomicity, *see infra* Section II.E. One qualification to this promise is that transactions routed through privacy RPCs may become public due to risks endemic to the protocol. *See* Flashbots, Uncle Bandit Risk, FLASHBOTS DOCS, <https://docs.flashbots.net/flashbots-protect/rpc/uncle-bandits>.

⁵⁸ *See, e.g.*, Alchemy, *How to Send Private Transactions on Ethereum*, ALCHEMY DOCS (Sept. 7, 2022), <https://www.alchemy.com/overviews/ethereum-private-transactions>.

⁵⁹ Barzentewicz, *supra* note 18 at 21.

⁶⁰ *See* Sebastian Bürgel, *DERP Example 3: Uniswap MEV*, MEDIUM (March 2022), <https://medium.com/hoprnet/dcrp-example-3-uniswap-mev-c2a8d3417c8>.

Cases (ii) and (iii) cover situations where service providers do not control the broadcasting of pending transactions, but may exclusively possess earlier or more complete information about the user's trading intent than other network participants. Hence, these groups may possess material non-public information about their users' trades. For instance, those in group (ii) can know which of their users' blockchain queries did not end up in submitted transactions, giving those nodes an information advantage regarding their users' potential upcoming trades. Likewise, those in group (iii) may have the ability to track the activity of their users on their front-end interfaces, equipping them with valuable data about their users' trading preferences and behaviors.

Moreover, when a user (or, more likely, a wallet provider) submits a transaction to an RPC operator in group (i), this operator is in a privileged position as they possess non-public information until the moment where they rebroadcast the transaction to other nodes in the network. While reputational considerations tend to incentivize nodes to act honestly (*i.e.*, to rebroadcast the mempool transactions they receive in a timely manner), there may be cases in which these incentives are not strong enough. For instance, a node who is the first recipient of a mempool transaction may treat that transaction as private order flow (POF), intentionally delaying rebroadcasting that transaction for just fractions of a second such that it would be very difficult for external observers to detect their misbehavior. With a delay of several hundred milliseconds, the misbehaving node could assess whether the transaction presents a profitable MEV extraction opportunity and, if so, submit the node's own transactions to take advantage of the opportunity. This series of events could all occur before the transaction actually becomes public (*i.e.* accessible to other nodes in the network).

In sum, transactions are not assured to be public or private on the basis of their purported routing. It is important to understand the nuance involved in transaction routing on Ethereum prior to classifying transactions as *public* or *non-public*, given the significant legal consequences associated with the publicness of information. We suggest that a meaningful standard of publicness for a pending transaction would be the following: a transaction is *public* when an actor, who did not receive the transaction directly from a user who submitted the transaction, can access it in an unencrypted state without too much delay and without special arrangements with the node that originally received the transaction.⁶¹ This standard would be satisfied even if reliably detecting public transactions requires maintaining "watcher" nodes simultaneously in several

⁶¹ The qualification about accessing a pending transaction in an unencrypted state is important because transactions may be transmitted in an encrypted state. *e.g.*, in commit-reveal schemes; see M. Arulprakash & R. Jebakumar, *Commit-reveal strategy to increase the transaction confidentiality in order to counter the issue of front running in blockchain*, 2460 AIP CONFERENCE PROCEEDINGS 020016 (2022). To the extent a transaction is encrypted, it does not give access to material information. There may be encryption schemes that only encrypt some parts of a transaction: in that case, some – but not all – information about a pending transaction may be public.

geographic zones (e.g. running on virtual servers in various Amazon Web Services regions). Admittedly, transactions “public” by this standard are only meaningfully public to professional operators, not to an average user.

E. Strategies for Generating Profit through MEV

Like opportunistic trading practices in traditional finance, the strategies through which MEV extractors seek out profits are virtually infinite and constantly evolving. There are several identifiable categories of MEV extraction strategies on the Ethereum blockchain, which have been the most studied and discussed. Even though in our legal analysis we only consider sandwiches and liquidations, we very briefly describe here all the main strategies, to give the reader a more complete picture.

*Sandwiches (sandwich trades).*⁶² We started this paper with an example of sandwiching.⁶³ As is apparent from that example, a sandwich consists of three elements: (1) the front-run, (2) at least one sandwiched transaction, and (3) the back-run. The general idea is to buy an asset at a lower price (the front-run) and then profit from selling it at a higher price (the back-run). Because the validator controls the order of transactions, they can place the front-run before the sandwiched transaction, and the back-run just after it. Sandwiched traders are harmed by sandwiches mainly by obtaining a worse trade execution price (*i.e.*, paying more of X for the same amount of Y) than they would have gotten in the absence of a sandwich. We are aware of two situations where a sandwich may not result in that kind of harm: i) “just-in-time liquidity” provision through a sandwich⁶⁴ and ii) sandwiches where the front-running transaction is so relatively small that it does not meaningfully affect the execution price of the

⁶² Sandwich trades are often referred to as “sandwich attacks.” Instead, throughout the rest of this paper, we refer to this practice as a “sandwich trade” or a “sandwich”. In doing so, we seek to avoid unhelpful and premature normative implications, allowing for genuine debate regarding the normative and legal character of sandwich trades.

⁶³ See *supra* Section I.

⁶⁴ Just-in-time (“JIT”) liquidity provision may be structured as a sandwich where the sandwiched transaction is front-run by a transaction providing more liquidity to a given smart contract market (“liquidity pool”), thus *improving* the price of execution for the sandwiched transaction, and then back-run by removing the liquidity added earlier and realizing profits. JIT is profitable if the liquidity provider can obtain sufficient trade fees for providing a large proportion of liquidity during the sandwiched trade. See Robert Miller (@bertcmiller), Twitter (Nov. 12, 2021, 4:04 PM), <https://twitter.com/bertcmiller/status/1459175377591541768>. By providing this momentary liquidity, JIT reduces the share of fees collected by “passive” liquidity providers and thus reduces incentives to engage in “passive” liquidity provision: See, e.g., Chainsight (@ChainsightLabs), Twitter (Nov. 9, 2021, 7:30 AM), <https://twitter.com/ChainsightLabs/status/1457958811243778052>.

sandwiched transaction.⁶⁵ According to a recent analysis, only in the first six months of 2022 sandwich attacks resulted in \$87.7 million in losses to Ethereum users, bringing \$17.85 millions of profit to the sandwichers.⁶⁶ Most Ethereum addresses that were identified as victims of sandwich attacks, lost “between \$50 and \$500.”⁶⁷ 80% of aggregate losses have been incurred by Ethereum addresses that were sandwiched less than 20 times.⁶⁸

DEX arbitrage. As described earlier in this section,⁶⁹ arbitrage between decentralized exchanges is among the simplest, most common, and most competitive MEV opportunities.

CEX/DEX arbitrage. Price discrepancies arise also between centralized crypto exchanges (CEX; e.g., Binance, Coinbase, Kraken) and DEXs. This kind of arbitrage requires off-chain actions, on a CEX, so only partially may constitute MEV extraction.⁷⁰

Loan liquidations. Liquidations operate in a similar manner to margin calls in traditional finance.⁷¹ However, they are not performed by the lender, but by anyone who is willing to step in and buy the collateral, thus repaying the loan. If a borrower’s loan becomes undercollateralized because the price of the collateral on some benchmark market has fallen, the decentralized lending protocol permits anyone to trigger a liquidation of the borrower’s remaining collateral.⁷² Such *liquidators* are remunerated in the form of a discount on the price of collateral.⁷³ Liquidations constitute MEV, because they are usually competitive and only the first actor to execute a liquidation will be able to profit from it. Thus, having control over whose liquidation-attempting transaction will be included first on the blockchain, entails having control over who will profit. As we discuss below, liquidation opportunities may be artificially created with the use of “oracle manipulation.”⁷⁴

Long tail MEV. The main types of strategies just listed do not exhaust the universe of profitable MEV extraction opportunities that may arise whenever a

⁶⁵ This is more likely to happen if the asset that is expected to rise in price cannot be leveraged for a riskless back-run from a different on-chain market (e.g. is not available in any other “liquidity pool”). See, e.g., Stalkopat, Flashbots Discord server (Aug. 8, 2022, 7:53 PM); Hasu (@hasufl), Twitter (Sep. 26, 2021, 5:14 PM), <https://twitter.com/hasufl/status/1442145582978674713>.

⁶⁶ EIGENPHI RESEARCH, *supra* note 11 at 5.

⁶⁷ *Id.* at 26.

⁶⁸ *Id.* at 27.

⁶⁹ See *supra* Section II.C.

⁷⁰ Amber Group, *supra* note 35.

⁷¹ SIRIO ARAMONTE ET AL., *DeFi lending: intermediation without information?*, (2022); Kaihua Qin et al., *An empirical study of DeFi liquidations*, in PROCEEDINGS OF THE 21ST ACM INTERNET MEASUREMENT CONFERENCE (2021), <https://doi.org/10.1145%2F3487552.3487811>.

⁷² We refer to what Qin et al. call “fixed spread liquidation” (used, e.g., by Aave, Compound, and dYdX) as distinguished from “auction liquidations” (used, e.g., by MakerDAO); only a fixed spread liquidation “allows to extract value in a single, atomic transaction”; Qin, Zhou, and Gervais, *supra* note 49 at 5.

⁷³ ARAMONTE ET AL., *supra* note 71.

⁷⁴ See *infra* Section IV.C. For an introduction to the concept of an “oracle,” see *supra* note 25.

competitive valuable use of blockspace can be identified. This may include, *e.g.*, NFT “minting” and trading opportunities.⁷⁵

F. The Techniques for Executing MEV Strategies

The profit-making strategies introduced above are executed using several main techniques, which are not necessarily mutually exclusive. Front-running and back-running of some target transactions are the main and the most basic ones. Those techniques are used for sandwiching, arbitrages, and liquidations. Front-running refers to placing a transaction ahead of a target transaction, back-running to placing it after. In some contexts, like for sandwiching, it may matter that front- or back-running transactions are immediately adjacent to the target transaction, but this is not always the case.

Generalized front-running. Generalized front-running is a practice engaged in primarily by automated bots. These bots monitor the mempool, seeking to detect pending transactions which yield immediate profits to the user who submitted the pending transaction upon execution. The generalized front-running bot then copies the profitable pending transaction and submits their own version with a higher gas price. As a result, the bot’s version of the profitable transaction will be executed on the blockchain state, and the user who originally found the profitable opportunity is deprived of their anticipated profit.⁷⁶ Generalized front-running bots do not seek out a particular transaction type to front-run, but target any-and-all transactions which they determine -- by simulating the blockchain state-change resulting from the pending transaction’s execution -- to have a high probability of producing immediate profits to the transaction originator.⁷⁷ As generalized front-runners do not discriminate in their activity on the basis of anything other than local profitability, their effects extend beyond DEX trades to centralized exchanges, derivative protocols that rely on oracle price updates,⁷⁸ and non-fungible token purchases.

⁷⁵ One example of Long tail MEV is the practice of NFT sniping. NFT sniping involves a MEV extractor identifying a NFT offered at a price which is significantly lower than both i) the previous lowest offer for the collection and ii) the average of prices for NFTs within the collection listed before and after the instance of NFT sniping. The MEV extractor would then offer a high bribe payment to validators in order to front-run other potential purchasers and “snipe” the NFT at the low price. *See, e.g.*, Zhou et al., *supra* note 32; Amber Group, *supra* note 35.

⁷⁶ Carsten Baum, James Hsin-yu Chiang, Bernardo David, Tore Kasper Frederiksen & Lorenzo Gentile, *SoK: Mitigation of Front-running in Decentralized Finance*, IACR CRYPTOL. EPRINT ARCH. (2021) at 4, <https://eprint.iacr.org/2021/1628.pdf>.

⁷⁷ Peyman Momeni, Sergey Gorbunov, and Bohan Zhang, *FairBlock: Preventing Blockchain Front-running with Minimal Overheads*, IACR CRYPTOL. EPRINT ARCH. (2022) at 21-22, <https://eprint.iacr.org/2022/1066.pdf>.

⁷⁸ *See* Zach, *Miner-Extractable Value, Oracle Front-running, and the Rise of Arbitrage Bots*, SMART CONTRACT RESEARCH FORUM (Jan. 2021), <https://www.smartcontractresearch.org/t/miner-extractable-value-oracle-front-running-and-the-rise-of-arbitrage-bots/179>.

Atomicity. “Atomicity” means that a sequence of instructions packaged together will be executed in an “all or nothing” manner: either all will be executed in the set order, or none will. This can be achieved for *single transaction* that uses a smart contract to execute a number of instructions—effectively allowing one transaction to have several steps, with a guarantee that if something goes wrong with one step, no part of the transaction will have consequences.⁷⁹ This can also be achieved for *a sequence of transactions*, if they are submitted as a “bundle” to a block builder who provides this guarantee for bundles. Whether a MEV opportunity is atomic is relevant to our discussion for two interconnected reasons: first, atomicity can imply a certainty of profit from resources expended, which mitigates risk and increases the competitiveness of an opportunity;⁸⁰ and second, atomic transaction sequences are less likely than non-atomic transaction sequences to create a lasting price impact on a decentralized exchange. Specifically, sandwichers strongly prefer relying on atomicity because this strategy may require significant amounts of upfront capital. However, sandwichers are not always able to use atomistic bundles.⁸¹

III. THE LAW OF MARKET MANIPULATION

A. Scope of Legal Analysis

This Part provides an overview of the legal frameworks which guide our analysis of the legality of MEV extraction. We focus on the law of market manipulation governing securities and commodities markets in the United States. After sketching the relevant statutory regimes, we dive deeper into open market manipulation, insider trading, and front-running.

In the United States, market regulation occurs on a bifurcated basis, with the Securities and Exchange Commission (SEC) governing securities markets and the Commodities and Futures Trading Commission (CFTC) overseeing markets in commodities and most derivatives.⁸² The regulation of any instance of MEV extraction will depend on the asset classification of the crypto asset(s) used in the MEV extraction strategy as securities or commodities.

However, an unresolved jurisdictional “turf war” exists between the SEC and CFTC, who both seek regulatory authority over the burgeoning new asset

⁷⁹ Daian et al., *supra* note 9 at 4.

⁸⁰ *Id.* at 2.

⁸¹ In their work quantifying the effects and properties of sandwich attacks, Qin, et al. found that some sandwich attacks take place where the front-run and back-run are separated by more than 200 transactions; Qin, Zhou, and Gervais, *supra* note 49 at 4–5.

⁸² See A JOINT REPORT OF THE SEC AND THE CFTC ON HARMONIZATION OF REGULATION (2009) (“Since the 1930s, securities and futures have been subject to separate regulatory regimes.”).

class of crypto assets.⁸³ Both the SEC and CFTC have opted for an adjudication-based (as opposed to rule-based) approach to policymaking with respect to crypto assets, with both agencies currently pursuing enforcement actions grounded in claims that particular crypto assets belong within their respective jurisdictional domains.⁸⁴ Commentators have also joined this debate to offer important practical, legal, and technical considerations implicated in this issue.⁸⁵ We do not attempt to resolve these tensions and proceed throughout this paper on the assumption that either the SEC's or CFTC's regulatory regime may apply to crypto assets affected by the MEV extraction strategies we discuss. Conveniently, as we'll see, the substance of most of the applicable standards relating to market manipulation relevant to MEV are the same regardless of whether the asset is classified as a security or a commodity.⁸⁶

B. Anti-Market Manipulation Rules

The Securities Exchange Act of 1934 (SEA) and the Commodities Exchange Act (CEA) equip the SEC and CFTC, respectively, with broad statutory authority to police market manipulation in their respective markets.⁸⁷ Yet, this authority is fluid: “the word ‘manipulation’... in its use is so broad as

⁸³ Compare SEC Chair Gary Gensler, Speech: “Kennedy and Crypto”, September 8, 2022, available at <https://www.sec.gov/news/speech/gensler-sec-speaks-090822> (“Of the nearly 10,000 tokens in the crypto market, I believe the vast majority are securities” (footnote omitted)) (“Kennedy and Crypto”) with *Digital Commodities Consumer Protection Act: Hearing to Review S.4760 Before the S. Comm. on Agriculture, Nutrition, and Forestry*, 117th Congress (2022) (statement of The Honorable Rostin Behnam, Chairman, Commodity Futures Trading Commission) (“as has been recognized by federal courts, many digital assets constitute commodities. As recognized by the DCCPA, the CFTC’s expertise and experience make it the right regulator for the digital asset commodity market”). See also *CFTC v. McDonnell*, 332 F. Supp. 3d 641, 651 (E.D.N.Y. 2018) (“Virtual currency may be regulated by the CFTC as a commodity.”).

⁸⁴ See, e.g., Complaint at 2, *CFTC v. FTX Trading et al*, No. 1:22-cv-10503 (S.D.N.Y. filed Dec. 13, 2022) (treating relevant the digital assets as commodities); Complaint at 6, *SEC v. Eisenberg*, No. 1:23-cv-503 (S.D.N.Y. filed Jan. 20, 2023) (treating other digital assets, specifically governance tokens on Mango Markets, as securities).

⁸⁵ See, e.g., Cohen, Lewis R., Strong, Gregory, Lewin, Freeman & Chen, Sara, *The Ineluctable Modality of Securities Law: Why Fungible Crypto Assets are Not Securities* (Nov. 10, 2022), <https://dlxlaw.com/wp-content/uploads/2022/11/The-Ineluctable-Modality-of-Securities-Law-%E2%80%93-DLx-Law-Discussion-Draft-Nov.-10-2022.pdf> (discussion draft); Thomas L. Hazen, *Tulips, Oranges, Worms, and Coins – Virtual, Digital, or Crypto Currency and the Securities Laws*, 20 N.C. J.L. & Tech. 493 (2019) (“under most, if not all, circumstances, crypto currencies are likely to be securities”).

⁸⁶ See, e.g., *Prohibition on Manipulative and Deceptive Devices*, 76 Fed. Reg. at 41399 (“The language of CEA section 6(c)(1), particularly the operative phrase ‘manipulative or deceptive device or contrivance, is virtually identical to the terms used in section 10(b) of the Securities Exchange Act of 1934”) (internal quotation marks omitted).

⁸⁷ See 7 U.S.C. § 6(c) and 9(a)(2) and 15 U.S.C. § 78(i) and 78(j).

to include any operation of the ... market that does not suit the gentleman who is speaking at the moment".⁸⁸ As we'll see this challenge is posed in especially stark terms by the complex phenomenon of MEV extraction. As such, MEV is an ideal vehicle for illuminating operative assumptions and crystallizing issues that require clarity.

Despite the jurisdictional differences of the SEC and CFTC, the purpose motivating each agency's anti-manipulation enforcement is the same. According to Professor Gina-Gail Fletcher, market manipulation, if left unchecked, "can eventually lead to the demise of the market" because it i) "[interferes] with price accuracy" by injecting false information into the market and creating false impressions of liquidity, and ii) "adversely impacts market integrity" by harming the actual and perceived fairness of the market.⁸⁹ Accordingly, the SEC and CFTC are concerned with market manipulation in their respective markets for the same reason: because it undermines the efficiency (including, but not limited to, price accuracy)⁹⁰ and integrity of the markets which it is their role to protect. They root out manipulative behavior which harms price accuracy by prohibiting price manipulation, and that which harms market integrity by prohibiting fraud and misstatements with respect to the asset class they regulate. We address each of these broad prohibitions in turn.⁹¹

1. Price Manipulation

Both section 9(a)(2) of the SEA and Section 6(c)(3) of the CEA prohibit price manipulation.⁹² Historically, the CFTC has been more active than the SEC in exercising their price manipulation authority under CEA s6(c)(3), codified by the agency as Rule 180.2,⁹³ because it was largely their only means of anti-manipulation enforcement prior to the passage of the Dodd-Frank Wall Street

⁸⁸ Craig Pirrong, *Commodity Market Manipulation Law: A (Very) Critical Analysis and a Proposed Alternative*, 51 Wash. & Lee L. Rev. 944, 949 (1994), quoting 2 FEDERAL TRADE COMM'N, THE COTTON TRADE, S. Doc. No. 100, 68th Cong., 1st Sess. 148 (1924), microformed on CIS No. 8242 (Congressional Info. Serv.).

⁸⁹ Fletcher, *supra* note 21.

⁹⁰ *Id.* at 490.

⁹¹ The SEC and CFTC also prohibit "fictitious trades", another broad category of manipulative practices. We focus our discussion here on price manipulation and fraud/misstatements as these classes of manipulative behavior are most relevant to our legal analysis of MEV extraction practices. For a discussion of fictitious trades, *see Id.* at 499.

⁹² *See* SEA s9(a)(2) [15 U.S.C. s78i(a)(2)] (prohibiting transactions in a security which "creat[e] actual or apparent active trading" or "rais[e] or [depress] the price of such a security, for the purpose of inducing the purchase or sale of such security by others") and CEA s6(c)(3) [7 U.S.C. s9(3)] (making it unlawful to "manipulate or attempt to manipulate the price of any swap, or of any commodity in interstate commerce, or for future delivery on or subject to the rules of any registered entity").

⁹³ 17 C.F.R. § 180.2 (2012).

Reform and Consumer Protection Act (Dodd-Frank).⁹⁴ Meanwhile, the SEC has tended more often to pursue price manipulation cases under SEA s10(b) and Rule 10b-5,⁹⁵ the agency's longstanding authority to police fraud-based manipulation, when possible.⁹⁶ Accordingly, and as reflected below, much of the defining features of price manipulation are expounded in the case law of enforcement actions brought by the CFTC.

CFTC Rule 180.2 renders it unlawful for “any person, directly or indirectly, to manipulate or attempt to manipulate the price of any swap, or of any commodity in interstate commerce”.⁹⁷ There are four requisite elements to a successful claim for price manipulation: (1) an artificial price existed; (2) the accused caused the artificial price; (3) the accused had the ability to influence a market price; and (4) the accused specifically intended to cause the artificial price.⁹⁸

(1) An artificial price is a price which “does not reflect the market or economic forces of supply and demand”.⁹⁹ A price is considered artificial where it is “affected by a factor which is not legitimate.”¹⁰⁰ Price artificiality is often called the *sine qua non* of price manipulation,¹⁰¹ yet, no binding tests exists for determining which *forces* or *factors* informing a price are legitimate and which are not.¹⁰² Thus, some scholars question the meaningfulness of an artificiality-based standard.¹⁰³ As such, determinations of price artificiality generally depend on a variety of considerations including, but not limited to, i) the competitiveness

⁹⁴ Merritt B Fox, Lawrence R Glosten & Gabriel V Rauterberg, *Stock market manipulation and its regulation*, 35 YALE J. ON REG. 67, 117 (2018).

⁹⁵ See 15 U.S.C. §78j (2014) and 17 C.F.R. §240.10b-5 (codifying the SEC's authority to prohibit fraud-based manipulation as the SEC's regulation 10b-5).

⁹⁶ Fox, Glosten, and Rauterberg, *supra* note 94 at 117.

⁹⁷ 17 CFR § 180.2.

⁹⁸ *In re Amaranth Natural Gas Commodities Litig.*, 587 F. Supp. 2d 513, 531 (S.D.N.Y. 2008).

⁹⁹ *In re Cox*, [1986-1987 Transfer Binder] Comm. Fut. L. Rep. (CCH) ¶ 23,786, at 24,060 (CFTC July 15, 1987); see also *SEC v. Resch-Cassin & Co.*, 362 F. Supp. 964, 978 (S.D.N.Y. 1973) (finding manipulation of the price of a security in violation of SEA §9(a)(2) because defendant made “it appear to be the product of the independent forces of supply and demand when... in reality, it was completely a creature of defendants' subterfuge”).

¹⁰⁰ *In re Cox*, ¶ 23,786 at 26,060.

¹⁰¹ See, e.g., Pirrong, *supra* note 88 at 956.

¹⁰² *In re Indiana Farm Bureau Coop. Ass'n, Inc.*, [1982-1984 Transfer Binder] Comm. Fut. L. Rep. (CCH) 21,796, at 80-81,281(CFTC Dec. 17, 1982)(Johnson, C., concurring) (“Legitimacy with respect to supply and demand is undefined in law and economics, unless the sole question is whether the forces were put in motion by an illegal act”).

¹⁰³ Frank H. Easterbrook, *Monopoly, Manipulation, and the Regulation of Futures Markets*, 59 J. BUS. S103, S117 (1986) (“An effort to isolate which “forces of supply and demand” are “basic” and which are not is doomed to failure. (...) Economists think of supply and demand as givens. (...) There is no way to say what demand is real and what is artificial.”); Matthijs Nelemans, *Redefining Trade-Based Market Manipulation*, 42 VAL. U. L. REV. 1169 (2008)(arguing that “prohibitions to counteract traders who cause artificial prices” are problematic because they “lack a precise delineation of ‘non-artificial price’ versus ‘artificial price’”).

of a market,¹⁰⁴ ii) the presence of fraud or deceptive omission which misleads market participants¹⁰⁵ and iii) whether the trading pattern of the accused is supported by a “legitimate economic rationale”¹⁰⁶ (although the term “legitimate” renders this consideration circular).

(2) After establishing price artificiality, a causal relationship between the artificial price and an identifiable trader or group of traders must be shown.¹⁰⁷ Artificial prices do not arise merely because of volatile market conditions, government action, or other forces beyond the defendant’s control. In practice, courts often engage in effectively a ‘*but-for*’ price assessment – looking to what the price would have been but-for the defendant’s trading activity.¹⁰⁸

(3) The “*ability to influence a market price*” element of price manipulation is sometimes built into this causation analysis, with courts looking to evidence of a defendant’s market dominance as indicators of both their ability to have caused and actual causation of an artificial price.¹⁰⁹

(4) The final and, oftentimes, most difficult element of a price manipulation claim to prove is the ‘specific intent’ of an alleged price manipulator to cause an artificial price.¹¹⁰ In *Indiana Farm*, the court held that price manipulation

¹⁰⁴ See, e.g., *United States CFTC v. Donald R. Wilson & Drw Invs.*, No. 13 Civ. 7884, 2018 LEXIS 207376, at *40 (S.D.N.Y. Nov. 30, 2018) (“a price is artificial when it has been set by some mechanism which ... prevent[s] the determination of those prices from free competition alone”) (internal citations omitted).

¹⁰⁵ See, e.g., *In re Tether & Bitfinex Crypto Asset Litig.*, 576 F. Supp. 3d 55 (S.D.N.Y. 2021) (Plaintiffs sufficiently alleged price manipulation on the basis of defendants’ fraudulent issuances of unbacked Tether (USDT), which defendants’ publicly stated were backed by the US dollar); *Resch-Cassin & Co.*, 362 F. Supp. at 964, 977 (S.D.N.Y. 1973) (defendants engaged in price manipulation because they “create[d] a false appearance of activity in the over-the-counter market [which tended] to support the price at an inflated level” by using their “dominion and control of the market”); Easterbrook, *supra* note 103 at 118 (“manipulation is a form of fraud [in which]...the profit flows solely from the trader’s ability to conceal his position from other traders”).

¹⁰⁶ *In re Amaranth Natural Gas Commodities Litig.*, 587 F. Supp. 2d 513, 535 (S.D.N.Y. 2008) (“If a trading pattern is supported by a legitimate economic rationale, it cannot be the basis for liability under the CEA because it does not send a false signal”).

¹⁰⁷ *In re Cox*, ¶ 23,786, at 35-36,060 (CFTC July 15, 1987) (“Once the Division of Enforcement shows that the respondents had the ability to influence prices and that the prices in question were artificial, it must then show that the respondents caused the artificial prices”).

¹⁰⁸ See, e.g., *CFTC v. Parnon Energy Inc.*, 875 F. Supp. 2d 233, 246 (S.D.N.Y. 2012) (applying but-for test in this context); *In re Cox*, ¶ 23,786 at 11,060 (“accused lacks the ability to influence prices if other market participants can bypass his demands and extinguish their obligations elsewhere”).

¹⁰⁹ *In re Cox*, ¶ 23,786 at 12-13, 060 (“the acquisition of market dominance is the hallmark of a long manipulative squeeze”); *Resch-Cassin & Co.*, 362 F. Supp. at 977 (“dominion and control of the market for the security” are factors establishing causation of an artificial price).

¹¹⁰ In securities price manipulation cases under SEA s9(a)(2), the language used in reference to this element is sometimes different. In the context of securities price manipulation, courts often use terms like “purpose” (see *Resch-Cassin & Co.*, 362 F. Supp. at 977), “motive”, and “willfulness” (see *Crane Co. v. Westinghouse Air Brake Co.*, 419 F.2d 787, 795 (2d Cir. 1969)) when referring to the requisite scienter for a violation.

liability requires a showing that the defendant “acted (or failed to act) with the purpose or conscious object of causing or effecting a price or price trend in the market that did not reflect the legitimate forces of supply and demand”.¹¹¹ The CFTC’s recent defeat in *CFTC v DRW & Wilson* re-emphasized that “mere intent to affect prices is not enough” to establish a price manipulation claim, but the defendant must have “intended to cause artificial prices”.¹¹²

Price manipulation liability alone has proved inadequate as a vehicle for protecting the efficiency and integrity of markets.¹¹³ Given the stringent requirements of establishing price artificiality and intent to manipulate prices, the SEC has consistently strayed away from exercising its anti-price manipulation authority in securities market manipulation cases, opting instead to rely on the fraud-based manipulation prohibition under SEA s10(b) and Rule 10b-5.¹¹⁴ More remarkably, the CFTC – who was until recently left with no other choice but to police commodities market manipulation through price manipulation charges – tried time and again to bring price manipulation claims, but has only a single court victory to show for it.¹¹⁵

Realizing the inadequacy of this approach, Congress imbued the CFTC with expanded authority, modeled explicitly after the SEC’s Rule 10b-5, to effectively police commodities market manipulation in 2010, through the passage of s753 of Dodd-Frank and codified in CFTC Rule 180.1, to which we now turn.¹¹⁶

2. Fraud-Based Manipulation

S753 of Dodd-Frank amended CEA s6(c) to give the CFTC the authority – long exercised by the SEC for securities under SEA s10(b) and Rule 10b-5 – to prohibit the use of any “manipulative or deceptive or contrivance” in contravention of CFTC rules in connection with commodities, swaps, or

¹¹¹ *In re Indiana Farm Bureau Coop. Ass’n, Inc.*, [1982-1984 Transfer Binder] Comm. Fut. L. Rep. (CCH) 21,796, at 8,281 (CFTC Dec. 17, 1982).

¹¹² *CFTC v. Wilson*, No. 13 Civ. 7884 (RJS), 2018 LEXIS 207376 (S.D.N.Y. Nov. 23, 2018) at *39, quoting *In re Amaranth Natural Gas Commodities Litig.*, 587 F. Supp. 2d 513, 535 (S.D.N.Y. 2008).

¹¹³ Rosa M. Abrantes-Metz, Gabriel Rauterberg, & Andrew Verstein, *Revolution in Manipulation Law: The New CFTC Rules and the Urgent Need For Economic and Empirical Analyses*, 15 Penn. J. Bus. L., 357 (2013); Jerry W. Markham, *Manipulation of Commodity Futures Prices-The Unprosecutable Crime*, 8 Yale J. On Reg. 281 (1991) (noting that price manipulation is “virtually unprosecutable” as “Plaintiffs must establish a manipulative intent that is conceptually and doctrinally among the most demanding mental state requirements anywhere in financial law.”).

¹¹⁴ Maxwell K. Multer, *Open-Market Manipulation Under SEC Rule 10b-5 and its Analogues: Inappropriate Distinctions. Judicial Disagreement and Case Study: FERC’s Anti-Manipulation Rule*, 39 SEC. REG. L.J. 97, 98 n.3 (2011).

¹¹⁵ See *DiPlacido v. CFTC*, 364 F. App’x 657 (2d Cir. 2009): this does not include settlements received by the CFTC in price manipulation actions.

¹¹⁶ CFTC OFF. OF PUB. AFFAIRS, ANTI-MANIPULATION AND ANTI-FRAUD FINAL RULES (2011).

2023-02-03]

BLOCKCHAIN TRANSACTION ORDERING...

27

futures.¹¹⁷ CEA s6(c)(1), codified through CFTC Rule 180.1,¹¹⁸ empowered the CFTC to police market manipulation even in the absence of evidence establishing a defendant's specific intent to manipulate prices or the existence of an artificial price.¹¹⁹ In relevant part, Rule 180.1 makes it unlawful for those engaged in commodities trades "to intentionally or recklessly":

- (1) Use or employ, or attempt to use or employ, any manipulative device, scheme, or artifice to defraud;
- (2) Make, or attempt to make, any untrue or misleading statement of a material fact or to omit to state a material fact necessary in order to make the statements made not untrue or misleading;
- (3) Engage, or attempt to engage, in any act, practice, or course of business, which operates or would operate as a fraud or deceit upon any person[.]¹²⁰

In the adopting release accompanying the CFTC's enactment of Rule 180.1, the agency clarified that its application would be "guided, but not controlled, by the substantial body of judicial precedent" interpreting the Securities and Exchange Commission's Rule 10b-5.¹²¹ That is, the interpretation of Rule 180.1 in the context of commodities markets draws explicitly from Rule 10b-5 precedent in securities markets.¹²²

The requisite elements of a successful 180.1 enforcement action include evidence of: i) reckless or intentional conduct by the accused, and ii) a "manipulative device, scheme, or artifice to defraud."¹²³ Like Rule 10b-5, Rule 180.1 is intended be a "broad catch-all provision" capturing all instances of fraud-based manipulation, and it has been applied as such.¹²⁴ Rule 180.1, in its relatively few years of existence, has been used by the CFTC to prosecute conduct ranging from insider trading in commodities¹²⁵ to the alleged corporate misconduct of Samuel Bankman-Fried and related entities in the FTX debacle.¹²⁶

¹¹⁷ 7 U.S.C. §9(1) (2011).

¹¹⁸ 17 C.F.R. §180.1 (2012).

¹¹⁹ Prohibition on the Employment, or Attempted Employment, of Manipulative and Deceptive Devices and Prohibition on Price Manipulation, 76 Fed. Reg. 41398, 41403 (July 14, 2011) (codified at 17 CFR pt. 180).

¹²⁰ 17 C.F.R. §180.1 (2012).

¹²¹ *Supra* note 119.

¹²² Gregory Scopino, *The (questionable) legality of high-speed ping and front running in the futures market*, 47 CONN. L. REV. 607, 617-618 (2015).

¹²³ 17 C.F.R. §180.1 (2012).

¹²⁴ *Supra* note 119 at 41403.

¹²⁵ For an overview of significant insider trading cases brought by the CFTC, see Latham & Watkins, *Insider Trading in Commodities Markets: An Evolving Enforcement Priority*, Client Alert White Paper (March 11, 2021), <https://www.lw.com/admin/upload/SiteAttachments/Alert%202827.v5.pdf>.

¹²⁶ *See* Complaint at 2, CFTC v. FTX Trading et al, No. 1:22-cv-10503 (S.D.N.Y. filed Dec. 13, 2022).

Yet, while capacious, Rule 180.1 still has discrete limits in its application. Most importantly, Rule 180.1 parallels SEC Rule 10b-5 in that it is “described as a catchall provision, but what it catches must be fraud”.¹²⁷ With this said, it is important to note that *fraud* in the context of fraud-based manipulation is not just fraud in its common sense, as express misrepresentation or deceptive omission.¹²⁸ Rather, fraud-based manipulation under Rule 10b-5 and Rule 180.1 can include both claims of fraud by misleading statements or deceptive omissions, and manipulative action which send a “false pricing signal to the market.”¹²⁹ A promising means for establishing fraud-based manipulation is the *fraud-on-the-market* (FOTM) theory.¹³⁰ While the FOTM theory has long been used in the securities fraud context, the advent of Rule 180.1 suggests that it may have some success in commodities’ manipulation cases as well.¹³¹ More specifically, Gregory Scopino proposes a variant of FOTM which he calls, and we will refer to, as the *manipulation-as-fraud* legal theory, which provides:

market participants are entitled to rely on the assumption that the securities market is free of manipulation and they are therefore deceived when, unbeknownst to them, a wrongdoer manipulates the market and distorts the way that the market prices securities.¹³²

It is important to note here that the courts themselves disagree as to whether trading activity alone is a form of manipulative *action* that can constitute fraud-based manipulation in the absence of express misrepresentations or other independent unlawful acts.¹³³ This raises a concept that will figure into our analysis below: open-market manipulation. ‘Open-market manipulation’ refers

¹²⁷ See *Chiarella v. United States*, 445 U.S. 222, 235-236(1980) (describing SEC’s Rule 10b-5) ; *United States CFTC v. Kraft Foods Grp., Inc.*, 153 F. Supp. 3d 996, 1010 (N.D. Ill. 2015) (“this Court finds that Section 6(c)(1) and Regulation 180.1 prohibit only fraudulent conduct”).

¹²⁸ *ATSI Commc’ns, Inc. v. Shaar Fund, Ltd.*, 493 F.3d 87, 100 (2d Cir. 2007) (“Section 10(b), in proscribing the use of a ‘manipulative or deceptive device or contrivance,’... prohibits not only material misstatements but also manipulative acts”).

¹²⁹ *In re Tether & Bitfinex Crypto Asset Litig.*, 576 F. Supp. 3d 55, 114 (S.D.N.Y. 2021), quoting *ATSI Commc’ns*, 493 F.3d at 100 (observing that both SEA 10(b) and the CEA plus Rule 180.1 “prohibit[] not only material misstatements but also manipulative acts,” including ‘a transaction that sends a false pricing signal to the market.’”).

¹³⁰ In the securities context, the FOTM theory “establishes a rebuttable presumption in private rights of action under Exchange Act 10(b) and SEC Rule 10b-5 that in an efficient market for a security a plaintiff can be held to have relied on a defendant’s fraudulent misrepresentation or omission in connection with the purchase or sale of a security—even if the plaintiff was not aware of the misrepresentation or omission—by virtue of the plaintiff’s reliance on the fact that a security’s price reflects the fraudulent misrepresentation and omission”. *Supra* note 119 at 41402 n.50.

¹³¹ In the enacting release of Rule 180.1, the CFTC “declin[e] to adopt comments recommending outright rejection of the potential application of the ‘fraud-on-the-market’ theory under final Rule 180.1.” *Id.* at 41403.

¹³² Scopino, *supra* note 122 at 672.

¹³³ See Fox, Glostien, and Rauterberg, *supra* note 94 at 119–122 (discussing the circuit split with respect to whether trading activity -- i.e. “open market manipulation” -- on its own can constitute fraud-based manipulation under Rule 10b-5).

2023-02-03]

BLOCKCHAIN TRANSACTION ORDERING...

29

to manipulative schemes which involve facially legitimate, open-market trading practices.¹³⁴ While the Second and D.C. Circuits have found open-market manipulation to violate Rule 10b-5¹³⁵ when it is combined with manipulative intent,¹³⁶ the Third circuit has rejected the notion that a facially legitimate trade alone can be considered manipulative because it does not “[inject] inaccurate information” into the market.¹³⁷

Some examples of open market manipulation, such as banging the close, are clearly seen as prohibited forms of manipulation, however. Banging the close involves executing many trades at the end of the trading period (settlement window) to give a false impression of high trading volume.¹³⁸ Often, this will be in order to benefit their position in a derivative (for instance, an option or swap) which is priced based on the settlement price of the asset traded.¹³⁹ Generally, banging the close involves transactions which are, in themselves, uneconomic, but become profitable to the manipulator based on their outsized impact on the

¹³⁴ For a more in-depth discussion of open-market manipulation, see Fletcher, *supra* note 21.

¹³⁵ While many instances of open-market manipulation could theoretically be brought as price manipulation charges, the aforementioned challenges of successful price manipulation actions make the agencies’ fraud-based manipulation prohibitions (10b-5 and Rule 180.1) better suited to open-market manipulation.

¹³⁶ *In re Amaranth Natural Gas Commodities Litig.*, 587 F. Supp. 2d 513, 535 (S.D.N.Y. 2008) (“a legitimate transaction combined with an improper motive is commodities manipulation”); *SEC v. Masri*, 523 F. Supp. 2d 361, 373 (S.D.N.Y. 2007) (“if an investor conducts an open-market transaction with the intent of artificially affecting the price of the security, and not for any legitimate economic reason, it can constitute market manipulation”); *Markowski v. SEC*, 274 F.3d 525 (D.C. Cir. 2001) (holding that Rule 10b-5 prohibits manipulations involving trades “solely because of the actor’s purpose” regardless of whether any unlawful act occurred).

¹³⁷ *GFL Advantage Fund, Ltd. v. Colkitt*, 272 F.3d 189, 206(3d Cir. 2001), quoting *In re Olympia Brewing Co. Securities Litigation*, 613 F. Supp. 1286, 1292 (N.D. Ill. 1985) (“[r]egardless of whether market manipulation is achieved through deceptive trading activities or deceptive statements...it is clear that the essential element of the claim is that inaccurate information is being injected into the marketplace”).

¹³⁸ *CFTC v. Amaranth Advisors, L.L.C.*, 554 F. Supp. 2d 523, 528 (S.D.N.Y. 2008) (“purchasing a substantial number of futures contracts leading up to the closing range on expiration day, followed by the sale of those contracts several minutes before the close of trading[] is known as “marking the close”); *id.* at 534 (“there is no doubt that marking the close or any other trading practices, without an allegation of fraudulent conduct, can also constitute manipulation in contravention of the CEA, so long as they are pursued with a manipulative intent”).

¹³⁹ CFTC, ‘Banging the Close’, *CFTC Glossary*, https://www.cftc.gov/LearnAndProtect/EducationCenter/CFTCGlossary/glossary_b.html#:~:text=Banging%20the%20close%3A%20A%20manipulative,position%20in%20an%20option%2C%20swap (last visited Jan. 25, 2023); *Koch v SEC* (finding market manipulation in violation of SEA s10(b) for marking the close).

pricing of a different, but related position.¹⁴⁰ These trading strategies have been ruled out as deceptive forms of manipulation.¹⁴¹

In its paradigmatic sense, banging the close constitutes what has been called a *covered* open-market manipulation scheme.¹⁴² Covered open-market manipulation derives its name from the fact that the trading activity involves (is covered by) a structural mechanism or arrangement that generates heightened duties of trust and honest dealing. Thus, covered open-market manipulation typically involves trades in some financial instrument X with the purpose of moving the price of financial instrument Y, where the pricing of Y is explicitly determined (i.e. through a benchmark or other formal dependent pricing mechanism) by reference to the price of X.¹⁴³ It is this pricing mechanism for Y, which explicitly references X, that creates the relationship of trust which entails heightened duties to avoid manipulation (e.g. an implied expectation that one will avoid affecting Y's price through exploiting trades in X, rather than simply allowing Y's price to be set independently by uninterested third parties' good faith demand for X).

By contrast, *naked* open-market manipulation is not covered by any trust relationship resulting in heightened duties. A paradigmatic example would be a simple "buy-low, sell-high" profitmaking strategy, with the added element that the trader has "some way of preventing the price from increasing as she purchased, decreasing as she sells, or both."¹⁴⁴ Covered open-market manipulation schemes involve some explicit or implicit agreement – that is, an agreement not to manipulate a predetermined formal pricing mechanism – which is interfered with by the manipulator.¹⁴⁵ By contrast, naked open-market manipulation schemes involve no such agreements or relations of trust, whether express or implied, which would be breached by their occurrence. As such, naked open market manipulation schemes tend to be both more difficult to pull off, at least profitably, and predictably will be more difficult to prosecute than covered open-market manipulation. We return to these issues in discussing sandwiching public versus private transactions in Sections IV.A-B.

¹⁴⁰ CFTC v. Wilson, No. 13 Civ. 7884 (RJS), 2018 LEXIS 207376 (S.D.N.Y. Nov. 23, 2018) at *57 (defining 'banging the close' as involving "someone putting in a disproportionate number of trades to push the price up or down to affect the closing price, typically in a non-economic fashion, to benefit a position that they held elsewhere").

¹⁴¹ See *supra* notes 138, 139.

¹⁴² *Covered* open-market manipulation has also been referred to as open-market manipulation with an external interest and contract-based manipulation. See Fox, Glosten, and Rauterberg, *supra* note 94 at 75.; Daniel R. Fischel & David J. Ross, *Should the Law Prohibit "Manipulation" in Financial Markets?*, 105 Harv. L. Rev. 503, 523 (Dec. 1991).

¹⁴³ See Fletcher, *supra* note 21 at 503.

¹⁴⁴ *Id.*

¹⁴⁵ *Id.* at 403.

C. Insider Trading

The SEC, CFTC, and Department of Justice (DoJ) each prohibit insider trading in their respective markets.¹⁴⁶ While there has been scholarly debate about the applicability of insider trading laws to crypto assets,¹⁴⁷ the SEC and DoJ recently clarified their stance when charging Ishan Wahi (a former Coinbase employee) and associates with wire fraud in the first ever crypto asset insider trading case.¹⁴⁸ We focus on the SEC and CFTC's insider trading enforcement, as the analogous criminal law regime is beyond the scope of this paper.

Neither the SEC nor the CFTC's authority to police insider trading comes from a statutory or regulatory prohibition. Rather, each agency views insider trading as a form of fraud and uses their respective anti-fraud provisions to pursue cases of insider trading. That is, insider trading cases brought by the SEC are charged as Rule 10b-5 violations,¹⁴⁹ those brought by the CFTC are charged as Rule 180.1 violations.

Much of the major precedent in the realm of insider trading law comes from securities regulation,¹⁵⁰ simply because SEA s10(b) is the oldest vehicle for pursuing insider trading actions. Notably, the CFTC lacked the authority to bring insider trading actions in commodities markets, with few exceptions,¹⁵¹ until the

¹⁴⁶ See Andrew Verstein, *Crypto Assets and Insider Trading Law's Domain*, 105 IOWA L. REV. 1, 13–17 (2019).

¹⁴⁷ Compare *Id.* (arguing that insider trading law should apply to crypto assets) with Mihailis E. Diamantis, *The Light Touch of Caveat Emptor in Crypto's Wild West*, 104 IOWA L. R. 113 (2020) (noting that “there exists a strong argument that insider trading laws would be unconstitutionally void for vagueness as applied to cryptocurrency insiders,” and arguing for a light-touch approach to the enforcement of insider trading laws against crypto asset traders).

¹⁴⁸ Press Release, SEC, SEC Charges Former Coinbase Manager, Two Others in Crypto Asset Insider Trading Action (July 21, 2022), <https://www.sec.gov/news/press-release/2022-127>; Press Release, DoJ U.S. Attn'y's Off. S.D.N.Y., Three Charged In First Ever Cryptocurrency Insider Trading Tipping Scheme (July 21, 2022), <https://www.justice.gov/usao-sdny/pr-three-charged-first-ever-cryptocurrency-insider-trading-tipping-scheme>.

¹⁴⁹ Some specific insider trading actions can also be brought by the SEC through other provisions of the SEA – like SEA s16 and SEA s14e-3. Yet, the SEC pursues most insider trading cases under SEA s10(b) and Rule 10b-5, because these provisions equip the agency with the broadest authority. See Verstein, *supra* note 146 at 14.

¹⁵⁰ See *Chiarella v. United States*, 445 U.S. 222, 234 (1980) (rejecting the notion that the possession of insider information by traders in an open-market creates any general duty absent a specific duty to disclose); *Dirks v. SEC*, 463 U.S. 646, 661 (1983) (holding that, in cases where an insider does not themselves trade on material nonpublic information, but provides an insider tip to a “tippee” who then trades on the material nonpublic information, the tippee is liable for insider trading only where the insider tipper breached their fiduciary duty to the source of the inside information); *United States v. O'Hagan*, 521 U.S. 642, 666 (1997) (upholding the misappropriation theory).

¹⁵¹ The only insider trading prohibition enforced by the CFTC prior to Dodd Frank were those against misuse of information by the CFTC's own staff and employees of the exchanges and self-regulatory organizations overseen by the agency (7 U.S.C. § 13(d) (2008); U.S.C. § 13(c) (2008)).

recent expansion of their anti-manipulation authority following the Dodd Frank amendments to the CEA and passage of Rule 180.1.¹⁵²

Both the SEC and CFTC adopt the *misappropriation* theory of insider trading, under which liability turns on whether “one misappropriates confidential information for securities [or commodities] trading purposes, in breach of a duty owed to the source of the information.”¹⁵³ This theory finds liability for trading on information learned “in a context that implies confidentiality, even if the trader is not a corporate insider.”¹⁵⁴ Likewise, the court in *CFTC v EOX Holdings* – the first insider trading action brought to trial by the CFTC – indicated that the “tipper/tippee” theory of insider trading commonly used in Rule 10b-5 insider trading cases¹⁵⁵ also applies in the context of commodities insider trading.¹⁵⁶

Accordingly, an important element of any insider trading action is the existence of an adequate “relationship of trust and confidence” owed by the accused to the source of the insider information. The Supreme Court in *Chiarella* held that a “duty to disclose under section 10(b) does not arise from the mere possession of nonpublic market information”, but rather arises where “one party has information that the other party is entitled to know because of a *fiduciary or other similar relation of trust and confidence* between them.”¹⁵⁷ While most insider trading cases involve a fiduciary relationship possessed by the accused trader or tipper, recent cases have made clear that fiduciary relationships – while sufficient-- are not necessary for there to be a “duty to disclose” that generates insider trading liability.¹⁵⁸ Rather, courts have expressed willingness to find such a duty absent a preexisting fiduciary relationship where other indicators of a “relationship of trust and confidence” exist. The district court in *SEC v. Cuban* found that such a relationship might arise from a private agreement between parties to a transaction which includes an explicit or implicit promise to keep

¹⁵² In enacting Rule 180.1, the CFTC “recognize[d] that unlike securities markets, derivatives markets have long operated in a way that allows for market participants to trade on the basis of lawfully obtained material nonpublic information.” The agency then stated that the new rule may prohibit “trading on the basis of material nonpublic information in breach of a pre-existing duty”. *Supra* note 119 at 41403.

¹⁵³ *Id.* at 41402 ; *see also O’Hagan*, 521 U.S. 642; Verstein, *supra* note 146 at 15 (“the misappropriation theory holds that a trader who feigns loyalty to a company or person to gain access to secrets ultimately defrauds his source out of information when he misuses the information for trading”).

¹⁵⁴ *Id.*

¹⁵⁵ *See, e.g., Dirks v. SEC*, 463 U.S. 646 (1983); *Salman v. United States*, 137 S. Ct. 420, 428 (2016).

¹⁵⁶ *CFTC v. EOX Holdings L.L.C.*, No. H-19-2901, 2021 WL 4482145, at *45 n.112 (S.D. Tex. Sept. 30, 2021).

¹⁵⁷ *Chiarella v. United States*, 445 U.S. 222, 229 (1980).

¹⁵⁸ *SEC v. Dorozhko*, 574 F.3d 42, 49 (2nd Cir. 2009) (“[what] is sufficient is not always...necessary, and none of the Supreme Court opinions *require* a fiduciary relationship [for] an actionable securities claim under s10(b)); *CFTC v. EOX Holdings LLC*, No. 19-cv-02901 (S.D. Tex. Sept. 26, 2019) at *713 (misappropriation theory is not limited to fiduciary relationships).

confidential and abstain from trading on the material nonpublic information.¹⁵⁹ This will become important particularly when it comes to MEV extractors who deal with private order flow (see IV.B).

D. Front-running

In closing, we set aside a source of confusion for crypto markets: “front-running.” A familiar critique of MEV techniques like sandwiching (discussed in IV.A-B) is that they involve front-running.¹⁶⁰ This follows a colloquial usage likely derived from Michael Lewis’s influential book *Flash Boys*, which referred to a form of High Frequency Trading latency arbitrage (focused on colocation and other speed advantages) as “electronic front-running.”¹⁶¹ However, commentators pointed out that latency arbitrage should not be confused with *illegal* front-running, insofar as high frequency trading involves only public information accessed through superior infrastructure.¹⁶²

In legal contexts, front-running prototypically refers to the illegal practice of a trusted person (usually, a broker or investment advisor) “trading a security, option, or future while in possession of non-public information regarding an imminent block transaction that is likely to affect the price of the stock, option, or future.”¹⁶³ Neither the SEC nor the CFTC has promulgated any rule generally prohibiting front-running (outside of specific, highly regulated contexts),¹⁶⁴ but

¹⁵⁹ SEC v. Cuban, 634 F. Supp. 2d 713, 726 (N.D. Tex., 2009) (holding that a “duty sufficient to support liability under the misappropriation theory can arise *by agreement* absent a preexisting fiduciary or fiduciary-like relationship”), *vacated on other grounds in* SEC v. Cuban, 620 F.3d 551, 559 (5th Cir. 2010).

¹⁶⁰ See, e.g. *Auer*, supra note 11.

¹⁶¹ MICHAEL LEWIS, *FLASH BOYS* (2014) (“They created a taxonomy of predatory behavior in the stock market [involving] ‘electronic front-running’—seeing an investor trying to do something in one place and racing him to the next”).

¹⁶² See, e.g. MERRIT B. FOX, LAWRENCE GLOSTEN, & GABRIEL RAUTERBERG, *THE NEW STOCK MARKET: LAW, ECONOMICS, AND POLICY* 96-99 (noting that “electronic front-running” is different from front-running in its traditional, legal sense, and that the name is “inapt because the HFT is not even accused of taking a position in anticipation of another trader’s order,” thus suggesting “anticipatory order cancelation” as a more accurate label).

¹⁶³ Christopher Gibson, Initial Decision Release No. 1398 (ALJ March 24, 2020) (initial decision), <http://www.sechistorical.org/museum/papers/1980/page-14.php> (scroll to May 13); see also CFTC, “Front-running”, *CFTC Glossary*, https://www.cftc.gov/LearnAndProtect/EducationCenter/CFTCGlossary/glossary_f.html (last visited Jan. 25, 2023) (front-running is the illegal practice of “taking a futures or options position based upon non-public information regarding an impending transaction by another person in the same or related future or option”).

¹⁶⁴ Agency prohibitions on front-running exist only in specific contexts. For instance, CFTC Rule 37.203(a) requires Swap Execution Facilities (SEFs) to prohibit abusive trading practices including front-running on their markets. 17 CFR § 37.203 (2013). Similarly, SEC Rule 17(j)-1 has been

instead rely on self-regulatory organizations like FINRA (the Financial Industry Regulatory Authority, Inc.), to establish and front-running prohibitions among member firms.¹⁶⁵ Additionally, the CFTC has recently leveraged its expanded anti-fraud authority to prosecute front-running as a form of insider trading constituting fraud-based manipulation in violation of CEA s6(1) and Rule 180.1.¹⁶⁶ In discussing this issue within securities markets, Professor Jerry Markham noted that insider trading liability is only likely to apply to front-running in limited situations where a clear duty arising from a “fiduciary or comparable relationship with the block trader” exists – for instance, where a stock broker trades ahead of his clients orders.¹⁶⁷

We will consider below whether MEV techniques involving front-running of these prohibited kinds, focusing especially on the key issue of whether MEV extraction contravenes any special duty (fiduciary or otherwise) that would be breached by front-running. Absent such a special duty, front-running is unlikely to be prohibited.

IV. LEGALITY OF MEV EXTRACTION

In this section, we apply the law of market manipulation to the facts of MEV extraction and argue that there are numerous forms of liability to be taken seriously in different MEV contexts. Our analysis covers both securities and commodities law.¹⁶⁸ We do not take a position as to whether any specific crypto assets are securities or commodities, but we assume that some assets involved in the types of MEV extraction we discuss are likely to at least be considered commodities (e.g., Ether).

We focus largely on *sandwiching*, given its paradigmatic status in MEV extraction.¹⁶⁹ First, we consider the sandwiching of *public* transactions, focusing primarily on an application of the SEC and CFTC’s prohibitions against fraud-based manipulation.¹⁷⁰ We then analyze sandwiching of *private* transactions, drawing out theories of fraud-based manipulation and insider trading liability for privileged actors (block-builders, wallet operators, node operators). We end

interpreted to prohibit portfolio managers from front-running their clients. 17 C.F.R. § 270.17j-1 (2005).

¹⁶⁵ See FINRA, RULE 5270 (2013). For the early history of efforts to regulate front-running, see Markham, “Front-Running” - Insider Trading Under the Commodity Exchange Act, 38 Cath. U. L. Rev. 69, 72-83 (1988).

¹⁶⁶ See Order Instituting Proceedings, *In the Matter of Arya Motazed*, CFTC No. 16-02 (Dec. 2, 2015) (insider trading claim in violation of CEA s6(c)(1) for front-running one’s employers).

¹⁶⁷ Markham, *supra* note 113 at 86.

¹⁶⁸ See *supra* Section II.A.

¹⁶⁹ See *supra* definition and description of sandwich trades in Section III.C.

¹⁷⁰ See *supra* discussion of CFTC Rule 180.1 and SEC Rule 10b-5 in Section II.B.

with cases of disruptive schemes like oracle manipulation in which MEV extraction is part of an independently manipulative strategy.¹⁷¹

This Section argues that potential liability for MEV extraction abounds, albeit in different ways for different forms of MEV. In Section A, we provide novel arguments for thinking that liability based on public sandwiching plausibly constitutes a manipulative act, although this conclusion requires particular forms of moralized reasoning about market integrity. Still, we think this is unlikely to be pursued as a high regulatory priority in present conditions.

However, as argued in section B, there is a stronger case to be made for thinking liability (particularly insider trading liability) would be found for the sandwiching of *private order flow*. This is because private order flow plausibly involves a position of trust and confidence in relation to the user – if not also (as sometimes may occur) express representations to keep order flow private and to refrain from various forms of MEV extraction including sandwiching. Wallet operators, we will argue, should be particularly careful about legitimate user expectations about transaction privacy and freedom from MEV sandwiching. Finally, in section C, we explain the high risk of legal liability that remains for oracle manipulation (in which benchmarks are manipulated to create deceptive liquidation opportunities), which regulators have recently pursued a flagrant example of in the Mango Markets case.¹⁷²

At bottom, we conclude that MEV extraction can sometimes carry substantial legal risk depending on the type of activity involved and the factors generating relations of trust or heightened duties to other market participants.

A. Sandwiching Public Transactions

Sandwiches are usually referenced as the key example of “toxic” MEV extraction both because they are relatively common and because they adversely affect the sandwiched trade.¹⁷³ In this subsection we analyse whether sandwiching of *public* transactions¹⁷⁴ violates anti-manipulation rules under the CEA and the SEA. We consider sandwiching of *non-public* transactions separately in the next subsection.¹⁷⁵

As discussed above, on our view a pending transaction *is public* when an actor who did not receive the transaction directly from a user who submitted the transaction, can access it in an unencrypted state without too much delay and without special arrangements with the node that originally received the

¹⁷¹ For a definition of oracles, see *supra* note 25. For in-depth discussions regarding the mechanics of how price oracles can be manipulated in decentralized finance, see *infra* note 284.

¹⁷² See *generally* Complaint, CFTC v. Eisenberg, No. 23-cv-00173 (S.D.N.Y. filed Jan. 9, 2023).

¹⁷³ See *supra* our explanation of sandwiches in Section II.E.

¹⁷⁴ See *supra* for our definition of publicness of pending transactions in Section II.D.

¹⁷⁵ See *infra* Section IV.B.

transaction.¹⁷⁶ We also noted that transactions “public” by this standard are only meaningfully public to professional operators, not to an average user.

In what follows, we will argue that there is a plausible case for thinking that sandwich attacks constitute a manipulative act within the meaning of the CFTC Rule 180.1(a)(3) or SEC Rule 10b-5 – at least if courts or regulators were to adopt a moralized form of inquiry focused on protecting particular (if widespread) notions of fairness in financial markets, which of course is a big if. Should courts decide to crack down on the exploitation of privileged positions of control of the machinery involved in processing transactions on Ethereum (*i.e.*, control over “blockspace”) in order to extract rents, the courts could determine that execution prices in sandwiched trades have been subject to an illegitimate and therefore artificial price effect, amounting to a manipulative practice. Nonetheless, we argue that this conduct, to the extent it constitutes a form of naked open market manipulation (not covered by an agreement or other relationship), is unlikely to rise to the top of the list of the regulatory agencies’ enforcement priorities. Our focus here, nonetheless, is on the theoretical case, as much can be learned about the legally salient features of this paradigmatic form of MEV extraction.

I. Price Manipulation

Although we will focus on the SEC and CFTC’s fraud-based manipulation prohibitions, we start by applying the agencies’ largely dormant price manipulation prohibitions to the sandwiching of public transactions, if only to demonstrate why we do not discuss this cause of action further. Recall that a successful claim for price manipulation requires proof of four elements: i) an artificial price, ii) the intent to cause that artificial price, iii) having the ability to cause the artificial price (typically through market dominance), and iv) actually causing the artificial price.¹⁷⁷ Yet, the evidentiary burdens of proving both specific intent and price artificiality have posed too high a bar for both the SEC and CFTC to experience much luck in enforcing their anti-price manipulation authorities. One scholar notes the cause of action has become “virtually unprosecutable”:¹⁷⁸

Plaintiffs must establish a manipulative intent that is conceptually and doctrinally among the most demanding mental state requirements anywhere in financial law. Moreover, the evidence for such intent is typically only highly ambiguous public behavior.¹⁷⁹

In a sandwich targeting public transactions, the sandwicher’s actions – that is, the *front-run* and *back-run* of the sandwiched transaction – are open-market transactions. In other words, they involve the “transacting party simply

¹⁷⁶ See *supra* II.D.

¹⁷⁷ See *supra* discussion of price manipulation Section III.B.

¹⁷⁸ Markham, *supra* note 113.

¹⁷⁹ Abrantes-Metz, *supra* note 113 at 359.

purchasing or selling securities in the open market without any prior arrangement with the counterparty.”¹⁸⁰ More specifically, sandwiching involves *naked* open-market trades because a sandwicher profits through their “buy-low, sell-high” scheme with respect to a pair of crypto assets, rather than the price impact of their transactions on an external interest.¹⁸¹ According to Professor Fletcher, pursuing open-market manipulation claims under the current price manipulation standard is rarely, if ever, done because price manipulation generally requires a showing of market power or dominance.¹⁸² In naked open-market trading, on the other hand, prices are affected through ordinary trading activity between anonymous counterparties who need not dominate or control a given market.¹⁸³ Given the challenges of establishing the elements of price manipulation, it is unlikely that a court would hold a sandwich to constitute price manipulation if no independent evidence of the sandwicher’s market dominance existed. Therefore, we turn instead to sandwiching under the law of fraud-based manipulation, which is more interesting in the present context. In so doing, we will come back to the question of what is an “artificial price,” as the related question of whether a price is artificially *affected* is also crucial for fraud-based manipulation.

2. Fraud-Based Manipulation

7 U.S.C. § 9(1) prohibits any person to “use or employ, or attempt to use or employ, in connection with any swap, or a contract of sale of any commodity...any manipulative or deceptive device or contrivance,” in contravention of CFTC Rules. The CFTC clarified this prohibition with its Rule 180.1, which mirrors the content of SEC rule 10b-5 (prohibiting securities fraud).¹⁸⁴ Rule 180.1, like SEC 10b-5, makes it unlawful for those engaged in commodities trades to “to intentionally or recklessly”:

- (1) Use or employ, or attempt to use or employ, any manipulative device, scheme, or artifice to defraud;
- (2) Make, or attempt to make, any untrue or misleading statement of a material fact or to omit to state a material fact...;
- (3) Engage, or attempt to engage, in any act, practice, or course of business, which operates or would operate as a fraud or deceit upon any person[.]¹⁸⁵

¹⁸⁰ Michael A. Asaro, ‘*Masri*’ and *Open-market Manipulation Schemes*, 239 N.Y. L. J., May 12, 2008, <https://www.akingump.com/a/web/1243/aogHP/07005080021aking.pdf> (Akin Gump reprint).

¹⁸¹ See *supra* discussion of covered and naked open-market manipulation in Section II.C.

¹⁸² See Fletcher, *supra* note 21 at 539–540.

¹⁸³ See *id.* at 533.

¹⁸⁴ In promulgating Rule 180.1 which accompanies section 6(c)(1), the CFTC stated that “the Commission deems it appropriate and in the public interest to model final Rule 180.1 on SEC Rule 10b-5.” See *supra* note 119 at 41399.

¹⁸⁵ 17 CFR § 180.1; 17 CFR § 240.10b-5.

Violating Rule 180.1 requires only reckless action, which is defined for CEA purposes as “one that departs so far from the standards of ordinary care that it is very difficult to believe the [actor] was not aware of what he was doing.”¹⁸⁶ This means “the Commission need not prove that the defendant’s...primary motive was to interfere with the forces of supply and demand.”¹⁸⁷

Our analysis will focus on liability for manipulative devices or acts under (a)(1) and (a)(3), and analogous provisions of SEC Rule 10b-5, as it is unlikely that sandwiching public transactions will involve untrue or misleading statements such as under 180.1(a)(2). By itself, sandwiching does not clearly involve an express false statement. Searchers typically do not make any representations to the public or to specific traders. Matters might be different, of course, if some actors who facilitate sandwiching were to make express representations that they know to be falsehoods. For example, a block builder could publicly promise not to engage in sandwiching (e.g., by including their own front- and back-running transactions), but then break that promise. Similarly, there may be a risk of liability if a relay operator or a block builder promised to “try its best” not to include transactions attempting to sandwich but then either (1) they did not try or (2) their efforts were manifestly below the reasonable level under the circumstances.¹⁸⁸

Instead, our focus will be the idea that a standard sandwich involves prohibited manipulation: either a “manipulative device,” CFTC 180.1(a)(1) and SEC 10b-5(a), or an act that “would operate as a fraud or deceit,” CFTC 180.1(a)(3) and SEC 10b-5(c).¹⁸⁹ That is, we will explore the manipulation-as-fraud theory, which maintains that:

[W]hen a person engages in manipulative trading practices in the markets and does not let others know of his manipulative acts, the fraud derives from the failure to inform the other market participants, who are entitled to rely on their belief that the market is free of such improper behavior.¹⁹⁰

¹⁸⁶ *Drexel Burnham Lambert Inc. v. CFTC*, 850 F.2d 742, 748 (D.C. Cir. 1988).

¹⁸⁷ *In the Matter of JPMorgan Chase Bank*, 2013 WL 6057042, at *11 (“even if a trader were motivated by a desire to obtain compensation rather than by a desire to affect a market price, if the trader recklessly effected the manipulative trades, he will be held liable”).

¹⁸⁸ As will be discussed in section B, liability based on express misrepresentations may also arise in private order flow arrangements where users are promised that their transactions will not be sandwiched as an inducement to receive exclusive access to their order flow, but where the promise is broken. Still, this is not the case we are concerned with here, namely sandwiching public transactions.

¹⁸⁹ It’s arguable that some of the manipulative acts in question here could be recast as deceptive omissions in contravention of 180.1(a)(2). For example, one might maintain that the failure to disclose a potentially manipulative act is itself a deceptive omission for (a)(2) purposes. However, this makes the omission theory of liability parasitic on the theory of manipulative act, which is more fundamental. Therefore, we set aside this conceptual possibility as it is not especially important in practice. For clarity, we focus chiefly on manipulative acts.

¹⁹⁰ Scopino, *supra* note 122 at 673.

For example, this covers deceptive trading practices such as “banging the close” – executing many trades at the end of the trading day e.g. to give a false impression of high trading volume.¹⁹¹ Even though such practices do not involve affirmative false statements, they count as fraud because they “artificially affect the price of securities without informing other market participants, who justifiably rely on the assumption that the market for those securities is functioning normally and not being manipulated.”¹⁹² (This theory of liability is similar in spirit to a “fraud on the market” theory, applicable in other contexts.¹⁹³)

As the Second Circuit explained the securities context, a manipulative act “‘refers generally to practices...that are intended to mislead investors by artificially affecting market activity,’ and ‘connotes intentional or willful conduct designed to deceive or defraud investors by controlling or artificially affecting the price of securities.’”¹⁹⁴ For assessing manipulation, “[t]he critical question then becomes what activity ‘artificially’ affects a security’s price in a deceptive manner.”¹⁹⁵

There are several theories for why sandwiching might contravene CFTC Rule 180.1 or SEC 10b-5 that are worth exploring – the most plausible of which, we argue, is that it involves manipulation through having an artificial impact on prices. But first, let’s focus on deception. Is sandwiching an act or business practice that “would operate as a fraud or deceit” under 180.1(a)(3) and 10b-5(c)? Sandwiching might be seen as fraudulent if it misleads either the sandwiched user or the market generally. We consider each in turn.

(i) First simple theory: the sandwiched user is at least recklessly misled

First, one might ask whether sandwiching is likely to involve knowingly or at least recklessly misleading the sandwiched user herself. The idea would be

¹⁹¹ *CFTC v. Amaranth Advisors, L.L.C.*, 554 F. Supp. 2d 523, 528 (S.D.N.Y. 2008) (“purchasing a substantial number of futures contracts leading up to the closing range on expiration day, followed by the sale of those contracts several minutes before the close of trading[] is known as “[banging]the close”); *id.* at 534 (“there is no doubt that [banging] the close or any other trading practices, without an allegation of fraudulent conduct, can also constitute manipulation in contravention of the CEA, so long as they are pursued with a manipulative intent”).

¹⁹² Scopino, *supra* note 122 at 674. *See also* GREGORY SCOPINO, ALGO BOTS AND THE LAW: TECHNOLOGY, AUTOMATION, AND THE REGULATION OF FUTURES AND OTHER DERIVATIVES 307–312 (2020).

¹⁹³ *Halliburton Co. v. Erica P. John Fund, Inc.*, 573 U.S. 258, 268 (2014) (upholding “fraud on the market” presumption, under which “the market price of shares traded on well-developed markets reflects all publicly available information, and, hence, any material misrepresentations,” and as a result “the typical ‘investor who buys or sells stock at the price set by the market does so in reliance on the integrity of that price’”; therefore, “whenever the investor buys or sells stock at the market price, his ‘reliance on any public material misrepresentations ... may be presumed for purposes of a Rule 10b–5 action.’”).

¹⁹⁴ *Set Capital LLC v. Credit Suisse Grp. AG*, 996 F.3d 64, 76 (2d Cir. 2021).

¹⁹⁵ *ATSI Communications, Inc. v. Shaar Fund, Ltd.*, 493 F.3d 87, 100 (2d Cir. 2007).

that when a searcher sandwiches another user, the first trade within the sandwich (which front-runs the original user) affects the natural price of the underlying crypto asset.¹⁹⁶ Specifically, it worsens the sandwiched user's execution price – and a competent searcher will inevitably be aware of this effect, since it is integral to making the sandwich more profitable. For example, if it is a buy order being sandwiched, the front-run will slightly raise the asset's price before building the original buy order into the relevant block, and so the sandwiched user purchases the asset at a slightly higher price than she otherwise would have. Trades on DEX-es like Uniswap V2 are only executed if the execution price is within the specified slippage limit, as competent sandwichers will be aware. One might think that because the searcher fails to disclose this practice *to the sandwiched user*, thereby harming her by increasing the slippage of her trade, this involves at least recklessness (awareness of a substantial risk) as to interfering with the original user's justifiable reliance on the integrity of the market, *i.e.* the reasonable assumption that prices accurately reflect only the forces of supply and demand.

Setting aside whether sandwiching has an artificial effect on prices (which we consider in a moment), we think this simple theory of liability is unlikely to succeed, since we doubt the sandwiched user is likely to be misled by the sandwicher. This means recklessness by the sandwicher is unlikely to exist.¹⁹⁷ There are two reasons to expect that the sandwiched user will not be misled by the sandwicher's conduct. First, sandwiching and other MEV extraction strategies generally are common on Ethereum at present, and so it is arguable that users may reasonably be expected to know that being sandwiched is a substantial risk for any trade she executes, given how the relevant markets work.¹⁹⁸ However, as Wang et al have shown based on their interviews of DeFi users, not all users potentially affected by sandwiches are aware of the phenomenon of sandwiching, and some users who are aware of sandwiching are not able to recognize whether their transaction has been sandwiched.¹⁹⁹ That said, the authors also noted that “[w]hen the financial loss from a sandwich attack is not significant, traders do not care whether they are being attacked.”²⁰⁰

¹⁹⁶ Depending on the size of the searcher's purchase order as well as other conditions (amount of liquidity in the liquidity pool, details of the algorithm with which the AMM calculates prices), the price impact may vary: from very small, likely imperceptible for the sandwiched user, to very large. Thus, it could be that appreciable harm to the sandwiched user happens only in some, but not all, sandwiches. *See supra* II.C.

¹⁹⁷ *Drexel Burnham Lambert Inc. v. CFTC*, 850 F.2d 742, 748 (D.C. Cir. 1988) (observing that recklessness is made out in the CEA context when “it is very difficult to believe the [actor] was not aware of what he was doing” – *i.e.* when there is an obvious risk).

¹⁹⁸ *See supra* Section II.

¹⁹⁹ Over the second half of 2021, Wang et al conducted interviews with 15 DeFi users; Ye Wang et al., *Impact and User Perception of Sandwich Attacks in the DeFi Ecosystem*, in Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems (2022) at 6-12, <https://doi.org/10.1145/3491102.3517585>.

²⁰⁰ *Id.* at 8.

It is likely that traders whose trading volume is large enough for sandwiching to become noticeable are also more likely to be aware of sandwiching. Thus, because sandwiching is likely common knowledge among those traders who are potentially meaningfully affected by sandwiching, it seems not very likely to interfere with users' expectations of what is likely to happen in the market.²⁰¹

Second, and more importantly, in each trade that is carried out on a DEX like Uniswap, users are alerted to the prospect of their transaction executing at a price significantly different from the currently estimated price because they are asked to specify a slippage limit beyond which their trade will not be executed (a slippage limit may also be suggested by default). We shall assume that the sandwicher only worsens the sandwiched user's execution price without preventing the underlying trade from being executed altogether. This could happen if the front-run moves the price to a level beyond the target transaction's slippage limit, but a sandwicher rationally would not want to cause that, since this means he or she will not profit from the sandwich. Assuming the sandwiched trade goes through despite the increased slippage from the front-run in the sandwich, the sandwiched user arguably will have consented to the trade being processed with this worse but still acceptable execution price. In this way, because users are alerted to the prospect of slippage particularly through the need to set a slippage limit on their trades, the sandwich is unlikely to mislead or deceive sandwiched users in fact. As a result, it is unlikely that a sandwicher would be found to have the mental state of recklessness as to the prospect of misleading the sandwiched user.

(ii) Second simple theory: the market is at least recklessly misled

If the sandwiched user (or users) in the particular case will be unlikely to be seen as being misled by the conduct of the sandwicher, then might other market participants end up being at least recklessly misled by this conduct? For this to be the case, (1) a sandwich would need to have an adverse effect on non-sandwiched traders, (2) those affected traders would need to be misled in some way, *e.g.*, as to the true price of the relevant assets, and (3) the sandwicher would need to be reckless as to the prospect of misleading others. However, we'll argue that in standard, economically rational sandwiches we would expect no adverse price effect on the wider market, which negates the prospect of other (non-sandwiched) users being misled as to true price as well as the sandwicher's recklessness as to the risk thereof. Let us examine why economically rational sandwiches are not likely to involve a price effect outside of the sandwiched user, *i.e.* on the market more broadly.

"Standard" sandwiching. By a standard sandwich we mean a sandwich where the back-run transaction completely reverses the front-run transaction. In

²⁰¹ This is not to say that users have *normatively positive* attitudes towards sandwiching, but only that it is a risk known to them. As Wang et al noted, some of their "interviewees identified sandwich attacks as malicious towards traders"; *id.* at 9.

other words, if the front-run is a purchase of 1,000 DAI for 1 ETH, then a standard back-run would sell 1,000 DAI. Qin et al. operationalized this intuition with a notion of “perfect” sandwiching.²⁰² The authors found that 80% of sandwiches in their sample were “perfect,” and 100% would count as “perfect” on a definition using a wider 90-110% range.²⁰³

A sandwicher maximizes their economic return from a sandwich by completely reversing the front-run transaction.²⁰⁴ In fact, if sandwiching is the sandwicher’s only goal, there is no economic reason for them to do anything other than strive for a full reversal of their position. If a sandwicher does not manage fully to reverse their position before any other market activity occurs, then their strategy is not entirely market neutral and they take a kind of “inventory” risk, because it is possible that the price will later move in a way that reduces the profitability of their sandwich.

Atomic way of executing sandwiches. If a sandwich is executed *atomically*, the MEV extractor is guaranteed that all the transactions they submit will be executed in the precise set order or none of the transactions will be executed at all. Atomicity may be guaranteed if the MEV extractor controls block production (because they are a validator or non-validating block builder) or if the MEV extractor uses a private relay accepting atomic bundles of transactions (like the Flashbots Auction). This method of sandwiching is much less financially risky than non-atomistic approaches, where there is a risk of other users’ transactions being included between the front-run, the sandwiched trade(s), and the back-run. When an actor controls the contents of a block and can order the transactions in the “perfect” manner that fully reverses the front run, this will eliminate the risk that others might profit from carrying out an interfering trade before the MEV extractor has realized her profit through the back-run. As a result, atomistic sandwiches are preferred by MEV extractors compared to non-atomistic alternatives, which are riskier in financial terms. We do not know precisely what proportion of sandwiches use the less risky atomistic method today. As measured by Qin et al., from late 2018 to late 2021, 32% of sandwiches were privately relayed to miners or added by miners themselves, which strongly suggests that those MEV extractors had guarantees of atomicity.²⁰⁵ Unsurprisingly, nearly all the privately relayed sandwiches had *zero* intermediate, unrelated transactions (submitted by other users) between the front-run, the sandwiched trade, and the back-run.²⁰⁶

Most sandwiches don’t affect non-sandwiched trades. However, even when – for any reason – sandwichers cannot rely on a guarantee of atomicity, they seem mostly to succeed in executing the strategy without having any intermediate, unrelated transactions “within” a sandwich. Taking all sandwiches

²⁰² Qin, *supra* note 49.

²⁰³ *Id.*

²⁰⁴ *Id.*

²⁰⁵ Qin, Zhou, and Gervais, *supra* note 49 at 4.

²⁰⁶ *Id.* at 5.

in the Qin et al. study, both privately relayed and not, *most* of them had no intermediate transactions.²⁰⁷

Impossibility of adverse price effect on non-sandwiched traders. Even if most sandwiches do not include intermediary non-sandwiched transactions, a non-trivial proportion of sandwiches still might. It is possible that some affected transactions in this minority group are transactions interacting with the same DEX, which means that these non-sandwiched trades would be affected by the sandwich. This involves two possibilities: either a) these other trades go in the same direction as the sandwich's front-run (buy/sell) or b) they go in the opposite direction.

a) If those trades are in the *same* direction as the sandwich's front-run, then they are *effectively sandwiched* even if that was not intended by the sandwicher. It will be so, because same-direction trades following a front-run receive worse price execution than they would have otherwise in the absence of the front-run. This situation persists until someone (the sandwicher – in their back-run – or someone else, likely an arbitrageur) will execute an opposite-direction trade. In those cases, our discussion from the previous subsection applies. There we found there was no risk of misleading sandwiched users themselves, as they are likely to be aware of the risk of sandwiches hurting their execution price through setting their slippage tolerance. Still, as discussed in the next section, it's conceivable that courts might find such users to have been affected by an artificial price to the extent sandwiching is deemed to have an unnatural impact on price. Hence, the situation for such users remains complex and we defer the conclusion as to this situation until the next sub-section.

b) On the other hand, if the intermediate trades are in the *opposite* direction than the front-run, then they *benefit* from the front-run's price effect. The front-run's price effect allows the opposite-direction trade to sell higher (or buy lower) than they otherwise would have. Moreover, those intermediate opposite-direction trades reduce the profitability of the sandwich. This is the reason why an economically rational sandwicher strives to reverse their position before anyone else does that. Thus, crucially, non-sandwiched users are not adversely affected. And if they are not adversely affected – in fact, they benefit – then it would be unlikely that they would be deemed to have been recklessly misled by the sandwicher. As a result, a successful cause of action for fraud-based manipulation likely could not be brought against the sandwicher on this theory.

By contrast, if a sandwicher – besides their aim to sandwich – also intends to take a longer-lasting position in the market (and thus intentionally does not fully reverse the front-run), then there would be little to doubt that the sandwicher's lasting market position is a legitimate trade, just with the use of a front-running transaction (akin to arbitrage with the use of front-running²⁰⁸). Of course, if this lasting market position is part of a manipulative scheme, then that

²⁰⁷ *Id.*

²⁰⁸ *See infra* Section IV.D.

scheme is of a different nature than a sandwich and would require separate analysis.

For the above reasons, significant challenges exist for a claim for fraud-based manipulation based on the sandwicher recklessly misleading non-sandwiched users as to true price. To recap, either the sandwich is economically optimal (what an economically rational sandwicher would prefer) or it is not. If it is, *i.e.*, the back-run fully reverses the price effect of the front-run, then the wider market of non-sandwiched users will not be detrimentally affected and so they'll face no risk of being misled as to true price. Thus, the sandwicher's recklessness as to misleading others will not be made out either. By contrast, if it is a non-economically optimal sandwich, then there could be a price effect on non-sandwiched users. If this price effect is beneficial, no claim of being misled is likely to be successful. But if the price effect is harmful, they will count as being effectively sandwiched themselves. It is possible they might count as having been misled, however, insofar as courts deem sandwiching to have an artificial price effect, as we discuss in the next sub-section.

The upshot is that liability for non-economically rational sandwiching is likely to depend on the final theory of liability for all sandwiching, which is that sandwiching entails an artificial price effect. So it is to this theory we now turn.

(iii) More sophisticated theory: artificial effect on prices created at least recklessly

This suggests that the most likely way in which a sandwich strategy – for both “standard” sandwiches (economically optimal) or non-standard ones – could generate liability under Rule 180.1 is this: it could be found to constitute manipulation via at least recklessly affecting the price for the asset at issue in the sandwiched user's trade in an *artificial* manner. The Second Circuit clarified that, in determining what constitutes a manipulative act, “[f]or market activity to ‘artificially’ affect a security's price, we generally ask whether the transaction or series of transactions ‘sends a false pricing signal to the market’ or otherwise distorts estimates of the ‘underlying economic value’ of the securities traded.”²⁰⁹

The most obvious implication of a sandwich front-run is the worse execution price received by the sandwiched user. Yet, this alone is by no means indicative of whether the practice is “artificial” – trading in traditional financial markets is characterized by zero-sum games in which one trader's gain is another trader's loss.²¹⁰ Rather, courts generally define an artificial price as a price which “does not reflect basic forces of supply and demand.”²¹¹ The court in *CFTC v. Cox* held that a price is considered artificial where it is “affected by a factor

²⁰⁹ *Set Capital LLC v. Credit Suisse Grp. AG*, 996 F.3d 64, 79 (2d Cir. 2021).

²¹⁰ What is a zero-sum game between the two directly involved traders may at the same time be positive-sum for the market (or more broadly: from the perspective of social welfare), *e.g.*, by contributing to effective price discovery.

²¹¹ *Cargill, Inc. v. Hardin, Secretary of Agriculture*, 452 F.2d 1154, 1163 (8th Cir. 1971).

which is not legitimate.”²¹² Yet, no binding tests exists for determining which forces or factors informing a price are legitimate and which are not.²¹³

This suggests that in considering whether sandwiches create artificial prices, or have an artificial price effect, it is conceivable that courts or regulators might draw on background moral assumptions in order to decide whether the prices obtained by sandwiched users – although technically consented to by way of the user’s preselected slippage limit – reflect only the forces of supply and demand or rather are artificial prices because they are influenced by a force that is not legitimate. This would be an instance of an approach to conceptualizing market manipulation which gives pride of place to moral criticisms. As Fox et al put it, in such cases “the normative criticism of the relevant conduct is doing all the work in identifying exactly what kind of behavior is supposed to be prohibited.”²¹⁴

To take one example of how such moralized reasoning could play out, the court in *Set Capital* found that plaintiffs had adequately alleged that the defendant bank (an issuer and seller of the relevant securities) had “knowingly or recklessly exacerbated [a] liquidity squeeze” in futures market through its trading behavior, which it knew would affect prices of certain derivatives that its hedge positions depended on, and the court further held that this was enough to constitute evidence of “conscious misbehavior or recklessness,” as required for a finding of “manipulative intent.”²¹⁵ Thus, the court reasoned, in effect, that the defendant bank’s actions had an illegitimate price effect because they “exacerbated” a liquidity squeeze, which falls on the wrong side of the distinction between *creating* a liquidity disturbance for one’s own benefit and merely taking advantage of such a disturbance that already existed. Professor Stuart Green argues that this distinction between creating a disturbance versus merely taking advantage of one that already exists is key to separating unfair or illegitimate trading practices from those that do not violate norms of fair play.²¹⁶

Although it is not certain a court or regulators will approach the inquiry by applying this sort of moralized reasoning about legitimate versus illegitimate price factors, it is conceivable that decisionmakers might take the sandwicher’s

²¹²*In re Cox*, [1986-1987 Transfer Binder] Comm. Fut. L. Rep. (CCH) ¶ 23,786 at 26,060 (CFTC July 15, 1987).

²¹³*In re Indiana Farm Bureau Coop. Ass’n. Inc.*, [1982-1984 Transfer Binder] Comm. Fut. L. Rep. (CCH) 21,796, at 80-81,281(CFTC Dec. 17, 1982)(Johnson, C., concurring) (“Legitimacy with respect to supply and demand is undefined in law and economics, unless the sole question is whether the forces were put in motion by an illegal act”).

²¹⁴FOX, GLOSTEN, AND RAUTERBERG, *supra* note 21 at 339 n.10.

²¹⁵*Set Capital LLC v. Credit Suisse Grp. AG*, 996 F.3d 64, 79 (2d Cir. 2021).

²¹⁶STUART P. GREEN, LYING, CHEATING, AND STEALING: A MORAL THEORY OF WHITE COLLAR CRIME 242 (2006) (discussing, in the insider trading context, “[t]he distinction between creating an unfair informational disparity and exploiting an informational disparity that already exists. (...) The disclose or abstain rule should be construed so as not to apply to cases in which an investor comes across non-public information fortuitously (say by overhearing it in an elevator or on the train)”).

impact on the execution price of the sandwiched trade to be an illegitimate one in cases where the *privileged position of the block producer* is relied on for sandwiching and thus amounts to exploiting a key part of the financial infrastructure on Ethereum to gain an advantage over other traders. Note the following argument applies only to sandwiching that relies on control of block production, which is one central case of sandwiching – although not the only one (*i.e.*, it may not apply to, likely rare, cases of non-competitive sandwiching²¹⁷). To make out the argument for thinking that sandwiching involves artificiality affecting prices amounting to manipulation, let us review how sandwiching can rely on control of block production. Then we explain how this might be seen as improperly exploiting access to the basic machinery of the financial ecosystem on Ethereum.

Sandwiching relying on control of block production. Sandwiching is often conducted by leveraging control over block production. A proposer-validator who does not rely on an external block-builder has full control over which transactions to include in a block and in what order, and she can thus order available pending transactions in a way that creates profitable (to her) sandwiches, arbitrage, and so on. Given that the proposer has this control over one piece of “blockspace,” they can allow others to extract valuable opportunities that can be realized in their block, just like a landowner can let others use their land and in return for rent. And like ground rent, the rent that can be extracted by the proposer will, in a competitive environment of value extraction, tend towards the total value extractable from the space they control.

Three types of players currently compete to extract value from blocks by leveraging the proposer’s power to control a piece of blockspace, while directly or indirectly paying a rent to the proposer: relay operators, block-builders, and other MEV searchers. A block-builder can use the same strategies as a proposer when constructing a draft block (adding their own transactions, choosing and ordering other users’ transactions), but for their block to be chosen by a proposer and included on the blockchain, they need to compete with other block-builders in an auction and offer the highest fee (rent) to a relay. In turn, relays compete in a rent auction for their block to be chosen by the proposer. Other users who aim to extract MEV, *i.e.* searchers, do not attempt to construct whole blocks, but some block-builders allow them privately to submit bundles of transactions realizing valuable opportunities. Searchers compete against other searchers, and presumably against the builders’ own value extraction efforts, to have their value-extracting transactions included on the blockchain.

An argument could be made that searchers may be able to extract value, *e.g.*, by sandwiching, without leveraging the proposer’s control of blockspace, at least in the *overt* sense discussed above. If a profitable opportunity is not competitive (no other searchers, block-builders are attempting to realize it), then a searcher may be able to realize the opportunity simply by setting higher/lower

²¹⁷ See *infra* market power (dominance) argument in this subsection.

gas settings for their transactions, to place them in front or behind some target transaction, as needed. Such a searcher still pays a rent to the proposer (in the form of the “tip” part of a transaction fee), but the rent may not be proportionate to the value of the profitable opportunity. Instead, the rent is based the transaction fee set by the target transaction (e.g., the transaction to be sandwiched). However, this is unlikely to be significant as profitable opportunities – especially for sandwiching – tend to be competitive. This competition may take place through the auction process described above or through so-called priority gas auctions.²¹⁸ In both cases, the proposer’s rent will tend toward the total value of the opportunity (although more efficiently in overt auctions than in priority gas auctions). (Note that validators-proposers in principle could attempt to avoid participating in, or facilitating, MEV extraction.²¹⁹)

Illegitimacy of relying on control of block production for sandwiching. It could be argued that, insofar as sandwiching leverages control over blockspace as described above, one might see the validator-proposer’s involvement in sandwiches as exploiting a key part of the financial infrastructure on Ethereum to give some market participants an advantage that others. In this way, their position as being in charge of the machinery of processing transactions gives validators an unfair advantage, which users generally do not and cannot have unless they too become validators in charge of building blocks. We propose that there are two main ways in which courts and regulators engaged in a moralized form of inquiry to determine where manipulation exists might deem the exploitation of one’s control over blockspace through sandwiching to constitute an illegitimate price factor, thus artificially affecting prices. One builds on intuitions about market power (or dominance), while the other flows from intuitions about conflicts of interest.²²⁰

Market power (dominance) argument. First, one might see facilitation of sandwiching by validator-proposers as exploitation of a key position of (temporary) monopoly power within the machinery of processing transactions, giving those exploiting the power an unfair vantage point in the ecosystem from which to extract rents for themselves. While it’s true that anyone could in principle become a validator (just as anyone could in theory become a landlord who charges rents), this doesn’t change the fact that validators engaged in sandwiching exploit their privileged position within the ecosystem/infrastructure of the financial structure. Given that *market power* or

²¹⁸ Daian, *supra* note 9.

²¹⁹ For example, a validator could order transactions randomly or on a “first-observed, first-included” basis, but while this is likely to reduce her profits, it is unlikely to reduce the amount of competition for blockspace and push it into a different stage of the supply chain, causing issues like latency races or spam.

²²⁰ Note that if a proposer could be liable under this theory, then arguably those who leverage the proposer’s power in cooperation with the proposer (relays, block-builders, searchers) for sandwiching, may also be liable.

dominance often plays a major role in courts' price artificiality analysis,²²¹ it seems plausible that a court could determine that sandwiching that overtly leverages the proposer's power to control a piece of blockspace, thus amounts an illegitimate and artificial force on market prices. Competent sandwichers will be aware of these facts, and so there is at least a colorable argument that they would be at least recklessly creating an artificial price, i.e. aware of at least a substantial risk that their activities produce prices that do not reflect solely the legitimate forces of supply and demand.

Conflict of interest argument. A second way to draw out the intuition that there is something unfair or illegitimate about the way in which sandwichers use the proposer's power to control a piece of blockspace to give themselves special advantages is to note that the situation presents something in the vicinity of a conflict of interest. After all, in such a situation, a proposer does not act only as neutral infrastructure, on whose services all traders rely and cannot trade without, but also as a self-interested trader or a profit-sharing enabler of other traders, leveraging a privileged position over other user's transactions.

For either reason, a morally-minded court or regulator might see sandwiching as creating an artificial price for the users they sandwich under circumstances where "it is very difficult to believe the [sandwicher] was not aware of what he was doing."²²² In other words, the impact that a sandwicher knows he will have on the execution price of the sandwiched user's trade might well be seen as an illegitimate one for either of the two reasons offered above. If so, there is a route to seeing the sandwich as at least recklessly sending a false price signal, i.e., creating an artificial effect on a price, thereby amounting to manipulative act. It would admittedly be a very common form of manipulation within the ecosystem, but manipulative and unfair nonetheless – at least by this reasoning. In this way, a Rule 180.1(1) or (3) violation might be in play.²²³

Note that there are other arguments one might adduce in this context, such as that MEV amounts to an illegitimate form of queue-jumping, but we think this argument clearly fails as there is no first-in-time queue in the Ethereum context in which to jump.²²⁴ Hence the market control (domination) and conflict

²²¹ See *supra* note 104.

²²² *Drexel Burnham Lambert Inc. v. CFTC*, 850 F.2d 742, 748 (D.C. Cir. 1988).

²²³ To be clear, this theory of liability does not hinge on "untrue or misleading statements" by any participants of the MEV extraction ecosystem. If a validator, block-builder, or a relay operator, publicly promise not to sandwich or not to include sandwiching transactions in blocks they control, and they break that promise, that could be a separate ground of liability, as discussed above.

²²⁴ While it might be tempting at first blush to regard MEV front-running as a form of illegitimate or immoral queue-jumping, this, we think, would be a clear mistake. The reason is that before the relevant transactions are selected and ordered by a validator in order to become one block, there is no pre-existing transaction ordering which could allow the sandwiched user to claim that the sandwicher cut in line in front of them. That is, transaction order in this context is not established through a *first in time* rule, but rather through the auction process, whereby higher bids lead to greater prospects of having one's transactions executed earlier. This was by design, as a first in

of intuitions provide the strongest basis for the manipulation argument in the present context.

(iv) Rejoinders

Let us close this section by considering some rejoinders. First, and most fundamentally, courts and regulators might eschew the form of moralized inquiry outlined above in their approach to determining what constitutes prohibited manipulation. Thus, they might instead prefer to take an empirical look at what behaviors produce efficient markets in traditional economic terms in order to decide what behaviors should be deemed manipulative.²²⁵

However as argued earlier,²²⁶ much more empirical work is needed to determine the extent to which MEV sandwiching is a behavior with net positive effects for the ecosystem construed in the aggregate. Hence, the liability outcome on this approach remains uncertain.

The second sort of rejoinder one might raise would arise within the moralized inquiry we gestured at above and argue that the domination and conflict of interest arguments sketched a moment ago are not decisive because of other conflicting normative principles. Let us consider a few of these, though we do not propose to resolve the matter conclusively.

First, then, one might respond that the price impact of a sandwich is quite similar to Uber's 'surge pricing' model, wherein Uber's pricing model algorithmically increases prices at times where potential Uber customers may be willing to pay more.²²⁷ So, to the extent that a sandwicher changes the execution price of a sandwiched user's transaction through their front-run, they do so solely on the basis of a user's publicly expressed price preferences (i.e. their slippage limit), rather than any false or deceptive information. Nonetheless, one might see a difference between price effects due to sandwiching and the Uber surge pricing model. Surge pricing benefits are meant to be redistributed to drivers to ensure there is enough driver supply to meet rider demand.²²⁸ In the

time rule for transaction ordering would have invited the sort of race to be first that one sees in latency arbitrage from high frequency traders. Accordingly, given the current architecture for transaction ordering through auctions, there is no plausible argument that the sandwicher's front-run is unfair or sends an illegitimate price signal due to "cutting in line" in front of the sandwiched user's trade.

²²⁵ Many scholars have advocated for such an approach. *See, e.g.*, Pirrong, *supra* note 88 (arguing for an approach to manipulation determinations which focuses on the economic effects of market manipulation and statistical analysis); Abrentez-Metz, *supra* note 113 at Part III (proposing the use of empirical economic and statistical tools, such as econometric screens, in the evaluation of manipulation claims, particularly at the pleading stage).

²²⁶ *See also* Barczentewicz, *supra* note 18.

²²⁷ Brett Helling, *Surge Pricing: What It Is & How It Works For Riders & Drivers*, Ridester (Jan. 13th 2023) (<https://www.ridester.com/surge-pricing/>).

²²⁸ *Id.* ("Making sure riders can always find rides when they need them is one of the main reasons Uber implemented surge pricing.").

sandwiching case, the extra profit generated in the sandwich is shared among those involved in sandwiching (searcher, block-builder, relay, proposer-validator), with the most value like to go to the proposer, *i.e.*, the actor who controls a key piece of financial infrastructure and extracts rents for themselves through it. On one view, that would be as if Uber raised prices in times of great rider demand such as a natural disaster or other crisis solely because the market would bear it – arguably a form of price gouging.²²⁹ Outside of disaster situations, however, one might argue that even if all the monetary value from competition for space (cars) accrues to Uber or to sandwichers, users may derive a significant non-monetary benefit in being able to express the strength of their preference for the use of space and thus have their preferences satisfied according to their strength. Of course, this in turn raises questions about the accuracy of willingness-to-pay as a proxy for well-being effects, particularly for actors with limited ability to pay.²³⁰ But the point is that one might bring duelling normative principles to bear in order to debate the legitimacy of the relevant form of rent extraction.

Second, and more importantly, one might counter the domination and conflict of interest arguments we introduced above by contending that the profit motive with which MEV sandwiching is pursued provides a legitimate economic rationale for sandwiching by those who control the construction of blocks. As some courts have maintained, trading with the purpose of receiving the best possible price for oneself is a “legitimate economic rationale,” even where it detrimentally impacts another trader.²³¹ Still, it is clear that this principle must have limits, as any paradigmatically manipulative trading strategy like spoofing²³² or banging the close²³³ is also pursued primarily from a profit

²²⁹ Ryan Lawler, *Uber Caps Surge Pricing During Emergencies Nationwide* (Jul 8th 2014) (<https://techcrunch.com/2014/07/08/uber-caps-surge-pricing-during-emergencies/>) (noting that Uber agreed with the Attorney General of New York to avoid such practices).

²³⁰ Ronald Dworkin, *Is Wealth a Value?* 9 J. Legal Studies 191-226 (1980) (arguing that wealth understood in willingness to pay terms is normatively problematic, particularly when considering differences in ability to pay prevents the accurate expression of one’s actual preferences – particularly as between rich and poor).

²³¹ *In re Amaranth Natural Gas Commodities Litig.*, 587 F. Supp. 2d 513, 535 (S.D.N.Y. 2008); *In re Indiana Farm Bureau Coop. Ass’n, Inc.*, [1982-1984 Transfer Binder] Comm. Fut. L. Rep. (CCH) 21,796, at 24,281 (CFTC Dec. 17, 1982). (“It is imperative that each [side] of the market seek the best price in order for price discovery to occur and that ‘best’ price is, of necessity, at the expense of the other side”).

²³² *United States v. Coscia*, 4 F.4th 454, (7th Cir. 2021) (upholding conviction for commodities fraud based on a strategy of spoofing).

²³³ *In the Matter of JPMorgan Chase Bank*, 2013 WL 6057042, at *11 (“In a properly functioning market, prices reflect the competing judgments of buyers and sellers as to the fair price of a commodity or, in this instance, swaps. Here, acting on behalf of JPMorgan, the...traders’ activities...constituted a manipulative device in connection with swaps because they sold enormous volumes of [a credit default index] in a very short period of time at month-end.”); *CFTC v. Wilson*, No. 13 Civ. 7884 (RJS), 2018 LEXIS 207376 (S.D.N.Y. Nov. 23, 2018) at *57 (defining “banging

motive, and this alone does not suffice to bless the relevant form of activity. Something more than the appeal to a profit motive for the specific transaction in question is needed to separate permissible transactions from those that form part of a manipulative scheme premised on illegitimately produced artificial prices, though it is no easy matter to specify with perfect generality precisely what more is required. In the end we suspect that the matter will be decided by the extent to which courts wish to protect notions of market integrity that exclude domination based on control of infrastructure that most traders do not have access to but all rely on.²³⁴ While we think the argument will surely continue to rage on, this strikes us as the most plausible going theory of liability for open market sandwiching in general sounding in manipulation premised on illegitimate price effects.

Nonetheless, there is a final problem, which is of particular practical importance: we suspect that liability for standard open market sandwiching is unlikely to be pursued as a regulatory priority in the near term. In principle, someone could argue that an atomic sandwich constitutes a *naked open-market manipulation* scheme because the atomic condition of the sandwich equips the sandwicher with a “good reason to believe” that the average price at which they purchased (or sold) a crypto asset (in the front-run) would be larger than that when they sold (or purchased) the crypto asset (in the back-run) due to the price impact of the sandwiched transaction.²³⁵ Nonetheless, very few cases – to our knowledge, only one – have found fraud-based manipulation liability on the basis of naked open market manipulation schemes alone.²³⁶

Our main explanation for why this is the case simply boils down to a matter of enforcement discretion. The limited precedent with respect to CFTC or SEC enforcement against naked open-market manipulation could simply stem from the fact that these practices are low on the totem pole of enforcement priorities given the high evidentiary costs associated with establishing the requisite scienter which differentiates legitimate from manipulative naked open market

the close’ as involving “someone putting in a disproportionate number of trades to push the price up or down to affect the closing price, typically in a noneconomic fashion, to benefit a position that they held elsewhere”).

²³⁴ Lindsay Farmer, *Taking Market Crime Seriously*, 42 *Legal Studies* 508, 523-24 (2022).

²³⁵ Fox, Glosten, and Rauterberg, *supra* note 94 at 74 (stating that naked open market manipulation schemes should be the subject of legal sanctions “only where it can be proved that [the trader] had, at the time of her purchase, good reason to believe that” an asymmetric price reaction would occur on the basis of their trades).

²³⁶ *See* Markowski v. SEC, 274 F.3d 525 (D.C. Cir. 2001).

trades.²³⁷ This would explain why practices like predatory trading,²³⁸ which seem to meet the definition of *naked open-market manipulation*, are left unchallenged by the agencies.²³⁹ As a result, a claim of fraud-based manipulation liability on the grounds that sandwiching constitutes an open market manipulation scheme involving at least recklessly creating artificial prices would be relatively unlikely to be brought in practice even if theoretically there is a plausible argument for this conclusion to be tested.

Of course, more debate always remains possible. As explained above,²⁴⁰ naked open-market market manipulation is characterized by the lack of relations of trust between the party accused of manipulation and other traders, while covered market-manipulation (such as paradigmatic banging the close or oracle manipulation) do involve some such trust relations, which are at least implied (e.g. based on a formal mechanisms for pricing one asset that references another). The considerations adduced above, about block builders' control and exploitation of crypto market infrastructure, on which other traders rely, might similarly be seen as generating implied relations of trust, which could move MEV sandwiching of public trades more in the direction of covered open-market

²³⁷ See, e.g., *Id.* at 530 (“We cannot find the Commission’s interpretation to be unreasonable in light of what appears to be Congress’s determination that manipulation can be illegal solely because of the actor’s purpose”); *SEC v. Masri*, 523 F. Supp. 2d 361, 373 (S.D.N.Y. 2007) (“The court concludes, therefore, that if an investor conducts an open-market transaction with the intent of artificially affecting the price of the security, and not for any legitimate economic reason, it can constitute market manipulation”); *In re Amaranth Natural Gas Commodities Litig.*, 587 F. Supp. 2d 513, 540 (S.D.N.Y. 2008) (“Entering into a legitimate transaction knowing that it will distort the market is not manipulation – only intent, not knowledge, can transform a legitimate transaction into manipulation”).

²³⁸ Predatory trading involves a strategic trader becoming aware (on the basis of public or private information) of an impending large transaction by another trader. For instance, a hedge fund with a nearing margin call may need to make a large liquidation. In response, the strategic trader first trades in the same direction as the distressed trader and subsequently reverses his position following the distressed trader’s large transaction. As such, the strategic trader effectively profits by forcing the distressed trader to suffer a worse price on their large transaction. For an in-depth look at predatory trading, see Markus K. Brunnermeier and Lasse Heje Pedersen, *Predatory Trading*, 60 *J. of Fin.* 1825, 1825 (August 2005).

²³⁹ See Procedures To Establish Appropriate Minimum Block Sizes for Large Notional Off-Facility Swaps and Block Trades, 78 Fed. Reg. 32870, n.46 (May 31, 2003) (discussing predatory trading as a consequence of a regulatory regime requiring the “publication of detailed information regarding ‘outsize swap transactions’”); Alternatively, it may be the case that courts are hesitant to find fraud-based manipulation liability on the basis of purely *naked* trades because there is some implicit theory that a contractual relationship, or other kind of relationship that generates expectations between parties, makes some kinds of conduct manipulative which otherwise are not. As applied to open-market trades, it would follow from this theory that *covered* open-market manipulation schemes are more likely to be manipulative because they generally involve some contractual relationship or expectation-setting between parties to a transaction, while the same cannot be said for naked open market manipulation.

However, we explore this issue in more depth below.

²⁴⁰ *Supra* Section III.C.

manipulation. But this is a speculative argument, again exploiting moralized forms of argument about when relations of trust, based on reliance upon market infrastructure that bock builders' control, should be found to exist. The closer MEV sandwiching of public trades appears to covered open-market manipulation, the more likely a regulatory response would be.

In the end, we think there remains a route to CTFC Rule 180.1 and SEC 10b-5 liability for public sandwiching provided courts and regulators adopt a moralized form of inquiry. It is by no means clear they will, but given that no binding tests exists for determining which *forces* or *factors* informing a price are legitimate and which are not,²⁴¹ we think this possibility cannot be conclusively ruled out ex ante.

(v) Front-running

We close this section by seeking to dispel a common misconception about sandwiching. A familiar critique of the first stage in a sandwich – rather unfortunately labelled the “front-run” – is that it resembles illegal front-running.²⁴² As discussed in Section III, illegal front-running entails a breach of a special duty (e.g., fiduciary duty) that a trusted person, like a broker or investment advisor, has toward their client.²⁴³ Breaching the duty, a trusted person – or someone they tipped off – trades ahead of the client to benefit from the price impact of the clients' order.

Existence of a special duty—relationships of trust. The key question for applying this theory of liability is whether anyone involved in executing sandwiches has a relevant special duty towards the sandwiched trader, which would make trading ahead in this context (the “front-run”) a “manipulative device, scheme, or artifice to defraud.” This duty may be part of, e.g., a fiduciary duty of an agent to their client or it may arise because someone promises in a different context that they will not trade ahead. In the latter case, the illegality of front-running boils down to liability for untrue or misleading statements discussed above.

An investment adviser, regulated under the Investment Advisers Act of 1940 (IAA), or a broker, regulated under the SEA, are most likely to have duties that could, under some circumstances, be breached by trading ahead of a client. We are not, however, aware of examples of registered investment advisors or brokers being involved in sandwiching or other kinds of MEV extraction. If an investment adviser were to consider engaging in sandwiching, then they might need to consider the breadth of their duties under *SEC v Capital Gains Research Bureau*: of “utmost good faith, and full and fair disclosure of all material facts”

²⁴¹ *Supra* note 213.

²⁴² *See, e.g.*, Auer et al., *supra* note 11; Piet, Fairuze, and Weaver, *supra* note 12; IOSCO, *supra* note 15 at 37; U.S. TREASURY DEPARTMENT, *supra* note 15 at 36.

²⁴³ *See supra* Section III.D.

and “to employ reasonable care to avoid misleading” clients.²⁴⁴ Such duties may apply not just to clients with personal relationships with an adviser. In *Capital Gains Research Bureau* mere recommendation of the adviser’s own investments in a newsletter, without appropriate disclosure (scalping), was held to be a breach of the advisers’ legal duties. Much more could be said about the special cases of investment advisers and brokers but given that they do not appear to be prominent among MEV extractors, we will not do so here.

An MEV searcher who relies only on public information about a pending transaction and has no other knowledge about the transaction seems unlikely to have the special duty.

Unclear whether sandwiching would breach the duty in all cases. It could be that being involved in sandwiching of a user to whom one *does have* the special duty discussed here, would constitute a breach of that duty and thus illegal front-running. But this need not be so, if it could be shown that the practice is fully disclosed and that it is in the best interest of the user. The consideration of best interest could include aspects like “MEV rebates” or other services offered to a user (like faster execution) in return for assent to sandwiching.

Front-running as misappropriation of private information. By definition, sandwiching a public transaction does not involve the use of private information, hence the “insider trading” version of front-running is not applicable here. We will, however, come back to this point while discussing sandwiching of *private* transactions below.

B. Sandwiching Private Transactions

The above discussion focused exclusively on sandwiches which target public transaction information. Yet, additional theories of liability – for instance, those finding insider trading and prohibited front-running²⁴⁵ – become plausible where material non-public information is the basis of trading activity. On our view, a pending transaction constitutes private (non-public) information by default and remains private until the moment when an actor who did not receive the transaction directly from a user who submitted the transaction, can access it in an unencrypted state without too much delay and without special arrangements with the network node that originally received the transaction.²⁴⁶

Users sometimes intend for their transactions to remain private while in a pending state (before they are included on the blockchain). To achieve that, users submit transactions to privacy RPCs.²⁴⁷ However, transactions may be kept

²⁴⁴ 375 U.S. 180 (1963) 365.

²⁴⁵ See *supra* Sections III.C and III.D.

²⁴⁶ See *supra* Section II.D.

²⁴⁷ See *supra* Section II.B.

private by actors who are not expected to do so by users.²⁴⁸ For example, an operator of an RPC that receives a user's transaction may decide to keep this transaction for herself before re-broadcasting it, even if only for several hundred milliseconds, to have a head start in identifying potential MEV extraction opportunities created by this transaction.²⁴⁹ While an operator keeps the knowledge of the existence of a pending transaction to herself (and possible some collaborating operators), without making it public, she effectively treats the transaction as private order flow (POF). Given the potential to profit from having exclusive, even if only temporarily exclusive, knowledge about pending transactions, there are incentives for payment for order flow (PFOF) arrangements to arise.

In this section, we discuss the kinds of market manipulation liability – ranging from traditional fraud-based manipulation to price manipulation to insider trading – possible where private transactions are sandwiched. We argue that, in the absence of appropriate disclosure, liability is likely for actors who sandwich or are complicit in the sandwiching of (*i.e.*, by “tipping” transaction information to others who sandwich or by receiving payment in exchange for leaking order flow which is subsequently sandwiched) private transactions. The risk of liability is significant here not only because of the additional avenues of market manipulation liability which exist where a trading practice involves *non-public* information, but also due to the heightened trust relationships involved where an actor is the recipient of a user's private transaction information. As we find that different theories of liability exist in the case where a user intends to keep their transaction private and where they do not, we divide our discussion here accordingly.

1. Explicit Private Order Flow

Where Ethereum users submit their transaction to a privacy RPC, intending for those transactions to be forwarded privately to a particular block builder (or several block builders), we consider that a kind of private order flow (POF). We refer to it as “explicit” POF, because here the user manifests the intention for these transactions to be private by choosing a privacy RPC. We consider “non-explicit” POF in the next subsection. A transaction sent to a privacy RPC is meant not only never to become public while pending, but also to be shared only with specific parties (block-builders). We argue that MEV extracted through explicit POF faces a heightened risk of liability under the fraud-based manipulation prong of the CFTC and SEC's anti-manipulation authority.

To contextualize the following discussion, it is useful to understand *why* Ethereum users may want to route their transactions directly to a validator. One obvious reason may be that they are interested in being paid for agreeing to do so. For instance, some MEV rebate programs offer privacy RPCs with the

²⁴⁸ *Id.*

²⁴⁹ *Id.*

guarantee that a portion of the MEV extracted from users' POF will actually be given *back* to the user.²⁵⁰ Alternatively, a user may route their transaction through a privacy RPC out of fear that sending their transaction to the mempool may serve as blood in the water, luring searcher bots who seek to exploit their trade and cause them to suffer a worse execution price. Rebate programs also tend to promise users that, in addition to MEV redistribution, the users will be protected from front-running (including sandwiching), and will receive "best execution."²⁵¹ POF arrangements generally involve off-chain communication wherein searchers and block-builders with access to POF make promises (either explicitly or implicitly, through their integration with a privacy RPC which advertises itself as offering privacy, front-running-protection, etc. as a service) to users in exchange for exclusive access to their order flow. Hence, POF is appealing for users because it provides them with both i) monetary rewards and ii) certain non-monetary guarantees with respect to their transaction such as pre-execution privacy and front-running protection.

When a user exclusively routes their order flow to a particular block builder (or set of builders), they are also *not* publicizing their transaction to the rest of the network. If the basic guarantee of a privacy RPC is not broken,²⁵² and the user herself does not submit the same transaction to a non-privacy (ordinary) RPC, then the information about a pending transaction submitted to a privacy RPC remains *non-public information* until the transaction is included on the blockchain.

The implicit and explicit promises made by block builders and searchers to the users who provide them with POF, we argue, create a relationship of *trust* between those operators and those users.²⁵³ That is, users providing their POF to network operators *trust* that their transactions will remain private, will not be front-run (including sandwiching), and more. The involvement of *non-public information* and the existence of a *relationship of trust* thus paves a route to insider trading liability for block builders and searchers who sandwich user trades they received as POF.

Recall that both the CFTC and SEC police insider trading in their associated markets as a form of fraud-based manipulation prohibited under Rule 180.1 and Rule 10b-5, respectively.²⁵⁴ Both agencies rely on the *misappropriation theory* of insider trading, which finds liability for trades made

²⁵⁰ See, e.g., ROOK, <https://www.rook.fi/#How-It-Works>; OPENMEV, <https://docs.openmev.org/router>.

²⁵¹ *Id.*

²⁵² See, e.g., *Ethermine Private RPC Endpoint*, BITFLY, <https://ethermine.org/private-rpc> (last accessed Jan. 30, 2023) (promising that "Ethermine will never leak nor act on the information received via this relay"); *Frontrunning Protection*; BLOXROUTE DOCUMENTATION, <https://docs.bloxroute.com/apis/frontrunning-protection>.

²⁵³ For an analysis of the trust relationships endemic to blockchain based systems - including that of network transactors to blockchain validators, see generally Primavera De Filippi, Morshed Mannan & Wessel Reijers, *Blockchain as a confidence machine: The problem of trust & challenges of governance*, 62 TECHN. IN SOCIETY 1 (2020).

²⁵⁴ See *supra* Section III.B.

on the “basis of material nonpublic information in breach of a pre-existing duty (established by another law or rule, or agreement, understanding, or some other source), or by trading on the basis of material nonpublic information that was obtained through fraud or deception.”²⁵⁵ Additionally, both agencies find insider trading liability for *tippers* – insiders owing a duty of confidentiality to the source of nonpublic information who do not themselves trade on the basis of material nonpublic information, but share such nonpublic information with others who proceed to trade on it.²⁵⁶ A duty giving rise to insider trading liability under the misappropriation theory arises between the source of some nonpublic information and its recipient wherever that recipient “learns information in a context that implies confidentiality, even if the trader is not a corporate insider.”²⁵⁷

Where a MEV extractor interacts with POF transactions, they could be held liable for insider trading where it is established that i) the MEV extractor had a “pre-existing duty” with the user from whom they received POF, and ii) the MEV extractor breached this duty in the process of either extracting MEV from the user’s POF transactions *or* by “tipping” the user’s transaction to another who then extracts MEV from the user’s transaction. To establish the requisite “duty of confidentiality” for insider trading liability, it is not necessary that a trader or tipper owe a fiduciary duty to the source of some nonpublic information.²⁵⁸

In his work applying insider trading law to the realm of crypto assets, Andrew Verstein notes that “relationships of trust and confidence are widespread in the crypto asset economy,” even though “it is common to refer to cryptocurrency systems as ‘trustless.’”²⁵⁹ In the context of POF, relationships of trust and confidence between an MEV extractor and a user are likely to be even more apparent than elsewhere in the crypto-economy, since explicit off-chain agreements are often formed laying out the obligations each of these parties owes to the other.²⁶⁰ The recipient of this trust and confidence, a searcher or block builder with access to POF may owe a duty to keep private and to not front-run or sandwich the transactions of the user who provided that order flow. Such a duty forming the basis of insider trading liability could arise from a number of sources, including the following. First, there might be evidence of a specific, explicit promise by the MEV extractor to the user that they would not disclose and would not extract at least some kinds of MEV on the basis of a

²⁵⁵ See *supra* note 119 at 41403.

²⁵⁶ See *Dirks v. SEC*, 463 U.S. 646, 661 (1983) (establishing the “personal benefit test” for tippers in securities insider trading cases); *CFTC v. EOX Holdings L.L.C.*, No. H-19-2901, 2021 WL 4482145, at *19 (S.D. Tex. Sept. 30, 2021) (holding that tippers can be liable for insider trading in commodities markets).

²⁵⁷ Verstein, *supra* note 146 at 15.

²⁵⁸ *CFTC v. EOX Holdings L.L.C.*, 405 F. Supp. 3d 697, 709 (S.D. Tex. 2019) (rejecting the defendants’ argument that the misappropriation theory applies only “when an individual owes a fiduciary duty to the principal whose information was allegedly misappropriated”).

²⁵⁹ Verstein, *supra* note 146 at 32.

²⁶⁰ See, e.g., *supra* note 252.

user's nonpublic transaction information.²⁶¹ Second, there might be an agreement made (even based on the expectation of compliance with a privacy RPC's terms and conditions) as a condition of a MEV extractor's integration with a privacy RPC guaranteeing that a user's order flow would not be subject to some kinds of MEV extraction and that it would only be made available to the operators who were exclusively granted access. Third, a relationship of trust between the user and MEV extractor might arise from the fact that the MEV extractor "feigns loyalty" to the user for the purpose of accessing their material, nonpublic transaction information.²⁶² There could well be other sources of such a trust relationship.

Should such a duty be found to apply to a recipient of explicit POF, it is likely that a successful claim for insider trading under Rule 180.1 would arise. If the same MEV extractor who owes a duty of trust and confidence to a user sandwiches that user's POF, that MEV extractor arguably would be liable under the traditional misappropriation theory of insider trading liability. Alternatively, if it is not the MEV extractor with a duty who sandwiches the user, but another MEV extractor who they "tipped" and who subsequently sandwiched the user's transaction, the "tipper" searcher or block builder may still be held liable.

Admittedly, what constitutes a pre-existing duty sufficient to serve as the basis for an insider trading action under CFTC Rule 180.1 or SEC Rule 10b-5 is by no means settled. Courts dealing with securities and commodities fraud claims have long struggled to define "the contours of a relationship of trust and confidence giving rise to the duty to disclose or abstain and misappropriation liability."²⁶³ Yet, even if an agency is unable to establish the existence of such a duty between an MEV extractor and user, the explicit representations made by MEV extractors in acquiring POF make plausible fraud-based manipulation claims on the basis of misrepresentations.²⁶⁴ Fraud by material misrepresentation and omission claims under Rule 180.1(a)(2) and 10b-5(b) typically require that an accused engaged in a specific misrepresentation or omission.²⁶⁵ Consider the experience of a user who provides POF to a MEV

²⁶¹ *EOX Holdings L.L.C.*, 405 F. Supp. 3d at 713 (discussing the conception of "duty" defined by the court in *SEC v. Cuban (Cuban I)* -- undisturbed by the Fifth Circuit in *Cuban II* -- that "insider trading could arise where there was an express ... agreement to maintain the confidentiality of material, nonpublic information and not to trade on or otherwise use the information").

²⁶² Verstein, *supra* note 146 at 15. See also *United States v. O'Hagan*, 521 U.S. 642, 670(1997) (holding that "'the deception essential to the misappropriation theory involves feigning fidelity to the source of information").

²⁶³ *SEC v. Cuban*, 620 F.3d 551, 555 (5th Cir. 2010); *CFTC v. EOX Holdings L.L.C.*, No. H-19-2901, 2021 WL 4482145, at *53 (S.D. Tex. Sept. 30, 2021) ("Defendants' argument that 'there is no need for an exegesis on the law of duty in this context,' fails to recognize that courts have been struggling with this precise issue for some time").

²⁶⁴ See 17 C.F.R. §180.1(a)(2) (2012).

²⁶⁵ The court in *CFTC v. Kraft* noted that fraud-based manipulation claims "based upon a misstatement" require the plaintiff to allege a material misrepresentation (or omission), scienter,

extractor in reliance on that MEV extractor's promise that their transaction would not be sandwiched, whose transaction is subsequently sandwiched by that MEV extractor resulting in a worse execution price for their transaction. Such a user's experience certainly "[sounds] in fraud" in a manner sufficient to satisfy the requirements of a fraud-by-misrepresentation claim,²⁶⁶ such that only the requisite scienter of recklessness or intent would need to be established for the CFTC to bring a successful claim for fraud-based manipulation liability under Rule 180.1.

Additionally, it may be possible to attach price manipulation liability under CFTC Rule 180.2 to the conduct of a block builder who becomes a dominant player in the block-building market due to their access to POF. MEV extraction based on public transactions, including sandwiching, generally stimulates competition among searchers.²⁶⁷ Yet, the same MEV extraction practices targeting POF transactions can generate anti-competitive effects. This is because a block-builder who receives POF is at a competitive advantage relative to other block-builders, as they have exclusive access to a source of order flow. As such, they may be able to build blocks from which they can extract more value than their counterparts, value which they can invest in better block-building infrastructure and/or obtaining more POF.²⁶⁸ This "vicious cycle" of builder centralization may ensue until a block-builder captures a majority, or even a monopoly, of the block builder market. Commodities regulators have long looked to a trader's "acquisition of market dominance" as a hallmark of manipulative conduct.²⁶⁹ Should an informed block builder acquire a dominant position in the block building market, and should they exercise that power – for instance, by censoring transactions for a fee or engaging in multi-block MEV strategies etc. (premised on the control of transaction ordering within multiple blocks) – it is possible that they will be held to have intentionally caused the creation of a price which does not reflect legitimate forces of supply and demand.²⁷⁰ Admittedly, a claim for traditional price manipulation might be

connection with the purchase or sale of a commodity, reliance, economic loss, and causation. *United States CFTC v. Kraft Foods Grp., Inc.*, 153 F. Supp. 3d 996, 1012 (N.D. Ill. 2015), quoting *Dura Pharms., Inc. v. Broudo*, 544 U.S. 336, 341 (2005).

²⁶⁶ *Ploss v. Kraft Foods Grp., Inc.*, 197 F. Supp. 3d 1037, 1058 (N.D. Ill. 2016) ("The court agrees that manipulation based on explicit misrepresentations sound in fraud").

²⁶⁷ Daian, *supra* note 9 at 5 ("Because each pure profit opportunity carries some computable profit p and is broadcast globally, a competitive game naturally ensues among arbitrage bots to be the first to execute an atomic transaction that exploits the opportunity").

²⁶⁸ See Quintus, *Order flow, auctions and centralisation I: a warning*, <https://collective.flashbots.net/t/order-flow-auctions-and-centralisation-i-a-warning/258>.

²⁶⁹ *In re Cox*, ¶ 23,786 at 12-13, 060 ("the acquisition of market dominance is the hallmark of a long manipulative squeeze"); *Resch-Cassin & Co.*, 362 F. Supp. at 977 ("dominion and control of the market for the security" are factors establishing causation of an artificial price).

²⁷⁰ The exercise of market dominance in a commodities market is often seen as a paradigmatic form of price manipulation. See, e.g., Pirrong, *supra* note 88 at 947 ("The most important form of manipulation consists of the exercise of market power in a commodity market").

difficult to make out given its higher requirement of intent to cause an artificial price. But Rule 180.1's lower standard of recklessness toward the creation of prices not reflecting only the forces of supply and demand, as involved in 180.1(a)(3) manipulative acts, may offer a more achievable route to imposing liability for exploiting a position of market dominance obtained through access to POF in the manner just described. While price manipulation liability is more plausible in this context relative to the context of sandwiching public information, it is still relatively unlikely given the prosecutorial burdens involved in establishing price manipulation.

2. Non-Explicit Private Order Flow and Payment For Order Flow

Recall from our discussion in the previous section that an Ethereum user, submitting transactions otherwise than to a privacy RPC, may *think* that their pending transaction is public while, in reality, it is not meaningfully so. In general, there are two ways in which this could happen. First, the default RPC used by the wallet software could treat such transactions as private, not re-broadcasting them in the Ethereum peer-to-peer network, instead forwarding them, *e.g.*, only to selected, cooperating block-builders. Second, the default RPC, or even the wallet software provider herself, could delay forwarding transactions long enough to have a sufficient advantage in extracting MEV from those transactions.

In traditional finance, payment for order flow (PFOF) refers to an arrangement in which an “internalizer” (*e.g.*, Citadel) pays a broker (*e.g.*, Robinhood) in exchange for the broker routing her retail clients' orders to the internalizer, who then executes trades against those orders.²⁷¹ In an analogous fashion, service providers like wallet software providers and RPC operators can, in a sense, sell the order flow of their customers to MEV extractors, acting as internalizers.²⁷² A wallet software provider could do this by setting an internalizer-operated RPC as the default option, which could – but in practice may be unlikely to be – changed by users. But this could also be done by not giving users the choice as to which RPC the wallet software will use. Finally, a wallet software provider could delay sending transactions to a public RPC, while sending the information about new transactions to paying internalizers first, thus guaranteeing them an advantage in extracting MEV. A popular RPC operator may be able to use similar methods (exclusive transaction forwarding, temporal priority in forwarding).

Both in the standard case of non-explicit POF, and in its special case – PFOF arrangements, user transactions constitute, at least temporarily, *non-*

²⁷¹ FOX, GLOSTEN, AND RAUTERBERG, *supra* note 21 at 289 n.34.

²⁷² See, *e.g.*, Quintus, *Order flow, auctions and centralisation I: a warning*, <https://collective.flashbots.net/order-flow-auctions-and-centralisation-i-a-warning/258>; 0xC8e7, *MEV Markets Part 3: Payment for Order Flow*, 0XSHITTRADER.ETH BLOG (Aug. 2022), https://mirror.xyz/0xshittrader.eth/f2VSuoZ91vAbCv82MtWM-Gosyf_DeUXfPIDx3EYV3RM.

public information which is only available to selected operators.²⁷³ The key difference between explicit and non-explicit POF is that in the latter case, the users are not informed about the practice.

It is arguable that an ordinary user is likely to assume - if not informed otherwise - that, when they submit transactions otherwise than to a privacy RPC, those transactions are routed publicly and that no one has privileged access to those transactions.²⁷⁴ Where any of the situations described earlier in this subsection arise, it may be that the wallet provider's customers are *misled* in a legally relevant way.

The CFTC's Rule 180.1(a)(2) renders it unlawful for a market participant to "omit to state a material fact necessary in order to make the statements made not untrue or misleading."²⁷⁵ The SEC's Rule 10b-5(b) contains a nearly identical prohibition.²⁷⁶ As recklessness is the requisite scienter for both Rule 180.1 and Rule 10b-5, an accused need not have intended or desired to artificially affect prices.²⁷⁷ The CFTC and SEC's prohibitions against fraud-by-omission suggest a route to liability for RPC operators and wallet software providers who privatize their user's transactions in order to extract MEV themselves or gain PFOF without disclosing such a practice to their users. In particular, if Ethereum users are entitled to believe that their transactions submitted with wallet software will not be treated as private order flow - at least on our definition - then it could be argued that a wallet software provider who treats transactions as private order flow must disclose this to users for users not to be misled.

Pursuant to this theory, the wallet provider or RPC operator could be *recklessly* engaging in a deceptive omission potentially warranting liability under Rule 180.1(a)(2) and 10b-5(b). Their actions could be deemed *reckless* even where their primary motive was simply to profit from PFOF.

One may respond to this by challenging the assumption that Ethereum users do, in fact, assume that software providers or RPC operators route their transactions in a public way. More research needs to be done regarding the frequency of routing practices used by wallet providers and other trusted DeFi intermediaries, and user perceptions of such routing patterns, in order to unpack the strength of this assumption. With this said, it is illustrative that the SEC requires securities brokers in traditional finance to publicly disclose their customer order routing practices, including those involving PFOF

²⁷³ See *supra* our proposed definition of *public* in Section II.D.

²⁷⁴ See De Filippi, Mannan, and Reijers, *supra* note 253 at 10 & n.7 (stating that "a participant in a blockchain-based system may expect that a miner will always act in accordance with the consensus algorithm of that system but empirical research has shown that [validators] can deviate from the standard protocol...").

²⁷⁵ 17 CFR § 180.1(a)(2) (2012).

²⁷⁶ 17 CFR § 240.10b-5(b) (1951).

²⁷⁷ In the Matter of JPMorgan Chase Bank, 2013 WL 6057042, at *11 ("even if a trader were motivated by a desire to obtain compensation rather than by a desire to affect a market price, if the trader recklessly effected the manipulative trades, he will be held liable").

arrangements.²⁷⁸ While not directly applicable in this DeFi context, this rule plausibly indicates a policy judgment that some fiduciary or other trust-based obligation exists requiring actors with privileged access to transaction information to act honestly and transparently with respect to the actual originators of that transaction information. It would not be unreasonable to assume a similar policy judgment might be implemented for DeFi as CFTC and SEC begin to flex their regulatory muscles in the crypto space more fully in the near term.

C. Other Ways to Extract MEV: Oracle Manipulation

There are many sources of, and many ways to extract, MEV. Sandwiching, discussed in the previous subsections, receives the most attention from external observers. However, though highly profitable and with a significant effect on the market, sandwiching is not even considered to be the most valuable kind of MEV.²⁷⁹ Strategies like liquidations and arbitrage, especially between centralized crypto exchanges and decentralized, on-chain exchanges (“CEX/DEX”), may be both more profitable and more likely to stay as a permanent feature of crypto markets, even if sandwiching is alleviated by technical developments.²⁸⁰

Legally speaking, strategies like arbitrage and liquidations are likely to be of less interest as a source of liability at least where they involve merely taking advantage of “natural market events.”²⁸¹ Matters are different if these strategies involve independent wrongdoing, of course (such as fraudulent statements), or perhaps in other narrow circumstances.²⁸² Because we focus here on the strongest going theories of direct liability for MEV, however, we do not discuss MEV arbitrage or liquidations further, instead exploring these issues in other work.²⁸³

Instead, we end by discussing one final important way MEV extraction may be facilitated, which in our view carries especially high legal risk: so-called “oracle manipulation.”

²⁷⁸ 17 CFR § 242.606 (2018).

²⁷⁹ Amber Group, *supra* note 35.

²⁸⁰ *Id.*

²⁸¹ *United States v. Coscia*, 866 F.3d 782, 786 (7th Cir. 2017); *see also* Green, *supra* note 217 (discussing the normative importance of taking advantage of an event or disturbance caused naturally by factors outside one’s control rather than causing it oneself).

²⁸² *See, e.g.*, Qin, Zhou, and Gervais, *supra* note 49 at 6; Barczentewicz, *supra* note 18 at 11–12.

²⁸³ In our related work on arbitrages and liquidations we consider issues like possible adverse consequences for trades that create an arbitrage opportunity, as well as whether the competition for exploiting arbitrage and liquidation opportunities can be said to be fair (non-manipulative) when it entails leveraging the privileged position of a block producer.

I. Oracle manipulation to create loan liquidation opportunities

Though this may change, currently the paradigmatic case of the use of oracle manipulation is to attack on-chain lending systems; notably, but not only, to create artificial *loan liquidation opportunities*.²⁸⁴ For on-chain liquidations to work, lending systems require external information about prices of the assets involved. Technically, the smart contracts that are the lending systems rely on other “oracle” smart contracts. The oracle smart contracts are meant to faithfully report prices (or other information), *e.g.*, based on what happens on some other on-chain (DEX) or off-chain (CEX) markets.

Hence, a liquidation opportunity can be created *artificially* in two scenarios: i) if an oracle can be made to report an incorrect (low) price of the asset used as collateral or ii) if the benchmark markets from which an oracle collects price information can be manipulated. Here, we only focus on the second strategy, as it is a more central case of market manipulation, without the complicating factor of hacking that would likely be needed for the first strategy. Strictly speaking, the second strategy does not manipulate the oracle itself, because the oracle functions as intended: it is just that the prices that it reports may result from manipulation. It may thus be more precise to refer, *e.g.*, to “loan liquidation price benchmark manipulation,” but the label of “oracle manipulation” is already established.²⁸⁵

Not all oracle manipulations involve MEV extraction. Yet, as Mackinga et al. show, the profitability of a self-created liquidation opportunity is often contingent on control over transaction ordering.²⁸⁶ That is, where a liquidation opportunity is triggered by an instance of oracle manipulation, it is publicly visible and able to be captured *not only* by the oracle manipulator but *also* by any other strategic actors paying attention. Because oracle manipulation generally requires a significant initial investment to create a sufficiently large change in the benchmark price, a rational manipulator will only expend that capital if they harbor a degree of *certainty* that i) they will be the first to execute the profit opportunity created by their oracle manipulation, *and* ii) that they will be able to reverse (*de-manipulate*) their oracle manipulation transaction in order to redeem the upfront capital expended.²⁸⁷

²⁸⁴ For a general description of loan liquidations, *see supra* Section II.C. For in-depth discussions regarding the mechanics of how price oracles can be manipulated in decentralized finance, *see* Austin Adams, Xin Wan, and Noah Zinsmeister, *Uniswap v3 Price Oracles in Proof of Stake*, UNISWAP BLOG (Oct. 27, 2022), <https://uniswap.org/blog/uniswap-v3-oracles>; Torgin Mackinga, Tejaswi Nadahalli & Roger Wattenhofer, *TWAP Oracle Attacks: Easier Done than Said?*, in 2022 IEEE INTERNATIONAL CONFERENCE ON BLOCKCHAIN AND CRYPTOCURRENCY (ICBC) 1 (2022).

²⁸⁵ *See also* Barzentewicz, *supra* note 18 at 12–14.

²⁸⁶ *See generally* Mackinga, Nadahalli, and Wattenhofer, *supra* note 284.

²⁸⁷ *Id.* at 2. (“the attack’s profitability ... rests on whether the [manipulator] can *de-manipulate* the price [of the collateralized crypto asset] back to market price without other users front-running the [manipulator]”).

To acquire that *certainty* of first execution and de-manipulation, a manipulator requires control over transaction ordering, i.e., engaging in MEV extraction and, specifically, *multi-block* MEV extraction.²⁸⁸ Where an oracle manipulator controls the ordering of not just one, but two consecutive blocks, or where two different agents who jointly control consecutive blocks collude, the manipulator(s) guarantee to themselves the profit from the liquidation opportunity they create through their oracle manipulation.²⁸⁹ After depressing a benchmark price (manipulating an oracle) in one block, the manipulator(s) can then control the transaction ordering of the next block so as to place their own de-manipulation and liquidation transactions *first* regardless of whether any other actors paid a higher bribe for their own version of those transactions.

2. Fraud-based manipulation liability

While “standard” instances of liquidations which merely take advantage of “natural market events” are unlikely to constitute impermissible market manipulation, those cases need to be distinguished from intentional creation of a liquidation opportunity. That is, from situations where a liquidation does not arise from a “natural market event.” When a MEV extractor engages in independently uneconomic activity with the purpose of triggering a liquidation opportunity, they likely cross the fine line from legitimate trading to illegal manipulation. Specifically, a MEV extractor who engages in oracle manipulation to trigger a liquidation/arbitrage opportunity may be liable for covered open-market manipulation²⁹⁰ in violation of the SEC and CFTC anti-fraud rules.

Covered open-market manipulation involves a trader “[trading] to trigger payments or rights in a separate contract or financial instrument, the pricing of which is affected by the trades”.²⁹¹ Thus, when the trader *intentionally* depresses the DEX price in order to trigger a liquidation (or other profitable opportunity)

²⁸⁸ On multi-block MEV, *see supra* Section II.B.

²⁸⁹ Mackinga, Nadahalli, and Wattenhofer, *supra* note 284 at 6.

²⁹⁰ *See* discussion of covered open-market manipulation in Section III.B. While many covered open-market manipulation schemes involve contractual arrangements (i.e. financial derivatives) between two or more parties, the existence of a contract between two parties whose pay-outs are determined by a common benchmark is not a necessary component of a covered open-market manipulation scheme. Wherever a manipulator “tilts what ought to be a neutral contract or financial instrument into an arrangement that benefits her by interfering with the objective valuation methods on which the parties agreed,” they act in contravention of the reasonable expectations of the others who rely on the objectiveness of that valuation method. Accordingly, covered open-market manipulation schemes can occur in the absence of explicit contractual arrangements – for instance, in the context of DeFi markets where parties transact anonymously but still harbor reasonable expectations regarding the integrity of benchmark-based valuation methods like oracles. *See* Fletcher, *supra* note 21 at 533.

²⁹¹ *Id.* at 503.

reliant on a price oracle affected by the DEX price, that trader has engaged in a form of covered open-market manipulation.

Notably, oracle manipulation is one of few DeFi market practices which has been directly challenged by the CFTC and the SEC.²⁹² While Avi Eisenberg's manipulation of Mango Markets was not a direct result of MEV extraction, the instance of multi-block MEV described above may produce analogous results. As such, there is a high likelihood that oracle manipulation strategies triggering liquidations and other profitable, publicly viewable opportunities -- thus implicating MEV extraction -- would be considered impermissible manipulative trading practices.

V. A NOTE OF CAUTION ON THE POLICY QUESTION

Should regulators and lawmakers find some of the theories of liability we explored in Section IV compelling, they may be inclined to pursue a blanket ban on certain disfavored MEV extraction practices, like sandwich trades. Likewise, it's conceivable that courts might converge on an interpretation of "manipulative device" that encompasses all sandwich trades -- not only POF sandwiching or schemes like oracle manipulation. In this section, we want to sound a note of caution about the extent to which this would be *good policy*.

While purely legal considerations in favor of or against a liability-based approach to the regulation of MEV extraction must have weight, they should not be viewed in a vacuum as this is in essence a technical, economic, and social phenomenon. The question of whether a strict prohibition against at least some kinds of MEV extraction would be desirable policy is distinct from that of how existing law would most likely treat MEV extraction. It is an important question nonetheless. We conclude by advising caution on this policy question. It is important for courts and regulators to bear in mind that *even if* sandwiching (or other forms of MEV extraction) turns out to be manipulative on the best legal interpretation, it's not obvious that a blanket ban on the practice would be good policy.

We begin with the unknowns. There are gaping holes in the existing state of knowledge regarding the economics of MEV extraction practices like sandwich trades which render it impossible to fully understand the net effect of sandwiching -- on market efficiency, and on social welfare more broadly. By corollary, we are not in a position at present to know what effects a domestic ban on sandwich trades would have on these criteria either. The implications of sandwich trades (indeed, all forms of MEV extraction) on market efficiency are shrouded in uncertainty and remain contested.²⁹³ The only research which has

²⁹² *Supra* note 26.

²⁹³ See Barczentewicz, *supra* note 18 at 16 (discussing the uncertainty regarding the implications of MEV extraction on market efficiency and social welfare).

substantively inquired into the efficiency effects of sandwich trades has done so through the lens of algorithmic game theory, rather than empirical analysis.²⁹⁴ Notably, this research found that sandwich trades, under some circumstances, can actually *increase* market efficiency and social welfare at the *network level* by causing more effective transaction routing patterns²⁹⁵ and stronger incentives for validators to stake (i.e. participate in block construction).²⁹⁶ This research indicates that limiting one's analysis of the market efficiency implications of sandwich trades and other MEV extraction practices to their purely local implications on individual trades is insufficient, as the individual harm to a sandwiched user may be outweighed by the market-wide efficiency gains produced by sandwich trades considered in the aggregate. Yet, because this research is theoretical in nature, we cannot currently predict the extent to which the social welfare and market efficiency gains it proposes does in fact affect the market. Further research on this point is crucial for the instant policy question.

Complicating the efficiency calculus further are the differences in underlying settlement technologies and market structures employed by DeFi and traditional financial systems. For instance, the security and strength of a blockchain's distributed consensus mechanism – i.e. for Ethereum, the network of independent and honest validators – can have significant implications for the efficiency of a DEX which is built on top of that blockchain. Meanwhile, there is no direct analogue for such a consideration in traditional markets.²⁹⁷ Additionally, the scope of a “market” for the purposes of a market efficiency analysis is broader in the context of MEV extraction than an examination of this concept in traditional finance may suggest.²⁹⁸ In traditional finance, one thinks of a “market” where manipulation can occur as any locus of the buying, selling, and lending of a financial instrument. Yet, MEV can be extracted in blockchain-based markets *beyond* the realm of DeFi – MEV extraction can arise in the context of non-fungible token (NFT) sales,²⁹⁹ and other decentralized application functionalities. As such, it may prove advisable to broaden the scope of a market efficiency analysis for MEV extraction beyond what would have been standard in traditional finance.

²⁹⁴ See generally Kulkarni, Diamandis, and Chitra, *supra* note 12 at 22–24.

²⁹⁵ *Id.*

²⁹⁶ See generally Tarun Chitra & Kshitij Kulkarni, *Improving Proof of Stake Economic Security via MEV Redistribution*, in PROCEEDINGS OF THE 2022 ACM CCS WORKSHOP ON DECENTRALIZED FINANCE AND SECURITY 1 (2022).

²⁹⁷ In traditional finance, the connection between the backbone infrastructure of a market and that market's efficiency still exists, but is more indirect and fragmented than this connection is in decentralized crypto asset markets. In traditional finance, market structure factors like supply chain, clearing/settlement processes, and trading rules implicate market efficiency considerations like a market's competition, liquidity, transparency, and price formation. Whereas, in the context of decentralized crypto asset markets, there is a more direct and coherent link between network/consensus security and market efficiency.

²⁹⁸ Barzentewicz, *supra* note 18 at 17.

²⁹⁹ See *supra* note 75.

Knowing so little about local and broader market effects of sandwiching and other forms of MEV extraction, the possibility cannot be ruled out that the costs associated with regulatory measures which implicate MEV could be as severe as “giving up on the benefits of decentralized and permissionless public blockchains.”³⁰⁰ For instance, as alluded to by Chitra and Kulkarni, validators in a proof-of-stake system like Ethereum will only rationally lock in the capital required to be a validator, if this use of capital is approximately as profitable than alternatives. Should validators’ profits from MEV extraction significantly decrease due to a legal prohibition, there is a risk that they would stop validating altogether, opting to put their assets to more profitable uses.³⁰¹ The consequence of this asset migration taking place on a large scale should not be underestimated. Because the security of a blockchain like Ethereum is contingent on the volume of assets locked within the protocol itself by validators, the security of the blockchain record could be significantly undermined. This could, for instance, increase the ease with which a malicious validator could execute a 51% attack³⁰² or increase the likelihood of double-spending³⁰³ – risks which are reduced by the existence of a larger, more diverse group of validators engaged in building blocks. While the purpose of this paper is not to outline the virtues of decentralized systems built on public blockchains, the current market capitalization of Ethereum at nearly \$200 billion and that of the entire crypto asset market at \$1.08 trillion should speak for itself with respect to what is here at stake.³⁰⁴ Risks created by regulatory intervention to the basic infrastructure of such a substantial market should not be taken lightly.

Of course, it’s possible that a court or regulator with an eye toward consumer protection may find the potential costs outlined above, even at their most severe, to be small compared to the benefit of meaningfully protecting consumers from being *attacked* by purportedly malicious sandwichers. Nonetheless, there is a significant risk that a policy banning sandwich trades in the U.S. would not have as great an effect on the protection of users as might be hoped. For one thing, the Ethereum network, and markets built on it, are

³⁰⁰ Barzentewicz, *supra* note 18 at 27.

³⁰¹ See generally Chitra and Kulkarni, *supra* note 296.

³⁰² A 51% attack involves a validator (or group of colluding validator) with control over more than 50% of the nodes in a blockchain network altering the blockchain record. While PoS blockchains like Ethereum are often considered resistant to 51% attacks, it is still possible for a malicious validator who acquires a large proportion of Ethereum’s total stake to engage in a profitable 51% attack. For instance, this can be done through short-selling. See generally Suhyeon Lee and Seungjoo Kim, Short Selling Attack: A Self-Destructive But Profitable 51% Attack On PoS Blockchains, CIST (2020), <https://eprint.iacr.org/2020/019.pdf>.

³⁰³ Double-spending occurs on blockchain networks where the same crypto asset is spent more than once; see Nakamoto, *supra* note 22.

³⁰⁴ *Ethereum Market Cap*, YCHARTS, [https://ycharts.com/indicators/ethereum_market_cap#:~:text=Ethereum%20Market%20Cap%20is%20at%2036.70%25%20from%20onc%20year%20ago%20ago;https://coinmarketcap.com/](https://ycharts.com/indicators/ethereum_market_cap#:~:text=Ethereum%20Market%20Cap%20is%20at%2036.70%25%20from%20onc%20year%20ago%20ago%20ago;https://coinmarketcap.com/) (accessed January 29, 2023).

borderless in nature, a U.S. ban on sandwich trades would still leave U.S. users vulnerable to the activity of sandwichers from other jurisdictions – particularly where the enforcement of U.S. laws are difficult (either due to restrictions on the extraterritorial application of securities laws or the difficulty of enforcing a judgment from U.S. courts in certain foreign jurisdictions).³⁰⁵ Moreover, there are well-known difficulties with enforcing securities laws within crypto markets in particular, given the heightened levels of anonymity these markets currently involve. Together these enforcement difficulties likely limit the benefit to consumer protection that a broad ban on certain forms of MEV extraction would have in practice.

Accordingly, rather than jumping the regulatory gun with a sweeping ban, it is crucial to explore whether consumer protection concerns surrounding sandwich attacks might not be better assuaged through technical solutions tailored to global blockchain networks, as opposed to regulatory measures bound by jurisdictional limits.³⁰⁶

VI. PROPOSALS AND CONCLUSIONS

This Article has examined how key differences in the operation of traditional finance as opposed to crypto markets can make a normative and, therefore, legally significant difference. We saw how basic notions of fair versus unfair conduct play out differently in a world of discretionary transaction ordering compared to the more familiar world of first-come first-serve execution of transactions. Because Ethereum is, among other things, a financial system where discretionary transaction ordering can prevent the transactions submitted first from being executed first, we saw that users like our sandwiched trader, 0x61, from the introduction cannot claim unfairness merely on the basis of queue-jumping. As we observed, there is no such natural temporally ordered queue in networks like Ethereum.³⁰⁷

Nonetheless, by itself, this does not settle the question of whether sandwiching and other forms of MEV extraction really are unfair – and more importantly, whether they are ever legally out of bounds. It is the latter legality question that this Article sought to illuminate through the first in-depth Article-length treatment of MEV under U.S. securities and commodities law. We argued that some forms of MEV extraction including certain common forms of

³⁰⁵ See, e.g., Rebecca Cloeter, *The Extraterritorial Application of the Commodity Exchange Act*, 41 ENERGY L. J. 387 (2020).

³⁰⁶ For an in-depth overview of current private sector approaches to mitigating the negative externalities of MEV extraction, see Sen Yang, Fan Zhang, Ken Huang, Xi Chen, Youwei Yang, and Feng Zhu, *SoK: MEV Countermeasures: Theory and Practice* (Dec. 2022), <https://arxiv.org/pdf/2212.05111.pdf>.

³⁰⁷ See *supra* Section I, Section IV.A.

sandwiching entail a significant risk of amounting to a manipulative practice in contravention of CFTC Rule 180.1 or SEC Rule 10b-5 (depending on whether the crypto assets at issue end up being classified as commodities or securities). We found that the key question on which the issue of manipulation liability depends, in many ways, is how much various MEV extractors, involved in different types of trading strategies and arrangements with other traders, can be said to occupy positions of *trust* that carry special responsibilities to avoid interfering with the reasonable expectations of other market participants.

In particular, Section IV developed novel arguments showing that even garden-variety MEV sandwiching of public transactions might amount to manipulation. We saw that especially courts drawing on moralized conceptions of market fairness – which would eschew the exploitation of privileged access to core financial infrastructure that other market participants lack (namely, the ability to order transaction while building blocks) – have a route to concluding that sandwiching of public transactions constitutes manipulation, in violation of CFTC Rule 180.1 or SEC Rule 10b-5, because such activity would typically at least recklessly create an artificial price effect. In the end, this turned on whether the requisite trust relation is found to run from MEV extractors like validators to other market participants. That said, we also stressed the significant practical hurdles for successfully bringing a manipulation claim against sandwiching public transactions, which we suspect make it unlikely to be pursued as a regulatory priority in the near term.

We then argued that the legal hazards are substantially greater when it comes to sandwiching of *private* transactions. When the crypto version of *private order flow* is involved, we saw there was a particularly strong case for thinking that validators, and others who may be involved in including transactions on the blockchain, have been trusted to act in confidence and thus are more likely to end up behaving in misleading or manipulative ways when engaging in sandwich attacks or otherwise handling private transaction information. Insider trading liability was a particular concern here in addition to the bite of anti-manipulation rules more generally. Finally, we observed that the case for liability is particularly strong when it comes to large disruptive schemes, such as oracle manipulation, involving the interference with financial benchmarks to which the prices of other crypto assets are pegged.

While there thus is a serious case for viewing some forms of MEV extraction as manipulative or otherwise in contravention of the relevant securities or commodities laws (as the case may be), we closed by arguing that this should not be taken to mean a sweeping ban on these forms of MEV should automatically be pursued. Section V moved to discussing matters of policy, aimed at regulators and other policymakers, and we argued that it remains far from clear that a strict ban on the offending forms specifically of MEV *sandwiching* would be good policy. There are at present too many unknowns about the net impact on market efficiency and social welfare, whether negative or perhaps positive, of MEV sandwiching, particularly when considered in the aggregate. Likewise, due to enforcement difficulties within crypto markets, we

saw questions remain about the benefits to consumer protection that such prohibitions can produce. More empirical research on both questions is imperative.

Where does this leave the debates both about permissibility under existing law of MEV extraction and the proper policy response thereto? To guide future conversations, we close with four general recommendations:

1. Focusing regulatory attention on MEV extraction practices that cause harm: The phenomenon of MEV extraction presents far more nuance than initially meets the eye. As discussed in Section IV, the publicness of transaction information, the atomicity of a MEV extraction opportunity, and the trust relationship between a user and MEV extractor are all crucial factors for determining whether a particular instance of MEV extraction is manipulative. Moreover, as we saw, there are myriad varieties of MEV extraction.

Accordingly, given all the technical and legal nuance that this presents, we warn against viewing “MEV extraction” as a singular phenomenon, and recommend an approach that recognizes that there may be as many different varieties of MEV extraction as there are opportunistic trading practices in traditional finance. Thus, it is not really “MEV extraction” that should be the subject of regulatory attention, but rather specific MEV practices which harm ordinary traders or the market at large. For instance, while DEX arbitrage – akin to cross-exchange arbitrage in traditional markets – usually supports price discovery without harming consumers, intentional self-created liquidations like those involving oracle manipulation strike a close resemblance to covered open-market manipulation schemes like “banging the close.”³⁰⁸ Likewise, the presence of express fraud (*i.e.*, a node operator, wallet operator, or block-builder promising not to front-run or sandwich a user, and subsequently proceeding to do so), or the existence of a relationship of trust that gives rise to legitimate expectations that then are contravened, are also indicators of manipulative conduct worthy of legal action. Accordingly, a regulator would understandably opt to expend limited resources pursuing the more obviously harmful MEV practices than to launch a broadside against MEV extraction in general, given its multiplicity and pervasiveness.

2. Cross-Disciplinary Research: Knowing which MEV practices rise to the level of harm that might make them a regulatory priority, however, requires more empirical research, as seen in Section V. Thus, we recommend that economists, technical researchers, and legal scholars engage in cooperative research to better understand the market efficiency and social welfare effects – on an individual and system-wide scale – of the many different strategies of MEV extraction. Such research, particularly when focused on individually harmful MEV extraction practices like sandwich trades, is the only way to shed light on the metaphorical dark forest of MEV.

³⁰⁸ See *supra* notes 138-140.

3. *Clarity within the law of market manipulation:* To enhance the clarity and predictability of the law, we further recommend a beneficial step that regulators and courts could take in this arena is to inject more certainty into the capacious anti-fraud standards within CTFC Rule 180.1 and SEC 10b-5 – which make use of moralized concepts like “deceit” and “manipulative device” – and to clarify the place of moral reasoning within the interpretation of these standards. Such calls for clarity have been subject of entire scholarly contributions,³⁰⁹ but we raise it here specifically with respect to the place of moralized criticisms in the applicable anti-manipulation standards. We saw in Section IV how the adoption of a moralized form of reasoning regarding how to protect market integrity from the exploitation of block builders’ privileged position of control led to an increased likelihood of finding liability for sandwiching. Thus, a crucial step to increasing the clarity and predictability of the law in this area is to further clarify which conceptions about the morally unfair exploitation of positions of control (or even domination) will take open market transactions out of the realm of fair play and place them under a cloud of potential liability.

4. *Terminology.* Our final recommendation is primarily addressed to the Ethereum community, though it also involves a note of caution for courts and regulators. In particular, it is important for Ethereum community members to choose their words carefully, as implicit associations – once formed – can become indelible.

The language used to describe many practices and concepts of the MEV ecosystem (and the crypto-economy more generally) is often derived from traditional finance. For instance, we use terms like “bribe” and “front-running” to describe concepts native to MEV extraction on public blockchains. Within ordinary language, such terms naturally connote crime and illegitimacy. But this is often misleading when we depart from context and expectations of traditional finance and move to the distinct architecture of crypto markets. We saw earlier why “front-running” used to describe the MEV extraction practice of seeking to have one’s order executed ahead of another’s is distinct from the legal notion of front-running as an illegitimate market practice. With respect to “bribes,” the term as used in the MEV context refers to the transaction fee a searcher pays to a block-builder or validator. Where such terms are used, it becomes easier for commentators and regulators to critique these practices as illegal *front-running* or immoral *bribing* without undertaking sufficient legal or technical investigation to justify these normative conclusions. Similarly, MEV extraction is often defined as involving the “reordering” of transactions,³¹⁰ which implies that a *different* ordering of transactions once existed and was altered by the

³⁰⁹ See, e.g., Pirrong, *supra* note 88; Janet Austen, *What Exactly is Market Integrity? An Analysis of One of the Core Objectives of Securities Regulation*, 8 Wm. & Mary Bus. L. Rev. 215 (2017).

³¹⁰ See, e.g., Piet, *supra* note 12 at 5; Kulkarni, *supra* note 12 at 4; *What is Maximal Extractable Value (MEV)*, BINANCE ACADEMY (Jan. 2023), <https://academy.binance.com/en/articles/what-is-maximal-extractable-value-mev>.

conduct of MEV extractors. But as we have stressed repeatedly in this Article, in a world of discretionary transaction ordering like Ethereum there is no obvious or natural ordering to serve as the default. Therefore, a block which includes MEV extraction opportunities has not necessarily been *reordered* by a validator but was simply *ordered*. Given that moralized conceptions of market fairness can play a significant role in legal determinations of trading practices as manipulative,³¹¹ a conceptualization of MEV extraction as “reordering” transactions (as opposed to just an outcome of ordering) may have adverse legal consequences.

We therefore urge members of the Ethereum community to be careful about the terminology chosen for on-chain concepts given their off-chain connotations. Likewise, we would caution courts and regulators wading into these matters afresh to be mindful that the concepts informally adopted for describing the workings of crypto-finance may not always mean what they naturally seem to when used in the rather different world of traditional finance.

³¹¹ See *supra* Section IV.A.

Hi (b)(6) just confirming that you were comfortable with all of the areas I indicated I would plan to direct questions to you? Thanks, and talk to you soon.

From: Buchholz, Steven
Sent: Monday, March 14, 2022 12:00 PM
To: Walker, Robert (Scott); (b)(6) @ic.fbi.gov; (b)(6) @usdoj.gov; (b)(6) @dfpi.ca.gov; (b)(6) @dfpi.ca.gov
Subject: Re: Planning call for BaySEC Cyber and FinTech Update panel

I've added the questions and panelists to whom I plan to direct them in this version. Please review and let me know if (b)(5) Thanks
(b)(5)

all! And please ask each other questions on the panel, too, as ideas come up.

From: Buchholz, Steven
Sent: Friday, March 11, 2022 7:25:38 PM
To: Walker, Robert (Scott); (b)(6) @ic.fbi.gov; (b)(6) @usdoj.gov; (b)(6) @dfpi.ca.gov; (b)(6) @dfpi.ca.gov
Subject: Re: Planning call for BaySEC Cyber and FinTech Update panel

Sorry this week got away from me; I'm still working on more detailed questions for the panel, but I thought I would send the current topic list anyway and who I'm planning to go to for each general area. Thanks to those of you who have sent me ideas, and definitely keep them coming. Look forward to speaking next week, and if anyone wants to talk again Monday afternoon, I'm keeping some time open on my calendar.

Steve

From: Buchholz, Steven
Sent: Thursday, March 3, 2022 6:42:45 PM
To: Walker, Robert (Scott); (b)(6) @ic.fbi.gov; (b)(6) @usdoj.gov; (b)(6) @dfpi.ca.gov; (b)(6) @dfpi.ca.gov
Cc: Vasquez, Carlos
Subject: RE: Planning call for BaySEC Cyber and FinTech Update panel

To follow up on the planning call today, here is the rough list of topics I came up with. If folks could send me thoughts on particular topics/questions/discussion points by Tuesday 3/8, I will incorporate them into the outline with proposed primary speakers in each area (but we'll try to make it as much of a dialogue as possible, so please chime in with thoughts and questions to other panelists as they come up).

The panel is Tuesday, March 15, from 11:20-12:20. I believe we will get more detailed logistical instructions and the WebEx link for the session closer to the date, but please let Carlos and me know if anyone would like to do a dry run via WebEx. Thanks to all of you for taking the time—I'm looking forward to the discussion.

Steve

Topics:
(b)(5)

To: (b)(6) [redacted] @usdoj.gov
From: Buchholz, Steven
Sent: 2022-03-15T18:04:58Z
Subject: Re: Planning call for BaySEC Cyber and FinTech Update panel
Received: 2022-03-15T18:04:58Z

Sure thing, I can just address that generally and will skip the question.

From: (b)(6) [redacted] @usdoj.gov
Sent: Tuesday, March 15, 2022 10:59:37 AM
To: Buchholz, Steven
Subject: RE: Planning call for BaySEC Cyber and FinTech Update panel

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Sorry Steve, one more thing. Could we maybe avoid this question?

(b)(5) [redacted]

(b)(5) [redacted] Is that okay with you?

From: Buchholz, Steven (b)(6) [redacted] @sec.gov
Sent: Tuesday, March 15, 2022 10:40 AM
To: (b)(6) [redacted] @usa.doj.gov
Subject: [EXTERNAL] Re: Planning call for BaySEC Cyber and FinTech Update panel

(b)(5) [redacted]

From: (b)(6) [redacted] @usdoj.gov
Sent: Tuesday, March 15, 2022 10:31:24 AM
To: Buchholz, Steven
Subject: RE: Planning call for BaySEC Cyber and FinTech Update panel

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hi Steve!
Yes, it looks great. (b)(5) [redacted]

(b)(5) [redacted] Thanks!

From: Buchholz, Steven (b)(6) [redacted] @sec.gov
Sent: Tuesday, March 15, 2022 10:28 AM
To: (b)(6) [redacted] @usa.doj.gov
Subject: [EXTERNAL] Fw: Planning call for BaySEC Cyber and FinTech Update panel

Hi (b)(6) [redacted] just confirming that you were comfortable with all of the areas I indicated I would plan to direct questions to you? Thanks, and talk to you soon.

From: Buchholz, Steven
Sent: Monday, March 14, 2022 12:00 PM
To: Walker, Robert (Scott); (b)(6) [redacted] @ic.fbi.gov; (b)(6) [redacted] @usdoj.gov; (b)(6) [redacted] @dfpi.ca.gov; (b)(6) [redacted] @dfpi.ca.gov

I've added the questions and panelists to whom I plan to direct them in this version. Please review and let me know if (b)(5)

(b)(5) Thanks

all! And please ask each other questions on the panel, too, as ideas come up.

From: Buchholz, Steven

Sent: Friday, March 11, 2022 7:25:38 PM

To: Walker, Robert (Scott); (b)(6)@ic.fbi.gov; (b)(6)@usdoj.gov; (b)(6)@dfpi.ca.gov; (b)(6)@dfpi.ca.gov

Subject: Re: Planning call for BaySEC Cyber and FinTech Update panel

Sorry this week got away from me; I'm still working on more detailed questions for the panel, but I thought I would send the current topic list anyway and who I'm planning to go to for each general area. Thanks to those of you who have sent me ideas, and definitely keep them coming. Look forward to speaking next week, and if anyone wants to talk again Monday afternoon, I'm keeping some time open on my calendar.

Steve

From: Buchholz, Steven

Sent: Thursday, March 3, 2022 6:42:45 PM

To: Walker, Robert (Scott); (b)(6)@ic.fbi.gov; (b)(6)@usdoj.gov; (b)(6)@dfpi.ca.gov; (b)(6)@dfpi.ca.gov

Cc: Vasquez, Carlos

Subject: RE: Planning call for BaySEC Cyber and FinTech Update panel

To follow up on the planning call today, here is the rough list of topics I came up with. If folks could send me thoughts on particular topics/questions/discussion points by Tuesday 3/8, I will incorporate them into the outline with proposed primary speakers in each area (but we'll try to make it as much of a dialogue as possible, so please chime in with thoughts and questions to other panelists as they come up).

The panel is Tuesday, March 15, from 11:20-12:20. I believe we will get more detailed logistical instructions and the WebEx link for the session closer to the date, but please let Carlos and me know if anyone would like to do a dry run via WebEx. Thanks to all of you for taking the time—I'm looking forward to the discussion.

Steve

Topics:

(b)(5)

From: Frayer, Corey
Sent: 2024-05-23T21:17:52Z
Subject: ETH ETP Order
Received: 2024-05-23T21:17:55Z
[lk87adfs99.pdf](#)

The attached order is public as of 5:12PM

Corey Frayer
Senior Advisor | Office of the Chair
U.S. Securities and Exchange Commission
100 F Street, N.E. | Washington, D.C. 20549
(b)(6) [SEC.gov](#)

SECURITIES AND EXCHANGE COMMISSION

(Release No. 34-100224; File Nos. SR-NYSEARCA-2023-70; SR-NYSEARCA-2024-31; SR-NASDAQ-2023-045; SR-CboeBZX-2023-069; SR-CboeBZX-2023-070; SR-CboeBZX-2023-087; SR-CboeBZX-2023-095; SR-CboeBZX-2024-018)

May 23, 2024

Self-Regulatory Organizations; NYSE Arca, Inc.; The Nasdaq Stock Market LLC; Cboe BZX Exchange, Inc.; Order Granting Accelerated Approval of Proposed Rule Changes, as Modified by Amendments Thereto, to List and Trade Shares of Ether-Based Exchange-Traded Products

I. INTRODUCTION

Pursuant to Section 19(b)(1) of the Securities Exchange Act of 1934 (“Exchange Act”)¹ and Rule 19b-4 thereunder (“Rule 19b-4”),² each of NYSE Arca, Inc. (“NYSE Arca”), The Nasdaq Stock Market LLC (“Nasdaq”), and Cboe BZX Exchange, Inc. (“BZX”, and together with NYSE Arca and Nasdaq, the “Exchanges”) filed with the Securities and Exchange Commission (“SEC” or “Commission”) proposed rule changes to list and trade shares of the following. NYSE Arca proposes to list and trade shares of (1) the Grayscale Ethereum Trust³ and (2) the Bitwise Ethereum ETF⁴ under NYSE Arca Rule 8.201-E (Commodity-Based Trust Shares); Nasdaq proposes to list and trade shares of (3) the iShares Ethereum Trust⁵ under Nasdaq Rule 5711(d) (Commodity-Based Trust Shares); and BZX proposes to list and trade

¹ 15 U.S.C. 78s(b)(1).

² 17 CFR 240.19b-4.

³ See Amendment No. 2 to Proposed Rule Change to List and Trade Shares of the Grayscale Ethereum Trust under NYSE Arca Rule 8.201-E (Commodity-Based Trust Shares) (SR-NYSEARCA-2023-70), filed May 21, 2024, available at <https://www.sec.gov/comments/sr-nysearca-2023-70/srnysearca202370-475871-1363474.pdf> (“Grayscale Amendment”).

⁴ See Amendment No. 1 to Proposed Rule Change to List and Trade Shares of the Bitwise Ethereum ETF under NYSE Arca Rule 8.201-E (Commodity-Based Trust Shares) (SR-NYSEARCA-2024-31), filed May 21, 2024, available at <https://www.sec.gov/comments/sr-nysearca-2024-31/srnysearca202431-475891-1363514.pdf> (“Bitwise Amendment”).

⁵ See Amendment No. 2 to Proposed Rule Change to List and Trade Shares of the iShares Ethereum Trust under Nasdaq Rule 5711(d) (Commodity-Based Trust Shares) (SR-NASDAQ-2023-045), filed May 22, 2024, available at <https://www.sec.gov/comments/sr-nasdaq-2023-045/srmasdaq2023045-475851-1363454.pdf> (“iShares Amendment”).

shares of (4) the VanEck Ethereum Trust,⁶ (5) the ARK 21Shares Ethereum ETF,⁷ (6) the Invesco Galaxy Ethereum ETF,⁸ (7) the Fidelity Ethereum Fund,⁹ and (8) the Franklin Ethereum ETF¹⁰ under BZX Rule 14.11(e)(4) (Commodity-Based Trust Shares). Each filing was subject to notice and comment.¹¹

Each of the foregoing proposed rule changes, as modified by their respective amendments, is referred to herein as a “Proposal” and collectively as the “Proposals.” Each trust (or series of a trust) described in a Proposal is referred to herein as a “Trust” and collectively as

⁶ See Amendment No. 2 to Proposed Rule Change to List and Trade Shares of the VanEck Ethereum Trust under BZX Rule 14.11(e)(4), Commodity-Based Trust Shares (SR-CboeBZX-2023-069), filed May 21, 2024, available at <https://www.sec.gov/comments/sr-cboebzx-2023-069/srcboebzx2023069-475811-1363394.pdf> (“VanEck Amendment”).

⁷ See Amendment No. 2 to Proposed Rule Change to List and Trade Shares of the ARK 21Shares Ethereum ETF under BZX Rule 14.11(e)(4), Commodity-Based Trust Shares (SR-CboeBZX-2023-070), filed May 21, 2024, available at <https://www.sec.gov/comments/sr-cboebzx-2023-070/srcboebzx2023070-475812-1363414.pdf> (“ARK Amendment”).

⁸ See Amendment No. 1 to Proposed Rule Change to List and Trade Shares of the Invesco Galaxy Ethereum ETF under BZX Rule 14.11(e)(4), Commodity-Based Trust Shares (SR-CboeBZX-2023-087), filed May 21, 2024, available at <https://www.sec.gov/comments/sr-cboebzx-2023-087/srcboebzx2023087-475831-1363395.pdf> (“Invesco Amendment”).

⁹ See Amendment No. 2 to Proposed Rule Change to List and Trade Shares of the Fidelity Ethereum Fund under BZX Rule 14.11(e)(4), Commodity-Based Trust Shares (SR-CboeBZX-2023-095), filed May 21, 2024, available at <https://www.sec.gov/comments/sr-cboebzx-2023-095/srcboebzx2023095-475791-1363374.pdf> (“Fidelity Amendment”).

¹⁰ See Amendment No. 1 to Proposed Rule Change to List and Trade Shares of the Franklin Ethereum ETF, a Series of the Franklin Ethereum Trust, under BZX Rule 14.11(e)(4), Commodity-Based Trust Shares (SR-CboeBZX-2024-018), filed May 21, 2024, available at <https://www.sec.gov/comments/sr-cboebzx-2024-018/srcboebzx2024018-475813-1363434.pdf> (“Franklin Amendment”).

¹¹ Comments received on SR-NYSEARCA-2023-70 are available at <https://www.sec.gov/comments/sr-nysearca-2023-70/srnysearca202370.htm>. Comments received on SR-NYSEARCA-2024-31 are available at <https://www.sec.gov/comments/sr-nysearca-2024-31/srnysearca202431.htm>. Comments received on SR-NASDAQ-2023-045 are available at <https://www.sec.gov/comments/sr-nasdaq-2023-045/srnasdaq2023045.htm>. Comments received on SR-CboeBZX-2023-069 are available at <https://www.sec.gov/comments/sr-cboebzx-2023-069/srcboebzx2023069.htm>. Comments received on SR-CboeBZX-2023-070 are available at <https://www.sec.gov/comments/sr-cboebzx-2023-070/srcboebzx2023070.htm>. Comments received on SR-CboeBZX-2023-087 are available at <https://www.sec.gov/comments/sr-cboebzx-2023-087/srcboebzx2023087.htm>. Comments received on SR-CboeBZX-2023-095 are available at <https://www.sec.gov/comments/sr-cboebzx-2023-095/srcboebzx2023095.htm>. Comments received on SR-CboeBZX-2024-018 are available at <https://www.sec.gov/comments/sr-cboebzx-2024-018/srcboebzx2024018.htm>.

the “Trusts.” As described in more detail in the Proposals’ respective amended filings,¹² each Proposal seeks to list and trade shares of a Trust that would hold spot ether,¹³ in whole or in part.¹⁴ This order approves the Proposals on an accelerated basis.¹⁵

II. DISCUSSION AND COMMISSION FINDINGS

After careful review, the Commission finds that the Proposals are consistent with the Exchange Act and rules and regulations thereunder applicable to a national securities exchange.¹⁶ In particular, the Commission finds that the Proposals are consistent with Section 6(b)(5) of the Exchange Act,¹⁷ which requires, among other things, that the Exchanges’ rules be designed to “prevent fraudulent and manipulative acts and practices” and, “in general, to protect investors and the public interest;” and with Section 11A(a)(1)(C)(iii) of the Exchange Act,¹⁸ which sets forth Congress’ finding that it is in the public interest and appropriate for the protection of

¹² See supra notes 3-10.

¹³ Ether is a digital asset that is native to, and minted and transferred via, a distributed, open-source protocol used by a peer-to-peer computer network through which transactions are recorded on a public transaction ledger known as “Ethereum.” The Ethereum protocol governs the creation of new ether and the cryptographic system that secures and verifies transactions on Ethereum.

¹⁴ All of the Trusts propose to hold spot ether. Additionally, all of the Trusts, except the Grayscale Ethereum Trust, propose to hold cash, and some Trusts also propose to hold cash equivalents, as described in their respective amended filings. See Bitwise Amendment at 5; iShares Amendment at 4; VanEck Amendment at 21; ARK Amendment at 20; Invesco Amendment at 22; Fidelity Amendment at 22; Franklin Amendment at 21.

¹⁵ See infra Section III.

¹⁶ In approving the Proposals, the Commission has considered the Proposals’ impacts on efficiency, competition, and capital formation. See 15 U.S.C. 78c(f). See also infra note 61 and accompanying text, discussing comments received regarding the efficiency of spot ether exchange-traded products (“ETPs”). See also Letter from Ryan Posey, dated Mar. 20, 2024, regarding SR-CboeBZX-2023-095 (“Posey Letter”) (stating that “[t]he history of [exchange-traded funds] in other asset classes demonstrates how competition drives fees down”). Additionally, a commenter states that the Commission should approve spot ether ETPs, but not all at once, so as not to “delay the innovators in order to allow free-riding copycats a free hand.” See Letter from James J. Angel, Georgetown University, dated Apr. 5, 2024, regarding SR-NYSEARCA-2023-70 (“Angel Letter”), at 3-4. The Commission believes that it is appropriate to approve all of the Proposals at the same time in order to foster competition by potentially providing investors with several spot ether-based ETPs from which to choose. The shares of any Trust, however, may not begin trading on its applicable Exchange unless and until its corresponding registration statement becomes effective.

¹⁷ 15 U.S.C. 78f(b)(5).

¹⁸ 15 U.S.C. 78k-1(a)(1)(C)(iii).

investors and the maintenance of fair and orderly markets to assure the availability to brokers, dealers, and investors of information with respect to quotations for and transactions in securities.

A. Exchange Act Section 6(b)(5)

When considering proposals to list bitcoin-based commodity trusts and bitcoin-based trust issued receipts, the Commission has explained that one way an exchange that lists bitcoin-based ETPs can meet the obligation under Exchange Act Section 6(b)(5) that its rules be designed to prevent fraudulent and manipulative acts and practices is by demonstrating that the exchange has a comprehensive surveillance-sharing agreement with a regulated market of significant size related to the underlying or reference assets.¹⁹ Such an agreement would assist in detecting and deterring fraud and manipulation related to that underlying asset.

The Commission has also consistently recognized, however, that this is not the *exclusive* means by which an ETP listing exchange can meet this statutory obligation.²⁰ A listing exchange could, alternatively, demonstrate that “other means to prevent fraudulent and manipulative acts and practices will be sufficient” to justify dispensing with a surveillance-sharing agreement with

¹⁹ See, e.g., Order Granting Accelerated Approval of Proposed Rule Changes, as Modified by Amendments Thereto, to List and Trade Bitcoin-Based Commodity-Based Trust Shares and Trust Units, Securities Exchange Act Release No. 99306 (Jan. 10, 2024), 89 FR 3008 (Jan. 17, 2024) (SR-NYSEARCA-2021-90; SR-NYSEARCA-2023-44; SR-NYSEARCA-2023-58; SR-NASDAQ-2023-016; SR-NASDAQ-2023-019; SR-CboeBZX-2023-028; SR-CboeBZX-2023-038; SR-CboeBZX-2023-040; SR-CboeBZX-2023-042; SR-CboeBZX-2023-044; SR-CboeBZX-2023-072) (“Spot Bitcoin ETP Approval Order”); Order Granting Approval of a Proposed Rule Change, as Modified by Amendment No. 2, To List and Trade Shares of the Teucrium Bitcoin Futures Fund Under NYSE Arca Rule 8.200-E, Commentary .02 (Trust Issued Receipts), Securities Exchange Act Release No. 94620 (Apr. 6, 2022), 87 FR 21676 (Apr. 12, 2022) (SR-NYSEARCA-2021-53). The Commission has provided an illustrative definition for “market of significant size” to include a market (or group of markets) as to which (a) there is a reasonable likelihood that a person attempting to manipulate the ETP would also have to trade on that market to successfully manipulate the ETP, so that a surveillance-sharing agreement would assist in detecting and deterring misconduct, and (b) it is unlikely that trading in the ETP would be the predominant influence on prices in that market. See Order Setting Aside Action by Delegated Authority and Disapproving a Proposed Rule Change, as Modified by Amendments No. 1 and 2, To List and Trade Shares of the Winklevoss Bitcoin Trust, Securities Exchange Act Release No. 83723 (July 26, 2018), 83 FR 37579, 37594 (Aug. 1, 2018) (SR-BatsBZX-2016-30) (“Winklevoss Order”).

²⁰ See Winklevoss Order, 83 FR at 37580; Spot Bitcoin ETP Approval Order, 89 FR at 3009.

a regulated market of significant size.²¹ Applying this same analytical framework to the spot ether to be held by the Trusts, the Commission finds that sufficient “other means” of preventing fraud and manipulation in this context have been demonstrated.

Each Exchange has a comprehensive surveillance-sharing agreement with the Chicago Mercantile Exchange (“CME”) via their common membership in the Intermarket Surveillance Group.²² This facilitates the sharing of information that is available to the CME through its surveillance of its markets, including its surveillance of the CME ether futures market. Spot ether, however, does not trade on the CME and the CME does not engage in surveillance of spot ether markets. As with the proposals approved in the Spot Bitcoin ETP Approval Order, this raises questions regarding the sufficiency of a surveillance-sharing agreement with the CME in preventing fraud and manipulation when the proposed ETPs hold spot ether.²³ If a would-be manipulator of a spot ether ETP engages in misconduct (such as fraud, manipulation, or other trading abuses) on the CME itself, the CME’s surveillance can be reasonably expected to detect such misconduct. But if the would-be manipulator is not transacting on the CME itself, the impacts of its misconduct would not necessarily be surveilled by the CME unless the misconduct also impacts the CME ether futures market. Thus, when assessing the sufficiency of a surveillance-sharing agreement with the CME, it is critical to establish whether, and to what extent, fraud or manipulation that impacts the spot ether market also impacts the CME ether futures market.²⁴

²¹ See Spot Bitcoin ETP Approval Order, 89 FR at 3009 (quoting Winklevoss Order, 83 FR at 37580).

²² See *id.* at 3009.

²³ See *id.*

²⁴ See *id.*

In the Spot Bitcoin ETP Approval Order, the Commission concluded that having a comprehensive surveillance-sharing agreement with a U.S.-regulated market that, based on evidence from robust correlation analysis, is consistently highly correlated with the ETPs' underlying assets (spot bitcoin) constituted "other means" sufficient to satisfy the Exchange Act Section 6(b)(5) standard.²⁵ Specifically, given the consistently high correlation between the CME bitcoin futures market and a sample of spot bitcoin markets—confirmed through robust correlation analysis using data at hourly, five-minute, and one-minute intervals—the Commission was able to conclude that fraud or manipulation that impacts prices in spot bitcoin markets would likely similarly impact CME bitcoin futures prices. And because the CME's surveillance can assist in detecting those impacts on CME bitcoin futures prices, the Exchanges' comprehensive surveillance-sharing agreement with the CME can be reasonably expected to assist in surveilling for fraudulent and manipulative acts and practices in the specific context of those proposals. The Commission indicated that the "robustness" of its correlation analysis rested on the pre-requisites of (1) the correlations being calculated with respect to bitcoin futures that trade on the CME, a U.S. market regulated by the Commodity Futures Trading Commission ("CFTC"), (2) the lengthy sample period of price returns for both the CME bitcoin futures market and the spot bitcoin market, (3) the frequent intra-day trading data in both the CME

²⁵ See *id.* at 3009-11. To be clear, this does not mean that such U.S.-regulated market is of "significant size" related to the ETP's underlying or reference asset. In particular, the Commission did not conclude in the Spot Bitcoin ETP Approval Order that the CME bitcoin futures market is of "significant size" related to spot bitcoin. See *id.* at 3010-11 ("[B]ecause the CME's surveillance can assist in detecting those impacts on CME bitcoin futures prices, the Exchanges' comprehensive surveillance-sharing agreement with the CME—a U.S.-regulated market whose bitcoin futures market is consistently highly correlated to spot bitcoin, *albeit not of 'significant size' related to spot bitcoin*—can be reasonably expected to assist in surveilling for fraudulent and manipulative acts and practices in the specific context of the Proposals.") (emphasis added).

bitcoin futures market and the spot bitcoin market over that lengthy sample period, and (4) the consistency of the correlation results throughout the lengthy sample period.²⁶

Several of the Proposals and some commenters offered correlation analyses in the ether context. Some Proposals provided correlation results that used data at a daily frequency. For example, the ARK Amendment finds a correlation between the daily returns of CME ether futures and daily returns on certain spot ether trading platforms of more than 99.89%;²⁷ the VanEck Amendment, Invesco Amendment, and Franklin Amendment find daily correlation of 99.8%;²⁸ and the iShares Amendment finds a daily correlation of 99.93%.²⁹ However, as explained in the Spot Bitcoin ETP Approval Order, calculating correlation using only *daily* price observations provides no information on how prices in the two markets are associated—if at all—*throughout* the trading day; and calculating correlation for only the full sample period does not provide evidence of a *consistently* high correlation over time.³⁰

The Fidelity Amendment performed rolling 90-day correlations between daily returns of CME ether futures and six spot ether trading platforms and found correlations ranged between 94% and 99.8%.³¹ As indicated above, however, calculating correlations using only daily price observations—even on a rolling basis—provides no information on how prices are associated—if at all—*throughout* the trading day. The Fidelity Amendment also examined correlation using

²⁶ See *id.* at 3010 n.38.

²⁷ See ARK Amendment at 14 (using data from Jan. 1, 2022, through Feb. 1, 2024).

²⁸ See VanEck Amendment at 13; Invesco Amendment at 14; Franklin Amendment at 13 (using data from Sept. 1, 2022, through Sept. 1, 2023).

²⁹ See iShares Amendment at 26 (using data from Oct. 13, 2022, through Oct. 13, 2023). Some commenters also assert that ether markets are highly correlated, but the commenters provide no evidence for this assertion. See Letter from Parker Jamieson, dated Mar. 12, 2024, regarding SR-CboeBZX-2023-095 (“Jamieson Letter”); Posey Letter.

³⁰ See Spot Bitcoin ETP Approval Order, 89 FR at 3009 n.30.

³¹ See Fidelity Amendment at 16 (the filing does not provide the exact range for its data sample, but based on the chart at 16, the range appears to be approximately July 2021 through Jan. 2024).

hourly returns data, and found such correlations for the full sample period to be above 98%.³²

While the filing does not provide rolling correlations using the hourly data, the filing examined the “distribution of hourly returns” and finds that at least 97.9% of the hourly returns of the spot ether platforms and the CME ether futures market are within 50 basis points. The filing stated that “[t]his suggests a high degree of similarity in price movements between the regulated exchange and the spot platforms for most hours.”³³

The use of hourly data, however, provides no indication of how prices move at finer increments. For example, the results provide no indication of whether price movements—including price manipulations—in ether spot markets that persist for only a few minutes or less are likely to be reflected in CME ether futures prices. While the Fidelity Amendment’s results may suggest a high degree of similarity in price movements between the CME ether futures market and the spot ether platforms “*for most hours*,” the results suggest nothing about the degree of similarity in price movements *for most minutes* within the hours.

Two commenters and one Proposal examined correlation between the CME ether futures market and spot ether trading platforms at hourly, five-minute, and one-minute intervals. The Coinbase Letter used price returns data from March 1, 2021, through January 31, 2024, for the CME ether futures market and the Coinbase platform.³⁴ This commenter calculated Pearson correlation statistics³⁵ for the full sample period as well as for rolling three-month segments

³² See *id.* at 17-18.

³³ See *id.* at 18.

³⁴ See Letter from Paul Grewal, Chief Legal Officer, Coinbase Global, Inc., dated Feb. 21, 2024, regarding SR-NYSEARCA-2023-70 (“Coinbase Letter”), at 20-22.

³⁵ Pearson correlation is a measure of linear association between two variables and indicates the magnitude as well as direction of this relationship. The value can range between -1 (suggesting a strong negative association) and 1 (suggesting a strong positive association). Correlation should not be interpreted as an indication of a causal relationship or whether one variable leads or lags the other.

within the sample period. The commenter's correlation results for the full sample period are 99.3% using data at an hourly interval, 96.2% using data at a five-minute interval, and 84.7% using data at a one-minute interval.³⁶ The commenter states that these results "show an even greater correlation than what was reported by the Commission" in the Spot Bitcoin ETP Approval Order with respect to the CME bitcoin futures market and spot bitcoin trading platforms.³⁷ The commenter also sought to replicate the same correlation analysis of the bitcoin market that the Commission performed for the Spot Bitcoin ETP Approval Order. The commenter's replication results also found greater correlation than what was reported in the Spot Bitcoin ETP Approval Order.³⁸

The CF Benchmarks Letters used price returns data from February 2, 2022, through February 2, 2024, for the CME ether futures market and the Coinbase, Kraken, and LMAX Digital platforms.³⁹ This commenter also calculated Pearson correlation statistics for its full sample period as well as for rolling three-month segments within that sample period. This commenter's correlation results for the full sample period are no less than 98.0% using data at an hourly interval, 91.5% using data at a five-minute interval, and 84.9% using data at a one-minute interval.⁴⁰ The commenter states that these results are "on the whole stronger" than those that the Commission reported for the bitcoin market in the Spot Bitcoin ETP Approval Order.⁴¹

³⁶ See Coinbase Letter at 21. The Coinbase Letter's rolling correlation results ranged between 98.1% and 99.7% using data at an hourly interval, 93.8% and 97.1% using data at a five-minute interval, and 80.4% and 88% using data at a one-minute interval.

³⁷ See *id.*

³⁸ See *id.*

³⁹ See Letters from CF Benchmarks, dated Mar. 22, 2024, regarding SR-CboeBZX-2024-018, and dated Apr. 11, 2024, regarding SR-NASDAQ-2023-045 ("CF Benchmarks Letters"), at 5-6.

⁴⁰ See *id.* at 6. The CF Benchmarks Letters' rolling correlation results ranged between 96.1% and 99.4% using data at an hourly interval, 81.3% and 94.7% using data at a five-minute interval, and 81.0% and 88.1% using data at a one-minute interval.

⁴¹ See *id.* at 6.

The Bitwise Amendment used price returns data from August 1, 2021, through March 20, 2024, for the CME ether futures market and the Coinbase and Kraken platforms.⁴² This filing also calculated Pearson correlation statistics for its full sample period as well as for rolling three-month segments within that sample period. This filing's correlation results for the full sample period are no less than 98.6% using data at an hourly interval, 90.0% using data at a five-minute interval, and 70.9% using data at a one-minute interval.⁴³

The Commission undertook to verify the Bitwise Amendment's and these two commenters' correlation results for certain spot ether markets. For robust⁴⁴ results, the Commission used stationary time series of price returns data at hourly, five-minute, and one-minute intervals for the spot ETH/USD trading pair on Coinbase and Kraken, as well as for the closest-to-maturity CME ether futures contract, over a similarly lengthy sample period (October 1, 2021, through March 29, 2024).⁴⁵ Pearson correlation statistics were calculated for the full sample period as well as for rolling three-month segments within the sample period. The Commission's correlation analysis utilized frequent intra-day trading data over the lengthy

⁴² See Bitwise Amendment at 18-19.

⁴³ See *id.* The Bitwise Amendment's rolling correlation results ranged between 95.7% and 99.3% using data at an hourly interval, 86.8% and 92.9% using data at a five-minute interval, and 65.0% and 79.5% using data at a one-minute interval.

⁴⁴ See also *infra* note 49.

⁴⁵ Data were sourced from the CME via the SEC's Market Information Data Analytics System ("MIDAS") for the closest-to-maturity CME ether futures contract price and from Kaiko for the ETH/USD prices on Coinbase and Kraken. The MIDAS CME ether futures data are limited to the 3:00am – 5:00pm ET, Monday through Friday, trading hours. All data sets used in the Commission's analysis are publicly available (although some require subscriptions). One-minute, five-minute, and hourly price *level* time series were created using the last trade price over the given interval for the spot ETH/USD pairs and the closest-to-maturity CME ether futures contract. For those time intervals during which there were no trades in the closest-to-maturity CME ether futures contracts or spot ether, the last trade price for the closest-to-maturity CME ether futures contract (or last trade price for spot ether, as applicable) was used as the price for such time interval. Each price *level* time series was then log differenced to create price *returns* time series. The stationarity of each price *returns* time series was confirmed through Augmented Dickey-Fuller tests.

sample period on this subset of spot ether platforms⁴⁶ and—crucially—on the CME ether futures market as well.⁴⁷

The results of the Commission’s analysis confirm that the CME ether futures market has been consistently highly correlated with this subset of the spot ether market throughout the past 2.5 years. The correlation between the CME ether futures market and this subset of spot ether platforms for the full sample period is no less than 96.2 percent using data at an hourly interval, 85.7 percent using data at a five-minute interval, and 67.1 percent using data at a one-minute interval. The rolling three-month correlation results range between 86.4 and 98.4 percent using data at an hourly interval, 75.8 and 90.2 percent using data at a five-minute interval, and 58.6 and 75.9 percent using data at a one-minute interval.

⁴⁶ The spot ether market is a 24-hour, global marketplace. However, due to the unregulated and fragmented nature of the spot ether market, there are no authoritative published figures for spot ether trading. Nonetheless, multiple sources of pricing information for the spot ether market are available 24 hours per day on public websites and through subscription services. *See, e.g.*, Grayscale Amendment at 46 (stating that real-time price and volume data for ether is available by subscription from Reuters and Bloomberg).

⁴⁷ The CME ether futures market, which is regulated by the CFTC, has developed since its inception in February 2021 into an active market, growing from \$64.3 million in average monthly open interest in February 2021 to \$965.6 million in average monthly open interest in April 2024 (source: Refinitiv). Real-time trade information, including prices, for the CME ether futures market is made available through CME at: <https://www.cmegroup.com/markets/cryptocurrencies/ether/ether.quotes.html#venue=globex> and <https://www.cmegroup.com/markets/cryptocurrencies/ether/micro-ether.quotes.html#venue=globex>. *But see infra* note 49.

Full-Sample and Post-Merge Correlations between Certain Spot Ether Markets and the CME Ether Futures Market (MIDAS and Kaiko Data)

	Coinbase			Kraken		
	Hourly	5 Minutes	1 Minute	Hourly	5 Minutes	1 Minute
Full Sample: October 1, 2021, through March 29, 2024	96.2	85.7	67.1	96.3	86.5	69.0
Rolling Three-Month Correlations Over the Full Sample Period:						
Maximum	98.4	90.1	74.5	98.4	90.2	75.9
Minimum	86.4	75.8	58.6	86.6	77.1	61.6
The Commission also examined correlation between the CME ether futures market and the Coinbase and Kraken spot ether trading platforms at hourly, five-minute, and one-minute intervals, using the same data sources and methodology (see note 45), for the period after the Ethereum Network changed from a Proof-of-Work to a Proof-of-Stake consensus mechanism in September 2022 (“post-Merge”). The results indicate that correlation has been similarly high and consistent during just the post-Merge period.						
Post-Merge Sample: September 16, 2022, through March 29, 2024	94.1	84.1	68.0	94.1	85.0	69.9
Rolling Three-Month Correlations Over the Post-Merge Sample:						
Maximum	98.4	88.3	73.1	98.4	89.3	75.9
Minimum	86.4	75.8	61.0	86.6	77.1	62.8

The Commission further examined correlation between the CME ether futures market and the Coinbase and Kraken spot ether trading platforms at hourly, five-minute, and one-minute intervals in a recent month, March 2024, sourcing CME ether futures market data from Refinitiv.⁴⁸ The results indicate similar correlation: no less than 97.6 percent using data at an

⁴⁸ Data were sourced from Refinitiv for the closest-to-maturity CME ether futures contract price and from Kaiko for the ETH/USD prices on Coinbase and Kraken. The Refinitiv CME ether futures data cover the CME’s full 23 trading hours. All data sets used in the Commission’s analysis are publicly available (although some require subscriptions). The Commission used the same methodology as summarized in note 45 above.

hourly interval, 86.0 percent using data at a five-minute interval, and 62.5 percent using data at a one-minute interval.

Correlations between Certain Spot Ether Markets and the CME Ether Futures Market (Refinitiv and Kaiko Data)

	Coinbase			Kraken		
	Hourly	5 Minutes	1 Minute	Hourly	5 Minutes	1 Minute
March 2024	97.6	86.0	62.5	97.7	87.5	67.0

The results of the Commission’s robust correlation analysis⁴⁹ provide empirical evidence that prices generally move in close (although not perfect) alignment between the spot ether market and the CME ether futures market.⁵⁰ As such, based on the record before the Commission and the correlation analyses in the record, including the Commission’s own analysis, the Commission is able to conclude that fraud or manipulation that impacts prices in spot ether markets would likely similarly impact CME ether futures prices. And because the CME’s surveillance can assist in detecting those impacts on CME ether futures prices, the Exchanges’

⁴⁹ The robustness of the Commission’s correlation analysis rests on the pre-requisites of (1) the correlations being calculated with respect to ether futures that trade on *the CME*, a U.S. market regulated by the CFTC, (2) the lengthy sample period of price returns for both the CME ether futures market and the spot ether market, (3) the frequent intra-day trading data in both the CME ether futures market and the spot ether market over that lengthy sample period, and (4) the consistency of the correlation results throughout the lengthy sample period. The relatively low frequency of trading in CME ether futures, however, makes condition (3) particularly difficult to assess. Over the Commission’s full sample period from October 1, 2021, through March 29, 2024, using MIDAS data (see note 45 above), front-month CME ether futures traded on average only 3.05 times per minute, and did not trade during 47% of the one-minute intervals. For comparison, over this same sample, front-month CME bitcoin futures traded on average 5.11 times per minute, and did not trade during 37% of the one-minute intervals. As explained in note 45 above, the Commission (1) used prior prices for the 47% of minutes during which front-month CME ether futures did not trade, which likely affected the correlation results. Alternatively, the Commission could have (2) dropped this 47% of minutes from the sample, but this also likely would have affected the correlation results. As the portion of no-trade minutes increases, the correlation results from both methodologies (1) and (2) become increasingly unreliable, because a larger and larger percentage of data is either dropped altogether (methodology (2)) or estimated with prior prices, potentially from distant past time intervals (methodology (1)). Consequently, with respect to future proposed spot ETPs, if trading on the regulated market is even less frequent, it may be more difficult to use correlation analysis to establish the sufficiency of a surveillance-sharing agreement with the regulated market.

⁵⁰ Correlation should not be interpreted as an indicator of a causal relationship or whether one variable leads or lags the other.

comprehensive surveillance-sharing agreement with the CME—a U.S.-regulated market whose ether futures market is consistently highly correlated to spot ether, albeit not of “significant size” related to spot ether—can be reasonably expected to assist in surveilling for fraudulent and manipulative acts and practices in the specific context of the Proposals.⁵¹

B. Exchange Act Section 11A(a)(1)(C)(iii)

Each Proposal sets forth aspects of its proposed ETP, including the availability of pricing information, transparency of portfolio holdings, and types of surveillance procedures, that are consistent with other ETPs that the Commission has approved.⁵² This includes commitments regarding: the availability via the relevant securities information processor of quotation and last-sale information for the shares of each Trust; the availability on the websites of each Trust of

⁵¹ One commenter argues that the Commission’s use of correlation as a basis for approval is “problematic” because (1) it relies on a subset of spot markets which may not be representative of the entirety of the spot markets worldwide; (2) the fact that prices between the spot market and the CME futures market “generally move in close alignment does not account for the times when the prices are not aligned,” and thus “the entire premise that price correlation leads to reliable detection of manipulation is fatally flawed;” and (3) “the fact that two variables are correlated in the past does not mean they will continue to be correlated in the future.” See Letter from Dennis M. Kelleher, Co-Founder, President, and CEO, and Stephen W. Hall, Legal Director and Securities Specialist, Better Markets, Inc., dated Jan. 12, 2024, regarding SR-CboeBZX-2023-070 and SR-CboeBZX-2023-069 (“Better Markets Letter 1”), at 6-7. Regarding (1), the Commission selected the spot ether trading platforms of Coinbase and Kraken because these platforms have the largest volume of ETH/USD spot trading; whereas on other platforms, ETH trading typically occurs through so-called “stablecoins” and thus has prices that may be affected by USD/stablecoin rate fluctuations. Regarding (3), the Commission assessed the consistency of correlation over the full sample period through rolling 90-day correlations. The Commission does not detect any trends in the rolling correlations that would lead it to expect that the correlation would not be similarly high in the future. Both the post-Merge correlations and the March 2024 correlations using Refinitiv data indicate that correlations have recently been similar to the full sample period. Regarding (2), the Commission does not consider the use of correlation analysis in the context of the Proposals to be “fatally flawed.” However, the Commission agrees that the *lower* the frequency of trading in the CME futures market, the *greater* the risk that a price movement in spot markets would not be similarly reflected in a price movement in the CME futures market, notwithstanding seemingly high correlation results. For this reason, the Commission has explained that *robust* correlation analysis requires, among others, that there be *frequent* intra-day trading data in the CME futures market (see Spot Bitcoin ETP Approval Order, 89 FR at 3010 n.38).

⁵² See, e.g., Spot Bitcoin ETP Approval Order, 89 FR at 3011; Securities Exchange Act Release No. 61220 (Dec. 22, 2009), 74 FR 68895 (Dec. 29, 2009) (SR-NYSEARCA-2009-94) (Order Granting Approval of Proposed Rule Change Relating To Listing and Trading Shares of the ETFs Palladium Trust); Securities Exchange Act Release No. 94518 (Mar. 25, 2022), 87 FR 18837 (Mar. 31, 2022) (SR-NYSEARCA-2021-65) (Notice of Filing of Amendment No. 1 and Order Granting Accelerated Approval of a Proposed Rule Change, as Modified by Amendment No. 1, To List and Trade Shares of the Sprott ESG Gold ETF Under NYSE Arca Rule 8.201-E (Commodity-Based Trust Shares)).

certain information related to the Trusts' intra-day indicative values ("IIV") and net asset values; the dissemination of IIV by one or more major market data vendors, updated every 15 seconds throughout the Exchanges' regular trading hours; the Exchanges' surveillance procedures and ability to obtain information regarding trading in the shares of the Trusts; the conditions under which the Exchanges would implement trading halts and suspensions; and the requirements of registered market makers in the shares of each Trust.⁵³ In addition, in each Proposal, the applicable Exchange deems the shares of the applicable Trust to be equity securities, thus rendering trading in such shares subject to that Exchange's existing rules governing the trading of equity securities.⁵⁴ Further, the applicable listing rules of each Exchange require that all statements and representations made in its filing regarding, among others, the description of the applicable Trust's holdings, limitations on such holdings, and the applicability of that Exchange's listing rules specified in the filing, will constitute continued listing requirements.⁵⁵ Moreover, each Proposal states that: its issuer has represented to the applicable Exchange that it will advise that Exchange of any failure to comply with the applicable continued listing requirements; pursuant to obligations under Section 19(g)(1) of the Exchange Act, that Exchange will monitor for compliance with the continued listing requirements; and if the applicable Trust

⁵³ See ARK Amendment at 28-30, 33-39; Bitwise Amendment at 19-23; Fidelity Amendment at 25-28, 31-37; Franklin Amendment at 25-28, 30-36; Grayscale Amendment at 45-49; Invesco Amendment at 25-27, 30-36; iShares Amendment at 12-16, 34-41; VanEck Amendment at 25-28, 30-36.

⁵⁴ See ARK Amendment at 36; Bitwise Amendment at 21; Fidelity Amendment at 34; Franklin Amendment at 34; Grayscale Amendment at 46; Invesco Amendment at 33; iShares Amendment at 37; VanEck Amendment at 34.

⁵⁵ See Nasdaq Rule 5711(d)(iii); NYSE Arca Rule 8.201-E(e)(2)(vii); BZX Rule 14.11(a).

is not in compliance with the applicable listing requirements, that Exchange will commence delisting procedures.⁵⁶

The Commission therefore finds that the Proposals, as with other ETPs that the Commission has approved,⁵⁷ are reasonably designed to promote fair disclosure of information that may be necessary to price the shares of the Trusts appropriately, to prevent trading when a reasonable degree of transparency cannot be assured, to safeguard material non-public information relating to the Trusts' portfolios, and to ensure fair and orderly markets for the shares of the Trusts.

C. Other comments

One commenter asserts that the Commission should approve the Proposals because CME ether futures exchange-traded funds (“ETFs”) registered under the Investment Company Act of 1940 (“1940 Act”) are already trading on national securities exchanges “and possess much more potential for manipulation of the underlying asset.”⁵⁸ Another commenter states that the Commission should approve the Proposals because “[t]here is no difference between the [spot bitcoin ETP] approval and the [spot ether ETPs] at this point.”⁵⁹

The Commission has considered and, for the reasons described above, is approving the Proposals on their own merits and under the standards applicable to them; namely, the standards provided by Section 6(b)(5) and Section 11A(a)(1)(C)(iii) of the Exchange Act.⁶⁰ As described above, based on the record before the Commission and the Commission’s own correlation

⁵⁶ See ARK Amendment at 38; Bitwise Amendment at 23; Fidelity Amendment at 36; Franklin Amendment at 35; Grayscale Amendment at 49; Invesco Amendment at 35; iShares Amendment at 33; VanEck Amendment at 35.

⁵⁷ See *supra* note 52.

⁵⁸ See Letter from Patrick Turley, dated Apr. 3, 2024, regarding SR-NASDAQ-2023-045 (“Turley Letter”).

⁵⁹ See Jamieson Letter.

⁶⁰ 15 U.S.C. 78f(b)(5); 15 U.S.C. 78k-1(a)(1)(C)(iii).

analysis, the Commission concludes that fraud or manipulation that impacts prices in spot ether markets would likely similarly impact CME ether futures prices, such that a surveillance-sharing agreement with the CME can be reasonably expected to assist in surveilling for fraud and manipulation that may impact the proposed spot ether ETPs.

Some commenters state that the Commission should approve the Proposals for a variety of investor protection reasons, including that spot ether ETPs would be a less costly and more efficient,⁶¹ more convenient and secure,⁶² and more regulated⁶³ way to gain exposure to spot ether. The Exchanges make similar investor protection arguments in support of approval.⁶⁴

Another commenter disagrees that the ETP investment vehicle would protect investors, stating that the value of an investment in a spot ether ETP would be subject to the same risks of fraud and manipulation in the spot ether market as holding ether directly, and that ETPs are not subject to the Commission's examination authority, custody requirements, or conflicts of interest rules of ETFs registered under the 1940 Act.⁶⁵ This commenter further states that any purported

⁶¹ See, e.g., Posey Letter; Letter from William Entriken, dated Oct. 31, 2023, regarding SR-NYSEARCA-2023-70; Letter from Brent Wickenheiser, dated Apr. 3, 2024, regarding SR-NYSEARCA-2023-70 (“Wickenheiser Letter”); Letter from Dirk Hooley, dated Apr. 3, 2024, regarding SR-NYSEARCA-2023-70; Letter from Kevin Thompson, dated Apr. 3, 2024, regarding SR-NASDAQ-2023-045 (“Thompson Letter”).

⁶² See, e.g., Posey Letter; Wickenheiser Letter; Thompson Letter; Turley Letter; Letter from Anonymous, dated Apr. 3, 2024, regarding SR-CboeBZX-2023-095; Letter from Anonymous, dated Apr. 5, 2024, regarding SR-NASDAQ-2023-045.

⁶³ See, e.g., Posey Letter; Thompson Letter; Angel Letter at 7-8.

⁶⁴ See, e.g., ARK Amendment at 8-13; iShares Amendment at 18-20, 33-34; Bitwise Amendment at 17. However, another commenter states that the Commission should approve the Proposals because “when it comes to crypto, things happen so fast that there is no legitimate protection possible.” See Letter from El Norro, dated Dec. 1, 2023, regarding SR-CboeBZX-2023-095 (“Norro Letter”).

⁶⁵ See Better Markets Letter 1 at 4. While many of the Trusts use “ETF” or “Fund” in their names, none is registered under the 1940 Act.

investor protections from an ETP compared to an “even-worse over-the-counter market” do not neutralize concerns about fraud and manipulation.⁶⁶

This commenter also states that the price volatility of ether means that spot ether ETPs would threaten retail investors by exposing them to an unstable asset.⁶⁷ The commenter further states that approving spot ether ETPs “would threaten not just investors but also the broader financial system” by “further entangl[ing] the crypto industry with traditional finance and aggravat[ing]” risks similar to risks that the commenter claims are posed by spot bitcoin ETPs, such as bitcoin price volatility and dislocations between the price of a spot bitcoin ETP and bitcoin that can “cause stress for institutions heavily exposed to” or reliant on spot bitcoin ETPs.⁶⁸

The Commission has considered these potential benefits and concerns in the broader context of whether the Proposals meet the applicable requirements of the Exchange Act,⁶⁹ including the requirement in Section 6(b)(5)⁷⁰ that the Exchanges’ rules be designed to “prevent fraudulent and manipulative acts and practices.” For the reasons described above, the Commission has determined that the Proposals meet such requirements.

The Commission also finds that the Proposals are consistent with the Section 6(b)(5) requirement that the Exchanges’ rules be designed to protect investors and the public interest because, in addition to the factors discussed in Section II.A and II.B above, existing rules and

⁶⁶ See *id.* See also Letter from Senator Jack Reed and Senator Laphonza Butler, dated Mar. 11, 2024. But see Letter from Representatives French Hill, Josh Gottheimer, Tom Emmer, Wiley Nickel, and Mike Flood, dated May 22, 2024.

⁶⁷ See Letter from Benjamin L. Schiffrin, Director of Securities Policy, Better Markets, Inc., dated May 15, 2024, regarding SR-CboeBZX-2023-069 and SR-CboeBZX-2023-070 (“Better Markets Letter 2”), at 4-7.

⁶⁸ See *id.* at 8. The commenter, however, provided no data on financial institutions’ exposure to spot bitcoin ETPs or likely exposure to spot ether ETPs.

⁶⁹ See also Winklevoss Order, 83 FR at 37602.

⁷⁰ 15 U.S.C. 78f(b)(5).

standards of conduct would apply to recommending and advising investments in the shares of the Trusts. For example, when broker-dealers recommend ETPs to retail customers, Regulation Best Interest (“Reg BI”) would apply.⁷¹ Reg BI requires broker-dealers to, among other things, exercise reasonable diligence, care, and skill when making a recommendation to a retail customer to: (1) understand potential risks, rewards, and costs associated with the recommendation and have a reasonable basis to believe that the recommendation could be in the best interest of at least some retail customers; and (2) have a reasonable basis to believe the recommendation is in the best interest of a particular retail customer based on that retail customer's investment profile.⁷² In addition, investment advisers have a fiduciary duty under the 1940 Act comprised of a duty of care and a duty of loyalty. These obligations require the adviser to act in the best interest of its client and not subordinate its client's interest to its own.⁷³

Some commenters contend that the Commission should disapprove the Proposals because the nature of ether and the Ethereum Network makes them inherently susceptible to fraud and manipulation.⁷⁴ Other commenters argue that the nature of ether and the Ethereum Network

⁷¹ Exchange Act rule 15c-1(a).

⁷² Exchange Act rules 15c-1(a)(2)(ii)(A) and (B). Separately, under Reg BI’s Conflict of Interest Obligation, broker-dealers must establish, maintain, and enforce written policies and procedures reasonably designed to, among other things, identify and disclose or eliminate all conflicts of interest associated with a recommendation and mitigate conflicts of interest at the associated person level. See Exchange Act rules 15c-1(a)(2)(iii)(A) and (B). To the extent that broker-dealers recommend ETPs to customers who are not retail customers covered by Reg BI, FINRA Rule 2111 requires, in part, that a member broker-dealer or associated person “have a reasonable basis to believe that a recommended transaction or investment strategy involving a security or securities is suitable for the customer, based on the information obtained through the reasonable diligence of the [broker-dealer] or associated person to ascertain the customer’s investment profile.”

⁷³ See Commission Interpretation Regarding Standard of Conduct for Investment Advisers, Investment Advisers Act Release No. 5248 (June 5, 2019), 84 FR 33669 (July 12, 2019), at 33671; Investment Company Act Release No. 34084 (Nov. 2, 2020), 85 FR 83162 (Dec. 21, 2020), at 83217 (discussing the best interest standard of conduct for broker-dealers and the fiduciary obligations of investment advisers in the context of all ETPs).

⁷⁴ See, e.g., Better Markets Letter 1 at 3 (asserting that relays are responsible for adding blocks of transactions to the Ethereum Blockchain, and recently one infrastructure provider exited the network, which left “only

makes them inherently resistant to fraud and manipulation.⁷⁵ The Commission acknowledges commenters' concerns regarding fraud and manipulation. Pursuant to Section 19(b)(2) of the Exchange Act, however, the Commission must approve a proposed rule change filed by a national securities exchange if it finds that the proposed rule change is consistent with the

four other major relay players to handle most Ethereum blocks and raises concern of potential problems, ranging from censorship of transactions to stealing of other key operators' profits"; that in addition to relays, the Ethereum Network is run by "parties called builders, which compile most transactions into blocks, and validators, which order blocks into a blockchain," but that both "builder and validator functions are dominated by a handful of participants"; and that "[a] validator controlling 34% could potentially falsify transactions" and one validator currently controls 32.3% of validator power and four builders account for the majority of blocks built); Letter from Robert, dated Apr. 23, 2024, regarding CboeBZX-2023-095 (stating that proof-of-stake is centralizing because as the "pile of [validators'] ether token increases, so does their ability to capture control over the network"; and that "the founding entities never relinquished control over the network" despite the Ethereum Foundation's "deceptive affinity marketing" to the contrary); Letter from Brandon, dated Apr. 4, 2024, regarding SR-NYSEARCA-2023-70 ("Control of the network will inevitably centralize ... because only the largest holders are the ones rewarded with new coins"; and "the entire [Ethereum Blockchain] can be manipulated by the foundation, such as after the DAO attack where the chain was rolled back by the organization"); Letter from James Keeton, dated Apr. 3, 2024, regarding SR-NASDAQ-2023-045 ("[T]he merge to proof of stake in 2022 solidified the lack of decentralization of this blockchain"); Letter from Tyler Mazun, dated Mar. 5, 2024, regarding SR-NASDAQ-2023-045 ("Proof of stake is just another mechanism for more increased centralization and control over the network by the biggest stakers."); Letter from Luther, dated Apr. 3, 2024, regarding SR-NASDAQ-2023-045 ("The Ethereum [F]oundation is the centralized entity that controls the protocol ... [T]hey regularly push out hard forks to their centralized node infrastructure to make protocol changes. In a truly decentralized system this would not be possible.").

⁷⁵ See, e.g., Coinbase Letter at 2 (asserting that the technological and operational security mechanisms inherent in the Ethereum Blockchain significantly limit ether's susceptibility to fraud and manipulation); Letter from Laura Brookover, Matt Corva, and William C. Hughes, Consensys Software Inc., dated Mar. 29, 2024, regarding SR-NASDAQ-2023-045, SR-CboeBZX-2023-087, and SR-CboeBZX-2023-095 ("Consensys Letter"), at 2-7 (arguing that Ethereum's proof-of-stake consensus mechanism "has several built-in protections providing additional security against fraud and manipulation," including: its block finality model provides increased reliability and integrity; the division of labor between two groups of block validators, proposers and attestors, "serves as a check and balance against error and manipulation;" the cost to an attacker group of obtaining the percentage of Ethereum nodes required to compromise the network is greater than for the Bitcoin Network; and the "slashing" that "penalizes validators who violate protocol rules by docking their stakes ... serves as both a punitive measure and a deterrent." This commenter also states that the "active and sizable developer community" enhances Ethereum's resilience against attacks; the redundancy afforded by independent open source software clients means that "network integrity is maintained even if one software client fails due to a bug or malicious exploit;" and the "inherent transparency" of Ethereum's public protocol development "forms a significant barrier to fraud and manipulation at the protocol level."); Letter from Chris McCullough, dated Apr. 3, 2024, regarding SR-NASDAQ-2023-045 (citing unspecified "advanced safeguards inherent in Ethereum's design"); Letter from Anonymous, dated Mar. 24, 2024, regarding SR-NASDAQ-2023-045 ("Anonymous Letter"), at 4 (arguing that the decentralization of ether software clients "helps mitigate the risks posed by bugs, although some concentration is still observed in a few clients"); Letter from Nathan Yang, dated Apr. 7, 2024, regarding SR-NYSEARCA-2024-31.

applicable requirements of the Exchange Act.⁷⁶ For the reasons described above, the Commission finds that the Proposals satisfy the requirements of the Exchange Act, including the requirement in Section 6(b)(5)⁷⁷ that the Exchanges’ rules be designed to “prevent fraudulent and manipulative acts and practices.”

Commenters also address, among other things: investor demand for spot ether ETPs;⁷⁸ environmental considerations of Ethereum’s proof-of-stake consensus mechanism;⁷⁹ whether to permit a Trust to stake its ether;⁸⁰ and the potential disadvantage from Commission disapproval of spot ether ETPs to U.S. innovation⁸¹ and to U.S. investors compared to those in other countries.⁸² Ultimately, however, for the reasons described above, the Commission is approving the Proposals because it finds that the Proposals satisfy the requirements of the Exchange Act, including the requirement in Section 6(b)(5)⁸³ that the Exchanges’ rules be designed to “prevent fraudulent and manipulative acts and practices.”

⁷⁶ See Exchange Act Section 19(b)(2)(C), 15 U.S.C. 78s(b)(2)(C). The Commission does not apply a “cannot be manipulated” standard; rather, the Commission examines whether a proposal meets the requirements of the Exchange Act. See, e.g., Winklevoss Order, 83 FR at 37582. The Commission does not understand the Exchange Act to require that a particular product or market be immune from manipulation. Rather, the inquiry into whether the rules of an exchange are designed to prevent fraudulent and manipulative acts and practices and, in general, to protect investors and the public interest, has long focused on the mechanisms in place for the detection and deterrence of fraud and manipulation.

⁷⁷ 15 U.S.C. 78f(b)(5).

⁷⁸ See, e.g., Jamieson Letter; Letter from John, dated Apr. 4, 2024, regarding SR-CboeBZX-2023-095 (“John Letter”); Letter from Johannes Swenberg, dated Apr. 3, 2024, regarding SR-CboeBZX-2023-095; Letter from Shaun Cumby, dated Apr. 3, 2024, regarding SR-NASDAQ-2023-045.

⁷⁹ See, e.g., Anonymous Letter at 2; Consensys Letter at 6; John Letter; Letter from Brett, dated Apr. 4, 2024, regarding SR-NASDAQ-2023-045.

⁸⁰ See, e.g., Better Markets Letter 2 at 7-8; Anonymous Letter at 3; Turley Letter. The Proposals under consideration by the Commission in this order do not contemplate staking of the Trusts’ ether. Accordingly, the relative benefits or drawbacks of staking are outside the scope of this order. Any future proposal of a Trust to, directly or indirectly, engage in action where any portion of the Trust’s ether becomes subject to the Ethereum proof-of-stake validation or is used to earn additional ether or generate income or other earnings would require the applicable Exchange to submit a proposed rule change under Rule 19b-4.

⁸¹ See, e.g., Turley Letter.

⁸² See, e.g., Norro Letter.

⁸³ 15 U.S.C. 78f(b)(5).

III. ACCELERATED APPROVAL OF THE PROPOSALS

The Commission finds good cause to approve the Proposals prior to the 30th day after the date of publication of notice of the Exchanges' amended filings⁸⁴ in the Federal Register. The amended filings clarified the descriptions of the Trusts; further described the terms of the Trusts; and conformed various representations in the amended filings to the applicable Exchange's listing standards and to representations that the Exchanges have made for other ETPs that the Commission has approved.⁸⁵ These changes do not raise any novel regulatory issues. Further, the changes assist the Commission in evaluating the Proposals and in determining that they are consistent with the Exchange Act and the rules and regulations thereunder applicable to a national securities exchange, as discussed above. Accordingly, the Commission finds good cause, pursuant to Section 19(b)(2) of the Exchange Act,⁸⁶ to approve the Proposals on an accelerated basis.

IV. CONCLUSION

This approval order is based on all of the Exchanges' representations and descriptions in their respective amended filings, which the Commission has carefully evaluated as discussed above.⁸⁷ For the reasons set forth above, including the Commission's correlation analysis, the Commission finds, pursuant to Section 19(b)(2) of the Exchange Act,⁸⁸ that the Proposals are

⁸⁴ See supra notes 3-10.

⁸⁵ See also supra Section II.B.

⁸⁶ 15 U.S.C. 78s(b)(2).

⁸⁷ See supra notes 3-10. In addition, the shares of the Trusts in SR-NYSEARCA-2023-70 and NYSEARCA-2024-31 must comply with the requirements of NYSE Arca Rule 8.201-E (Commodity-Based Trust Shares) to be listed and traded on NYSE Arca on an initial and continuing basis; the shares of the Trust in SR-NASDAQ-2023-045 must comply with the requirements of Nasdaq Rule 5711(d) (Commodity-Based Trust Shares) to be listed and traded on Nasdaq on an initial and continuing basis; and the shares of the Trusts in SR-CboeBZX-2023-069, SR-CboeBZX-2023-070, SR-CboeBZX-2023-087, SR-CboeBZX-2023-095, and SR-CboeBZX-2024-018 must comply with the requirements of BZX Rule 14.11(e)(4) (Commodity-Based Trust Shares) to be listed and traded on BZX on an initial and continuing basis.

⁸⁸ 15 U.S.C. 78s(b)(2).

consistent with the requirements of the Exchange Act and the rules and regulations thereunder applicable to a national securities exchange, and in particular, with Section 6(b)(5) and Section 11A(a)(1)(C)(iii) of the Exchange Act.⁸⁹

IT IS THEREFORE ORDERED, pursuant to Section 19(b)(2) of the Exchange Act,⁹⁰ that the Proposals (SR-NYSEARCA-2023-70; SR-NYSEARCA-2024-31; SR-NASDAQ-2023-045; SR-CboeBZX-2023-069; SR-CboeBZX-2023-070; SR-CboeBZX-2023-087; SR-CboeBZX-2023-095; SR-CboeBZX-2024-018) be, and hereby are, approved on an accelerated basis.

For the Commission, by the Division of Trading and Markets, pursuant to delegated authority.⁹¹

J. Matthew DeLesDernier,

Deputy Secretary.

⁸⁹ 15 U.S.C. 78f(b)(5); 15 U.S.C. 78k-1(a)(1)(C)(iii).

⁹⁰ 15 U.S.C. 78s(b)(2).

⁹¹ 17 CFR 200.30-3(a)(12).

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From: Frayer, Corey

Sent: 2022-08-29T13:19:20Z

Subject: Commerce Comments SMAIL

Received: 2022-08-29T13:19:20Z

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Sorry, spaced this. FYI.

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From: Nigro, Daniel

Sent: 2022-07-21T12:47:24Z

Subject: Markets Daily: ECB +50bp in 1st Hike Since 2011; Nordstream Gas Pipeline - Partial Re-Open; Housing Sales Down, But Prices Rise; HY 4 Day Rally Puts Yields at Lowest in 6 Weeks

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Wall St. Breakfast Summary: Futures were down slightly, and turned up a bit post ECB announcement. The ECB had not hiked rates since 2011. Crude oil is off 4% on evidence of declining demand for gasoline. Gold and silver are lower; Bitcoin is off 3%.

European Central Bank raises rates by 50 basis points, its first hike in 11 years (CNBC, Ling Yu)

The ECB has been hesitant to get too aggressive on the monetary policy front - especially in comparison to the Federal Reserve - fearing a looming recession that was exacerbated by Russia's invasion of Ukraine. That stance may be changing, however, as the bloc clearly sees Moscow in the driver's seat in terms of natural gas supplies and even higher energy prices that could put it further behind the inflation curve. **Bigger picture:** While the Fed began its latest rate hike cycle back in March, the ECB had yet to raise rates as it sought to prioritize economic growth. In fact, the last time the central bank raised rates was in 2011, in the aftermath of the European debt crisis. Over the past few months, the ECB warmed to the idea by telegraphing a 25 basis point hike, though a bigger 50 bps move has not been ruled out (and would be seen as a very hawkish signal by the markets) Unlike the U.S., which makes up one large jurisdiction, the ECB's decision today will reverberate through 27 different member states and their economies. That could expose more indebted countries like Italy to financial trouble and weigh on peripheral bond yields as a whole. The situation remains even more precarious on word that Italian Prime Minister Mario Draghi (a former ECB president) would resign, prompting Italy's 10-year government bond yield to jump above 3.5% and the iShares MSCI Italy ETF (NYSEARCA:EWI) to slide 4.2% during yesterday's session. **Anti-fragmentation tool:** Seeking to limit the spreads between yields across the eurozone, the ECB is also poised to unveil a new stimulus plan during today's meeting. Investors will be paying close attention to the details of the new bond-purchase program, including what assets policymakers are considering buying and under what circumstances. "While ECB President [Christine] Lagarde is likely to stress the temporary nature of the instrument - owing to the exceptional circumstances the euro area finds itself in - she will also underline the ECB's determination to secure the integrity of the monetary union, thereby trying to evoke a 'whatever it takes' spirit,"

The overheated U.S. housing market is starting to cool down in what some in the industry are calling a real estate shakeout. Sales of previously owned homes fell 5.4% M/M in June to 5.12M units, according to the National Association of Realtors, and were 14.2% lower when compared to the same month a year ago. At those levels, sales fell to their slowest pace since June 2020, when buying activity dropped briefly at the start of coronavirus pandemic. **Future construction:** Single-family housing starts came in at a two-year low in June, down nearly 8% for the month and about 16% lower Y/Y. Things didn't look any better in terms of single-family permits, which were off by similar percentages.

Futures at 8:35, Dow -0.2%. S&P flat. Nasdaq +.2%. Crude -4.0% to \$95.93. Gold -.7% to \$1687.70. Bitcoin -2.4% to \$22,737. **Ten-year Treasury Yield +1 bp to 3.04%**

BMO Commentary: The Bank of Japan held policy rates unchanged and Kuroda stated that "We have no intention at all of raising rates under the yield curve control framework. We also have zero intention of expanding the 0.25% range on either side of the yield target. Right now, we need to continue to tenaciously pursue monetary easing." Needless to say, the yen was weaker as a result; although not at the lows from July 14 - at least not yet. The ongoing selloff in the yen continues to have implications for Japanese investors in Treasuries insofar as hedging costs remain onerous. Suffice it to say, Kuroda's comments won't improve this dynamic and therefore we anticipate flows from the region will remain subdued for the time being. Meanwhile in Frankfurt, the ECB is preparing for policy rate liftoff - with a 50 bp hike on the table; even if the consensus remains for a quarter-point initial move. Let us not forget Italian politics are back in focus with Draghi's resignation as Prime Minister adding further uncertainty to the European political landscape. 10-year Italian yields are 18 bp higher this morning as a result; although bunds and Treasuries have shrugged off the news.

The relevance of the BoJ and the ECB today to the global efforts to combat higher consumer prices are difficult to ignore; however, given the developments are likely to be well in line with expectations, we struggle to see any durable impact on US rates. In fact, given how well-telegraphed moves from the major global central banks are poised to be over the summer, it is reasonable to anticipate that the next phase of trading in US rates will be watching for evidence that the removal of accommodation and policy tightening is having a more material impact on the real economy. As it presently stands, the labor market remains remarkably resilient and while there has been a modest rise in initial jobless claims, the outright numbers remain low from a historic

perspective. That said, this morning's claims data will provide an update that includes the July NFP survey week – adding to the tradability of the release.

Taking a step back, the apparent indifference of US rates to overseas developments demonstrates the increasing focus on the domestic economic narrative versus the global outlook. In part, this mirrors a similar shift undertaken by the FOMC in the wake of the pandemic. Given how dramatic the rise in inflation has been, how long it has persisted, and the degree to which higher consumer prices have become politicized, it follows intuitively that inflation remains public enemy number one for the US economy. That much is clear; so much so that it has become widely understood that the Fed will accept an economic downturn and significant demand destruction in order to preserve its inflation-fighting credibility. Implicit within this tradeoff is an apparent de-emphasis of the ramifications for other economies. We're sympathetic to the urgency of Powell's objective of keeping inflation expectations anchored at all costs and grasp its fundamental relevance.

Moreover, we anticipate that this will become increasingly apparent during the next several months as the FOMC delivers a combined 150 bp of hiking via 75 bp next week and then again in September. The resulting fed funds range of 3.00-3.25% puts policy into restrictive territory – a key transition to be sure and one that we expect won't be lost on risk assets as financial conditions tighten further as well. With a nod to the fact neutral policy is a moving target, we're content with the characterization of 'we'll know it once we've passed it' – implying the fallout for stocks, EM, credit, and commodities has yet to be fully realized despite investors' willingness to price in downside risks for growth throughout the balance of 2022.

Our base case is that the Treasury market will shrug off the actual ECB decision (25 bp or 50 bp) in favor of trading any secondary impact in global risk assets. This afternoon's 10-year TIPS action will provide a real-time gauge of investors' demand for inflation protection in the face of the current array of upward pressure on input costs and strain on consumers' balance sheets. Tactical Bias: 5s/30s moved back below zero and 20s stopped well through with the lowest dealer allocation on record as Treasuries retraced their early strength on Wednesday and 10s moved back to 3% as what is increasingly feeling like the first week of summer trading dragged on. There is little on the calendar ahead of the weekend that will change this tone, although the uncertainty around the scale of the ECB's first hike certainly holds the potential to set the trajectory of global rates on Thursday. For the time being we continue to favor the flattener, although there is admittedly the potential for more appealing entry points to present themselves coming out of the event risk posed by the Fed next week.

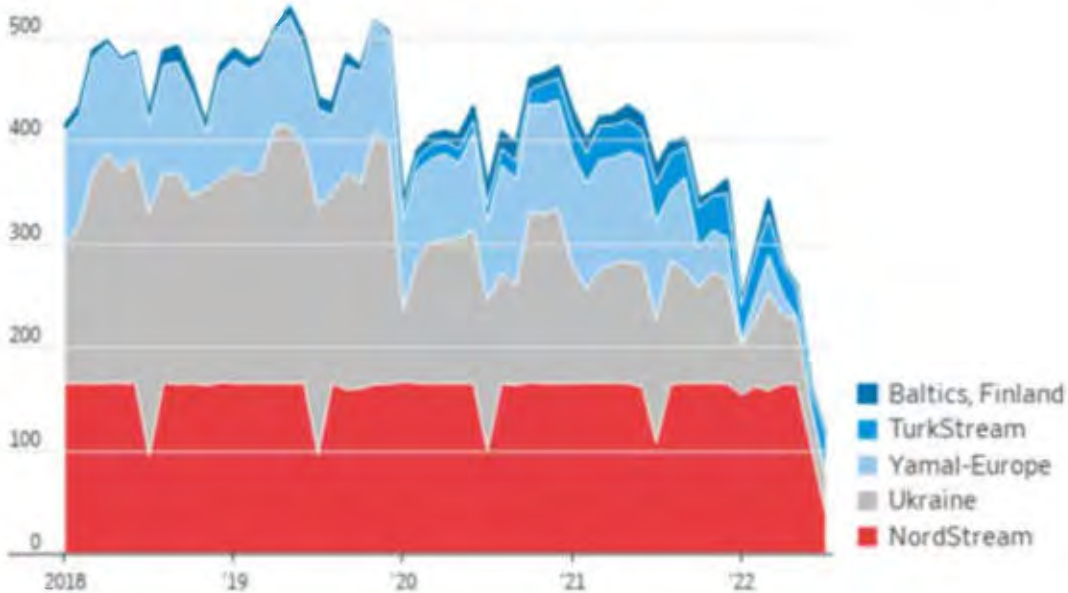
As the path of hiring and overall state of the labor market become increasingly relevant to the Fed and the path of rates, we've seen a sharpening focus on jobless claims that have slowly been on the rise. Anecdotally there has been an increase in headlines surrounding decelerating hiring, hiring freezes, and layoffs as a moderation in the robust jobs recovery has come along with the progress through the cycle and global central banks' normalization efforts. In terms of jobless claims we have now seen the 4-week moving average of initial filers reach its highest level since December 2021 – still low in outright terms, but the trajectory matters as Powell attempts to strike the balance between preventing a wage price spiral while not driving a surge in the unemployment rate. This will make the weekly jobless claims figures increasingly tradable as the other side of the labor cycle draws nearer. The machinations in the TIPS market at the current point in the cycle continue to occupy a large share of the market conversation as rates have found a period of stability. In 10-year real yields that zone is 50 bp to 75 bp and while ostensibly a level that is still very low, over the past ten years current valuations are actually far closer to the upper end of the range than the lower. We'll credit the Fed's hawkishness with the bulk of the increase in reals, as well as the optimism on growth that came out of the pandemic, and with an aggressive hiking cycle now effectively priced and mounting recession worries have sparked questions just how much further the expansion can extend. In practical terms this advocates for a dip buying mentality in the low end of the real curve with 10- and 30-year yields at 60 bp and 95 bp, respectively. - Ian Lyngen and Ben Jeffery

8:30 Release: Initial jobless claims during NFP survey week rose to 251k from 244k vs. the 240k consensus as layoffs continue to tick up from an admittedly strong departure point. The four week moving average of IJC is now 241k vs. 236k prior. Continuing Claims during the week ended July 9 also climbed to 1384k vs. 1340k seen and 1331k previous. Not a game-changing print, but a detail that is contributing to the softening jobs market narrative.

Interest-Rate Pain From Higher Inflation Has Barely Begun (WSJ) *(Yesterday I gave you Krugman's more optimistic take. Here is the more pessimistic view)* Stocks, houses, corporate borrowers and the federal Treasury may not be ready for a world of much higher real interest rates

Russia Resumes Nord Stream Natural-Gas Supply to Europe (WSJ) **Putin's Gas Game: Toy With Europe's Supply and Make Its Leaders Squirm (WSJ)** Kremlin weaponizes energy over Ukraine sanctions, a gambit that carries huge risks for both sides as customers race to lock in alternative sources **Natural Gas Remains Putin's Weapon of Choice (WSJ)** Restarting limited natural-gas flows down the Nord Stream pipeline keeps Moscow in the money and markets on edge

Average daily flows of Russian natural gas to Europe by route, in millions of cubic meters



Note: Monthly data
Source: ICIS

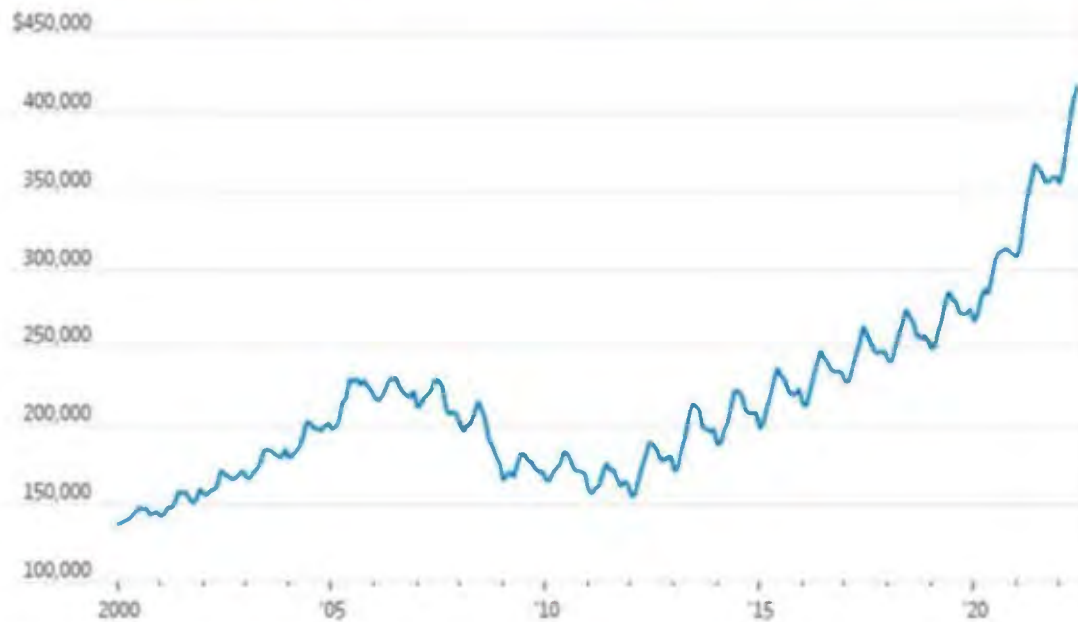
Draghi Resigns as Premier, Leaving Italy Politically Adrift (Bloomberg, attached)

- Move raises prospect of snap election as early as October
- Collapse was inevitable after key allies withdrew support

U.S. Home Prices Hit Record of \$416,000 in June (Even) as Sales Continued to Slide (WSJ) The housing market and construction have cooled as higher interest rates start to bite

And yet...America Still Needs More Homes (WSJ) Housing slowdown is only exacerbating the market's biggest problem: There aren't enough homes

Median existing-home sales price



Source: National Association of Realtors



Note: Seasonally adjusted annual rate
Source: National Association of Realtors

Wall Street Debates the Real Message Behind Bank Loss Provisions (Bloomberg, attached)

- Traders mull bad loan reserves as prudent acts or danger signs
- Consumers are going deeper into debt: Miller Tabak's Maley

Deutsche Bank, UBS Offload \$1 Billion of LBO Debt at a Discount (Bloomberg, attached)

- The \$300 million loan sold at a discounted price of 90.5 cents
- The \$710 million junk bond priced at 90.3 cents to yield 11%

Market Rout Shows Dangers of Margin Lending, Crypto Style (WSJ) A borrower is trapped as Celsius Networks suspends transactions

Peter Thiel-Backed Crypto Lender Vault Files for Protection Against Creditors (WSJ) Vault suspended withdrawals earlier this month and laid off 30% of its staff in June

Lawmakers Near Deal on Tougher Rules for Stablecoins (WSJ) Bipartisan House bill envisions bank-like regulation for volatile digital assets

Law360 - Crypto Miner And SPAC Cancel Plans For \$294M Merger (attached, Ling Yu) In the latest canceled SPAC merger, cryptocurrency miner VCV Digital Technology and special purpose acquisition company Fortune Rise Acquisition Corp. have scrapped tie-up plans that would have taken VCV public valued at about \$294 million, according to a regulatory filing Wednesday.

JPM Sees Crypto Retail Demand Improving, End of 'Intense' Deleveraging Phase (Coindesk, attached – Ling Yu) Improved investor sentiment and increased demand ahead of the Ethereum merge has sparked a market recovery, according to the bank.

FT - Phantom surge in Berkshire trading caused by brokers like Robinhood (attached, Ling Yu) Reporting of fractional share transactions has resulted in artificial increase in volumes, say academics

Law360 - Investors Sue Zillow Execs In Home-Buying Meltdown (attached, Ling Yu) Zillow Group Inc. shareholders sued company leaders Wednesday, alleging they hid risks and overrode internal property valuations as the real estate firm lost more than \$1.2 billion on its home-buying program.

Law360 - SEC, Ripple Spar Over Token Holders' Role In Court Battle (attached, Ling Yu) A group of crypto token holders seeking to weigh in on a U.S. Securities and Exchange Commission expert's report has become the latest flashpoint in the agency's case against blockchain company Ripple Labs, as both sides sparred over the token holders' proper role. Ripple Labs and its two executives, Bradley Garlinghouse and Christian A. Larsen, told a New York federal court that the token holders should be able to weigh in as "friends of the court."

CREDIT DAYBOOK AMERICAS: Investment-Grade Issuance Roars Back (Bloomberg) -- A measure of credit risk is holding steady Thursday after reaching the lowest in six weeks on Wednesday. High-grade issuers continue to take advantage of the calm in markets with weekly volume so far at more than \$43 billion, the largest since more than \$55 billion priced in the week ended April 22, following 1Q bank earning announcements.

- The spread on the Markit CDX North American Investment Grade Index, which declines as credit risk drops, tightened 0.44 basis points to 84.2 as of 7:20 a.m. New York time
- Six investment-grade issuers combined to price \$8.35 billion Wednesday. Tobacco company Imperial Brands headlined the calendar, bringing bonds at an incredibly deep discount to its outstanding curve while domestic banks took a break from their recent frenetic issuance pace, which added more than \$30 billion in the previous two sessions
- Private-credit giants including Blackstone, Ares Management, KKR, Antares Capital -- the only game in town lately for big-

- o Those firms are getting higher yields on financing packages with less leverage, while also commanding stronger investor protections, the people said
- A group of banks led by Goldman Sachs and Barclays has launched a \$1.65 billion loan offering to support Clayton Dubilier & Rice's LBO of Kindred At Home Hospice
 - o A lender meeting for a loan to fund Cinven's acquisition of a stake in telecom-equipment firm ETC Group is scheduled for Thursday
- In junk bonds, Cornerstone Building Brands priced the first since July 6 on Wednesday, wrapping up at \$710 million -- up from \$600 million initially -- and offering investors a juicy 11% yield
- Option adjusted investment-grade spreads narrowed 1 basis point to 144 basis points, according to the Bloomberg US Investment Grade Corporate Total Return Bond index
 - o Option adjusted high yield spreads narrowed 19 basis points to 480 basis points, according to the Bloomberg US Corporate High Yield Total Return Bond index

US HY OPEN: Four-Day Rally for Junk Bonds Lifts Even CCC Credits (Bloomberg) -- CCC yields staged their biggest one-day drop in eight weeks on Wednesday, falling to 13.19%, amid a broader junk bond rally.

- US junk bonds had their biggest one-day gains in about two weeks, after climbing for four straight sessions, helped by traders paring back their bets on next week's Federal Reserve rate hike plus relatively strong earnings that are lifting stocks
- The resurgence in the US junk bond market is persistent and gains spanned across ratings. Junk bond yields drop to a six-week low of 8.22%. Spreads narrowed 19bps to +480
- Taking advantage of the rally, the building products company Cornerstone Building Brands Inc. sold \$710m 6-year notes to fund its buyout by Clayton, Dubilier & Rice after drawing orders of more than \$1.1b
 - o Bankers had to sweeten terms to bring investors on board
 - o Read Deutsche Bank, UBS Offload \$1 Billion of LBO Debt at a Discount
- The primary market remained quiet ahead of the FOMC meeting next week to assess the outlook for growth and the likely path of the monetary policy
 - o Tight credit conditions create a natural barrier for the Fed, BofA wrote last Friday
- While the junk-bond market has edged higher all week, investors still appear to be withdrawing money from high-yield funds
 - o US high-yield funds shed roughly \$1.15 billion through Tuesday's close, JPMorgan wrote on Wednesday, citing Refinitiv
 - o The funds reported withdrawals of \$652 million in the week ended July 13 after an inflow of \$889 million the week before
 - o US junk bonds have seen outflows in six of the last nine weeks
- The junk bond rally may slow down on Thursday, taking its cue from equities. US equity futures fluctuated as investors braced for the European Central Bank's first interest rate hike in 11 years amid political turmoil in Italy

STRUCTURED PIPELINE: Single-Family Rental, CRE CLO Marketing (Bloomberg) -- The next rush of new debt sales may begin premarketing Thursday and Friday now that the SFVegas conference is over. Activity will probably remain fairly active until at least the middle of next month before the traditional late-August slowdown takes hold. Pretium Partners began premarketing its sixth single-family rental ABS of the year off its PROG shelf on Wednesday. ABS-15Gs were filed for a credit card offering from Mission Lane and a subprime auto by Exeter.

- A CRE CLO managed by MF1 is expected to price this week
- Freddie Mac priced its WI-K149 CMBS on Wednesday

Structured Highlights

- Bearish Structured Finance Set for Fast 'Snapback,' Nomura Says
- SFVegas Conference-Goers Put Housing Market in Focus: Kroll
- Wells Fargo Hires Morgan Stanley CLO Trader John Wojciechowski
- SFVegas Attendees Weigh CLO Headwinds & Opportunities: Kroll
- JPMorgan CLO Model Shows Trouble May Come From Loan Downgrades
- Tight Job Market May Contain Weakening ABS & RMBS, Moody's Says
- Eagle Point Nabs Structured Vet Chabba From KLS in Credit Push

DISTRESSED DAILY: AMC Chips Away at Debt with Bond Repurchase (Bloomberg) -- AMC Entertainment Holdings Inc. repurchased some \$72.5 million of its debt in the open market, a move CreditSights analysts called "refreshing" amid the company's embrace of retail traders who might have other ideas on how the movie theater chain should use its cash. The company said Wednesday that it

paid around \$50 million for a chunk of its 10% second-lien bonds due 2026, a move that will save it around \$7.25 million in annual interest costs. The notes jumped 3.25 cents on the dollar Wednesday to 76.25 cents. "It is heartening to see AMC deploy its excess cash at long last to reduce debt, and we think that purchases ~70 cents on the dollar represent great value for the Company," CreditSights analysts Hunter Martin and Matt Zloto wrote in a note. AMC still has some \$5.5 billion in long-term borrowings, but the analysts said the repurchases suggest the company has "significant flexibility" to buy back the rest of the second-lien securities with its more than \$1 billion in cash. Still, they maintained their "hold" rating on those bonds, saying their low ranking makes them "equity like" and the 19% yield is appropriate. Improving theater attendance should help AMC boost its revenue and earnings in the coming years, Bloomberg Intelligence analyst Stephen Flynn wrote in a note this week. He expects the company's Ebitda to be around \$285 million this year, a hefty improvement from last year's \$292 million deficit. AMC's net debt could fall to around 7 times earnings next year, he wrote.

- DATA POINTS

Read more: Ukraine Plan to Freeze Foreign-Debt Payments Clears First Hurdle

- QUOTABLE
 - "Investors are concerned that it's just a matter of time for liquidity stress to spread to larger and healthier developers."
 - Daniel Fan, an analyst at Bloomberg Intelligence on how a liquidity crunch among real estate developers could ripple through the global economy.
- DEADLINES AND DOCKETS
 - All times are U.S. Eastern unless specified and are subject to late revision or cancellation.
- Thursday, July 21
 - Talen Energy, bankruptcy hearing, 2:30 p.m.
- READING LIST
 - News, research and insight relevant to distressed investing
- Discount Retailer Tuesday Morning Is Said to Weigh Bankruptcy
- McLaren Raises \$150 Million From Shareholders With Cash Low
- Bath & Body Works Bonds Drop After Cutting 2Q EPS Forecast
- Banks Kick Off \$1.65 Billion Loan Sale for CD&R Hospice Deal
- Sam Bankman-Fried Expands Crypto Empire During \$2 Trillion Rout

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Thanks so much.

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Table of Contents

Wall Street Journal

- 1. SEC Climate Rule Won't Demand Extensive Reporting From Small Businesses, Gensler Says
- 2. U.S. Audit Inspectors Heading to China After Landmark Agreement

New York Times

6. Can 'the Merge' Save Crypto?

POLITICO Pro

- 7. SEC's Gensler backs accelerating U.S.-China audit deal timeline
- 8. Republicans blast SEC chair over climate disclosure plan
- 9. Senate Ag moves to put crypto under CFTC oversight
- 10. Railroad unions, freight carriers reach deal to avoid massive work stoppage

Bloomberg

- 11. US to Start Review of Chinese Audit Documents Next Week, Gensler Says
- 12. New Crypto Fund Takes US a Step Closer to Spot Bitcoin ETF
- 13. Barclays Is Buying Back \$7.7 Billion of Securities After Mistake
- 14. Senator Pat Toomey Still Sees Stablecoin Legislation This Year
- 15. ETFs That Track Stock Trades of US Congress Members Planned
- 16. SEC Sues Chicago Crypto Over Alleged Illegal Securities Sales
- 17. SEC Sues Ex-New Yorker Alleging \$4.4 Million Digital Asset Fraud
- 18. SEC Advisory Panel Pushes Accounting Rulemaker Oversight Plan
- 19. SEC Body Plans to Back Corporate Reporting of Indirect Emissions
- 20. Gensler Raises Concerns Over 'Staking' Model on Ethereum (1)
- 21. SEC Readies Diversity Guidance for Asset Managers, Gensler Says

Reuters

- 22. U.S. Senate grills SEC's Gensler over climate rule, crypto stance
- 23. U.S. SEC's crypto guidelines push up costs for lenders, disrupting projects
- 24. Analysis: U.S. SEC draft rules could boost resilience of \$24 trillion Treasury market

The Hill

25. SEC chair spars with senators over climate rules

Law360

- 26. SEC's Gensler Suggests Crypto Rules Could Be Years Away
- 27. CFTC Head Calls Crypto Bill First Piece In A Regulatory Puzzle
- 28. SEC Claims Real Estate Loan Co. Misused Investors' \$100M
- 29. SEC Eyeing Public Country-By-Country Reporting, Chair Says
- 30. Lawyers Join In Reimagining Role Of Public Companies

American Banker

31. Toomey predicts Supreme Court will overturn SEC's climate risk plan

InvestmentNews

- 32. SEC slaps B-D with \$100,000 penalty for not registering as muni adviser
- 33. Gensler stands ground on climate disclosure despite lawmaker concerns

ThinkAdvisor

Other Outlets

- 35. Republicans grill SEC Chair Gensler over climate change rules, crypto regs (Yahoo! Finance)
- 36. Doubts Over XRP's Future As Ripple's Battle With the SEC Continues (Newsweek)
- 37. Q&A with Hester Peirce, part two: crypto regulation should not be enforcement-led (IFLR)
- 38. SEC Charges RIA With Stealing Nearly \$750,000 From Pro Baseball Player (Barron's)
- 39. Wilmington man sentenced for role in decade-long Ponzi scheme (Wilmington StarNews)
- 40. SEC's Gensler Signals Extra Scrutiny for Proof-of-Stake Cryptocurrencies: Report (CoinDesk)
- 41. CFTC Already Preparing to Be Crypto Watchdog, Benham Tells US Senators (CoinDesk)
- 42. Powers On... Insider trading with crypto is targeted — Finally! Part 2 (CoinTelegraph)
- 43. Republicans plan legal assault on climate disclosure rules for public companies (The Guardian, UK)

Wall Street Journal

1. SEC Climate Rule Won't Demand Extensive Reporting From Small Businesses, Gensler Says

15 Sep 2022 (8:06 PM), Richard Vanderford

A proposed climate disclosure rule wouldn't require public companies to ask small private suppliers to report on their carbon footprints, Securities and Exchange Commission Chairman Gary Gensler said, responding to concerns about compliance costs.

Public companies reporting emissions linked to their supply chain—known as Scope 3 emissions—can estimate the carbon footprint of small suppliers and still comply with the proposed rule, Mr. Gensler said Thursday at a U.S. Senate oversight hearing.

The SEC in March proposed a rule that would require public companies to report their climate-related risks and their emissions, including in some cases those from suppliers. Representatives for some small businesses expressed concern over the costly compliance burden during a public comment period. The rule isn't yet final and could face challenges in court.

Sen. Jon Tester (D., Mont.), a farmer, said at the hearing that the "little guy" doesn't have time to sit in front of a computer cataloging fuel and fertilizer consumption. Mr. Gensler responded by saying that wasn't the intent of the rule.

"That public company you sell to does not have any obligation to ask you specifically," he said. "[Public companies] either need to estimate, or if they don't have an estimate just discuss how they're managing that Scope 3.

"The intent, senator, is...whether it's the farm community or other community—if they're not public companies, they're not under this rule," Mr. Gensler said, adding that the SEC is "working through" the issue, which was raised in some of the 14,000 comments the agency received.

An SEC representative didn't respond to a request for further information.

Small businesses across industries, from egg farmers to convenience-store owners, have voiced concerns over the proposal and the cost burden it would place on them. Mr. Gensler on Thursday responded to questions about those costs by saying the rule is meant to provide investors with more consistent information on climate-related risks faced by public companies.

A lawyer for the American Farm Bureau Federation said Thursday that the organization was encouraged that the SEC had recognized its concerns. The federation hopes the SEC will publish a final rule that ensures "farmers will never be responsible for tracking and reporting their operational data to Wall Street,"

A manufacturing trade group said the Scope 3 requirements of the proposed rule should be taken off the table.

“The best way to protect these businesses is to strike Scope 3 from any final rule,” said Charles Crain, senior director of tax and domestic economic policy at the National Association of Manufacturers. The mandate as proposed prioritizes actual reported emissions over estimates and could disproportionately harm small and family-owned manufacturers, he said.

The SEC has estimated the plan will raise the cost to businesses to comply with its disclosure rules from \$3.9 billion to \$10.2 billion. Mr. Gensler Thursday referred to estimates that place the cost to comply with the climate rule in the “single-digit billions across the entire economy.”

[Back to Top](#)

2. U.S. Audit Inspectors Heading to China After Landmark Agreement

15 Sep 2022 (4:27 PM), Paul Kiernan

U.S. regulators could know by Thanksgiving if Beijing is complying with an agreement designed to allow Chinese companies to continue trading on American stock exchanges.

Inspectors from the U.S. Public Company Accounting Oversight Board are preparing to travel to Hong Kong to begin reviewing the audit files of publicly traded Chinese companies, Securities and Exchange Commission Chairman Gary Gensler told lawmakers Thursday. The PCAOB is a nonprofit created by Congress and overseen by the SEC.

The inspectors are expected to depart Friday and start work next week, Mr. Gensler told members of the Senate Banking Committee. The process would take eight to 10 weeks. “So we’ll probably know somewhere around Thanksgiving or early December,” he said.

Washington and Beijing reached an agreement last month to allow the PCAOB to inspect the audits of Chinese companies listed on U.S. exchanges, a 20-year-old requirement of U.S. law that China hasn’t met. The agreement, which came after a decadelong standoff between regulators in the two countries, created a path that could prevent some 200 Chinese companies from being kicked off U.S. stock exchanges in early 2024.

The agreement allows PCAOB inspectors to travel to Hong Kong or mainland China for inspections. When it was signed last month, PCAOB officials said the deal promised “complete access to the audit work papers, audit personnel, and other information we need to inspect and investigate any firm we choose, with no loopholes and no exceptions.”

China had previously denied U.S. regulators routine access to such documents on the grounds of national security. In a departure from that justification, China’s stock regulator said last month that audit working papers generally don’t risk exposing state secrets, individual privacy, companies’ vast user data or other sensitive information.

U.S. officials welcomed the change of tone but have questioned if China will follow through.

“I don’t know if the Chinese are going to comply,” Mr. Gensler said Thursday, even though he said officials from China’s Ministry of Finance directly told him in video calls that they intended to.

[Back to Top](#)

3. Justice Department Targets Executive Pay, Probationary Deals to Curb Corporate Crime

15 Sep 2022 (7:40 PM), Dylan Tokar and Dave Michaels

The Justice Department will push companies to claw back compensation from executives involved in bribery and fraud and limit the use of probationary deals that allow companies to avoid criminal charges, in a bid to adopt a tougher stance on white-collar crime.

The new policies—part of a expansive list of changes to how the department prosecutes companies that run afoul of the law—were outlined in a memo issued by Deputy Attorney General Lisa Monaco on Thursday. Ms. Monaco, who was appointed by President Biden and took office last year, announced the policy overhaul during a speech at New York University’s law school.

Although political appointees at the Justice Department often make changes to the agency’s policies on corporate crime, Ms. Monaco’s memo is one of the most comprehensive updates in years, and makes good on a promise she made last year to review how prosecutors handle corporate cases, including those involving companies with long histories of past offenses.

The policy changes are the result of a yearlong review by an advisory group that included consultation with both internal experts and outside stakeholders, ranging from consumer advocates to the U.S. Chamber of Commerce, Ms. Monaco said ahead of her speech on Thursday.

“What you’re seeing here is an approach that is focused on both individual accountability and corporate responsibility,” she said.

The policy changes are likely to face some pushback from companies and lawyers, and could be rolled back by future administrations. Although members of both parties have voiced support for policies giving priority to the prosecution of individual executives, Democrats and Republicans have differed on other questions surrounding the Justice Department’s approach to corporate crime.

That debate has sparked a series of policy revisions—and sometimes reversals—by Justice Department officials installed by various presidential administrations who have sought to address criticism of the department’s response to the 2008 financial crisis.

Prosecutors in recent decades have come to rely on probationary deals known as deferred prosecution agreements, under which companies pay a fine, admit wrongdoing and agree to improve policies designed to prevent employee misconduct. Critics have argued that such settlements have become the cost of doing business for big companies and Wall Street banks, and that too few executives ever face criminal charges.

Ms. Monaco’s memo builds on a policy issued by a Democratic predecessor, Sally Yates, which required companies to turn over evidence of wrongdoing by executives to receive cooperation credit from prosecutors. Ms. Monaco’s latest guidance states that companies may be penalized if they don’t turn such evidence over quickly enough.

The memo also places restrictions on the use of deferred prosecution agreements, stipulating that prosecutors must seek approval from Ms. Monaco’s office to use that form of settlement with a company that has received one in the past. It also targets corporate policies concerning executive compensation, pushing companies to design clawback policies that would apply in cases where an executive is involved in wrongdoing.

The memo also lays out some new benefits for companies that report wrongdoing and cooperate with prosecutors. Companies that do so may be eligible for probationary deals and can avoid additional oversight measures that prosecutors sometimes impose after a settlement is struck. The move extends a leniency program created in 2016 for companies that violate antibribery laws.

“The goal here is twofold: to be very, very clear that companies should not think they can bake in, or price in, [deferred prosecution agreements] as a cost of doing business,” Ms. Monaco said ahead of her speech. “By the same token...what we hope is this provides a clear signal, a clear path, for general counsels and chief compliance officers to go in to the board and say, ‘We’ve got to invest in this [compliance].’”

Case 1:24-cv-01858-AER Document 34-4 Filed 06/20/25 Page 254 of 601
Clawbacks already are a part of regulators' enforcement toolbox, and many public companies tell shareholders they have policies to reclaim incentive pay in some circumstances. About half of public companies disclosed clawback policies last year, according to a research note issued by the Securities and Exchange Commission's Division of Economic and Risk Analysis in June.

Under a law passed in 2003, the SEC can order a public company's chief executive or chief financial officer to return one year's worth of incentive pay if the company is accused of misconduct that results in a restatement of financial results.

The 2010 Dodd-Frank financial-overhaul law expanded that authority, although the SEC hasn't used those powers. The SEC is now weighing a rule that would require all exchange-listed companies that restate financial results because of accounting misconduct to claw back incentive pay awarded to both current and former executives for three years before the restatement.

[Back to Top](#)

4. [Ether's New 'Staking' Model Could Draw SEC Attention](#)

15 Sep 2022 (6:07 PM), Paul Kiernan and Vicky Ge Huang

Ethereum's big software update on Thursday may have turned the second-largest cryptocurrency into a security in the eyes of a top U.S. regulator.

Securities and Exchange Commission Chairman Gary Gensler said Thursday that cryptocurrencies and intermediaries that allow holders to "stake" their coins might pass a key test used by courts to determine whether an asset is a security. Known as the Howey test, it examines whether investors expect to earn a return from the work of third parties.

"From the coin's perspective...that's another indicia that under the Howey test, the investing public is anticipating profits based on the efforts of others," Mr. Gensler told reporters after a congressional hearing. He said he wasn't referring to any specific cryptocurrency.

Issuers of securities—a category of assets that includes stocks and bonds—are required to file extensive disclosures with the SEC under laws passed in the 1930s. Exchanges and brokers that facilitate the trading of securities must comply with strict rules designed to protect investors from conflicts of interest. Cryptocurrency issuers and trading platforms face strict liabilities if they sell any assets that are deemed to be securities by the SEC or courts.

Staking is one of two ways in which cryptocurrency networks verify transactions. Used by some of the largest cryptocurrencies—including Solana, Cardano and, as of this week, ether—it allows investors to lock up their tokens for a specified amount of time to receive a return.

If an intermediary such as a crypto exchange offers staking services to its customers, Mr. Gensler said, it "looks very similar—with some changes of labeling—to lending." The SEC has repeatedly signaled over the past year that firms offering crypto-lending products need to register with the agency and in February forced BlockFi Lending to pay \$100 million for failing to do so.

Competition for jurisdiction over crypto is heating up among federal agencies and the congressional committees they answer to. As the Senate Agriculture Committee, which oversees the Commodity Futures Trading Commission, held a hearing Thursday to vet a crypto bill, the Senate Banking Committee, which oversees the SEC, held a simultaneous hearing for members to question Mr. Gensler.

The crypto bill proposed by leaders of the agriculture group last month would specifically designate bitcoin and ether as digital commodities rather than securities. Under current law, such assets have no federal regulator. The bill would grant the CFTC, which oversees derivatives markets, authority to regulate digital commodities.

Exchanges such as Coinbase and FTX would be required to register with the CFTC, monitor trading,

protect investors from abuse and only offer assets that are resistant to market manipulation among other rules. They also would be obliged to disclose some information about the assets they list, such as operating structure and conflicts of interest.

Consumer-protection advocates worry that the CFTC lacks the resources and experience to look out for small investors in a market that Mr. Gensler has described as the Wild West. The CFTC's staffing is a fraction of the SEC's and the markets it oversees are dominated by sophisticated hedge funds, banks and companies—not individuals saving for retirement.

To fund its oversight of the digital commodity market, the CFTC would need \$112 million over the first three years for rule making, hiring, training and outreach purposes, CFTC Chairman Rostin Behnam said during the hearing. He said the amount would be generated from crypto companies in the form of a user fee. The agency has a current annual budget of \$320 million, Mr. Behnam added.

While it doesn't communicate directly with individual investors, Mr. Behnam said the CFTC works closely with the National Futures Association and state regulators to ensure the individuals and institutions within its jurisdiction are complying with the law.

The crypto industry has shown a strong preference to be regulated by the CFTC instead of the SEC, which has a rigorous disclosure regime that crypto lobbyists argue is expensive and impractical. Crypto firms have spent millions of dollars lobbying congress for its interests.

Before moving to the proof-of-stake model this week, ether previously relied on an alternative model, known as proof-of-work, the model bitcoin uses. The model is often criticized for its high energy use because miners commit massive amounts of computing power to the network.

Under the bill, the CFTC also would be required to work with other regulators with expertise in the energy space to produce a report on the energy consumptions of crypto projects.

The agency would make recommendations to either create a disclosure regime or incentives for firms to indirectly move away from proof of work to proof of stake or other methods to reduce energy consumption.

[Back to Top](#)

[5. Nikola Founder Trevor Milton Faces Jury Over Electric-Truck Claims](#)

15 Sep 2022, N/A

Trevor Milton, the founder of electric-truck company Nikola, is facing fraud charges in a New York court. Prosecutors allege he lied to investors about the company's technology, but his lawyers call it a case of a founder voicing their hopes for the company. But the trial could have ramifications beyond Nikola and its founder. Wall Street Journal reporter Ben Foldy joins WSJ Tech News Briefing host Zoe Thomas to lay out the issues and why it could matter for startups looking to go public.

FULL TRANSCRIPT

This transcript was prepared by a transcription service. This version may not be in its final form and may be updated.

Zoe Thomas: As a founder, Trevor Milton was known for making bold statements, and displaying a charisma that inspired employees and attracted investors. When it came to promoting his electric truck startup Nikola, he went on podcasts and new shows, making big claims about its hydrogen trucks and the fueling stations that would support them. The company brought in a lot of funding, and when it went public in 2020, retail investors flocked to it, raising its valuation from \$3.3 billion to \$30 billion. But now, Milton is on trial, accused of lying about Nikola's technological capabilities to enrich himself. He left the company in 2020. Milton faces two counts of wire fraud and two counts of securities fraud, with the possibility of 25 years in prison. He's pleaded not guilty. Beyond what it could mean for Milton and Nikola, the case could have ripple effects for other young pre-IPO companies looking to get investors excited about their future.

Speaker 2: Thanks for having me.

Zoe Thomas: So prosecutors allege that Trevor Milton made these big promises and misled investors about the technology Nikola had developed. Can you tell us a bit more about what those allegations are and how they came about?

Speaker 2: Yeah, so the allegations came after a short seller, Hindenburg Research, and some whistleblowers put out a report alleging that Trevor Milton had made all kinds of misrepresentations about the company. And one of the US attorneys, when they first unveiled these charges said Trevor Milton lied about basically every element of the business. And in their opening statements, the prosecutors said Mr. Milton had lied about the technology that the company had built, namely this early prototype truck, which he had said was fully built, fully functional. And whistleblowers and prosecutors alleged that, no, it wasn't, never drove anywhere under its own power, and was rolled down a hill for promotional video, that Mr. Milton misrepresented the production of the fuel, there were a couple times where he'd said Nikola was making hydrogen at \$4 a kilogram, which not only was that an unprecedentedly cheap price for producing hydrogen, but Nikola had not produced any hydrogen at any price at that point. They also focused on representations Trevor Milton made about the quality and amount of the contracts and orders they had for the trucks in the future. And the last thing that they sound like they're going to focus on in this trial is a pickup truck called the Badger. That was a big motor for Nikola's big stock jump in June of 2020, but prosecutors allege barely existed beyond some very basic preliminary steps towards it.

Zoe Thomas: What do we know about the defense's strategy?

Speaker 2: Yeah, so Tuesday was the first day that we really got a look at it. There were a few arguments running in parallel. One was that the government's case is based on distortion and they said distortion of context, distortion of the words, cherry-picking of claims. They also made the argument that it's not enough to have misstatements, you have to have intent essentially. And that Trevor had not intentionally deceived and misled. They also pointed the finger at other Nikola executives. According to them, Trevor was part of Nikola's promotion, was pushed to go out there by Nikola executives and not stopped when he talked and made some of these representations. So there was kind of why isn't everybody else at Nikola also being held accountable for this? And then there was also an element of questioning the motives of everybody who would be called to testify against Mr. Milton, and we got a taste of that. One of the witnesses who acted as a whistleblower has a financial incentive under the SEC's whistleblower program, and also participated in shorting the stock at one point. So it seems like the defense is keen to point out that people testifying against Milton have an interest in doing so. They took kind of an interesting tack at the end of their opening statement. Trevor Milton's lawyer compared Trevor Milton talking about Nikola as like a parent talking about a child, and said if a parent looks at a five-year-old and says, "That kid is going to Harvard," nobody takes them seriously and thinks that that kid is actually going to Harvard at that moment and said that Trevor was talking in the same way about this product of his labor and a vision for the future.

Zoe Thomas: Let's dive into one of those points you just mentioned. Trevor Milton, the founder and former leader of this company is on trial. Why isn't the company itself part of this case?

Speaker 2: I think if the defense has their way, that the company will be a part of this case, looking as to who in the room was trying to stop Trevor. Nikola did settle with the SEC and had an investigation into these allegations and paid \$125 million. So I think Nikola the company did pay its pound of flesh, so to speak. But even the defense himself pointed out was that Nikola and all of its disclosures, these reams and reams of financial documents would often have it more hedged or careful or qualified version of some statement. And then Trevor would be the one on the podcast or on TV with the big, boisterous claim.

Zoe Thomas: Let's talk a bit about the people who did buy the Nikola stock because a lot of them were novice investors, very excited about this company. Is that expected to be an important part of this trial at all?

Speaker 2: I think for the prosecutors, it is. They really are trying to paint this as this was a stock promotion scam, for lack of a better word, that was aimed at retail investors. And one of the ways that they backed that up was by saying that Trevor Milton wasn't just on CNBC or just on earnings calls, he was tweeting, he was Instagram Living, he was validly saying, "I want to be the most open and accessible executive on social media." And so according to the prosecution, that was part of this larger fraud to drive the stock price up by appealing to retail investors and Robinhood traders and the like.

Zoe Thomas: Nikola when public via a special purpose acquisition company, sometimes called a blank check company. A lot of other green vehicle companies went public the same way, around the same time, with also big promises. Does the fallout from Nikola have any impact on them, on how investors or maybe regulators are looking at them?

Speaker 2: I think Nikola was the first big SPAC success in the space, and also the first big catastrophic blowup in the space, and not the last of either of those. When Nikola went public in June of 2020, it soared in its first week, and was briefly worth more than Ford Motor Company without having any revenue to speak of. And that showed a lot of companies, I think, that there was an easier and quicker way of going public pre-revenue in a lot of cases, and that the market had an appetite for those kinds of deals at that moment, and really drove valuations up for a while. So Nikola was the first of those to come back to earth with these allegations that started coming out in June, but didn't really get traction until September. And then in the time since, a lot of the other EV companies that have SPACed have disclosed SEC investigations or Department of Justice investigations, they've been hit by short sellers, even the same short sellers in some cases. And the sector is really, it's not just one Icarus, it's been a bunch of Icaris I guess. Nikola was kind of the poster child, but the whole sector's been racked with these issues.

Zoe Thomas: All right. That's our reporter, Ben Foldy. Thanks so much for joining us, Ben.

Speaker 2: Thank you for having me.

Zoe Thomas: To hear more tech stories from The Wall Street Journal, ask your Google Assistant to play WSJ Tech News Briefing Podcast.

[Back to Top](#)

[New York Times](#)

6. Can 'the Merge' Save Crypto?

15 Sep 2022, Kevin Roose

Crypto could use a bit of good news these days. And on Wednesday, it got some.

Ethereum, the most popular crypto platform, appears to have successfully upgraded its software architecture from a type of blockchain known as "proof of work," which it has run since its inception in 2015, to a type of blockchain known as "proof of stake."

This upgrade, which came to be called, simply, "the merge," is already being heralded as a watershed moment in the history of crypto.

Early Thursday, as the first proof-of-stake transactions were verified, dozens of Ethereum developers gathered on a celebratory Zoom call hosted by the Ethereum Foundation.

"This is the first step in Ethereum's big journey towards being a very mature system," Vitalik Buterin, Ethereum's founder, told the group. "To me, the merge symbolizes the difference between early stage Ethereum and the Ethereum we've always wanted."

And many crypto fans hope that it will turn things around for the crypto movement, which has been besieged in the past year by trillions of dollars in losses, a string of major scams and hacks, and a new

I'm not so sure it will. But before I tell you why, let's review some of the reasons that crypto supporters are celebrating.

First, it was far from a given that the merge would work. Switching a blockchain's so-called consensus mechanism — the way that it processes and verifies new transactions — is terrifyingly complex. (Some crypto developers have compared it to swapping out a spaceship's engine midflight.) Before the merge, nobody had tried such a maneuver on a crypto platform anywhere near Ethereum's size, and it took years of testing and research (and many, many delays) for developers to get confident enough to attempt one. Ethereum, which is open source, hosts hundreds of billions of dollars' worth of cryptocurrency transactions, NFT collections and DeFi protocols, all of which could have been irreparably broken if the merge hadn't gone according to plan.

Something could still break in the coming days. But the merge appears to have gone as smoothly as Ethereum fans could have hoped.

The second reason crypto fans are happy about the merge is that the new Ethereum blockchain is much more environmentally friendly than the old one. Ethereum used to be secured by a network of high-powered computers that competed against one another to solve cryptographic puzzles, burning vast amounts of energy in the process. Now, it will be secured by a process known as "staking," which involves investors agreeing to deposit their crypto coins in a shared pool in exchange for a chance to earn financial rewards.

There are other benefits to the merge — it's expected to make Ethereum faster and more efficient in the long run — but the environmental footprint is the big, immediate improvement. According to crypto researchers, the new Ethereum blockchain will consume 99.95 percent less energy than the old one. That's a huge change — comparable to the entire nation of Portugal going off the grid, according to Digiconomist, a website that tracks crypto's energy consumption. And it should help industry advocates make the case that crypto can be green.

Third, many crypto fans are optimistic that the merge will be good for the value of Ether, Ethereum's native cryptocurrency. For reasons that are too complicated to get into here, running the Ethereum blockchain requires destroying (or "burning") billions of dollars' worth of Ether every year. The new Ethereum blockchain will still burn Ether, but it won't need to create as much new Ether to pay out rewards to participants. That means that the overall supply of Ether could shrink, increasing the value of existing coins. In addition, miners — the people who ran those giant, energy-guzzling server farms under the old proof-of-work system — will no longer be forced to sell some of their Ether to pay their electricity bills, which could result in more stable prices.

I've talked to a number of crypto industry leaders about the merge, and the general feeling they express is one of cautious optimism. It's been a brutal year in crypto, but now that Ethereum has neutralized one of the most common objections to crypto — the enormous environmental toll — they hope that at least some skeptics will come around. Regulators won't object as strenuously to Ethereum 2.0, they believe, and companies that experiment with NFTs and other Ethereum-based technologies won't face as much backlash.

But I'm doubtful that the merge will solve crypto's problems overnight — and it may introduce some even thornier ones.

For starters, it's not clear to me that Ethereum's energy use was the biggest obstacle to mainstream crypto adoption. It's true that a lot of people who are opposed to crypto on principle tend to cite environmental concerns as a strike against it. But these days, a lot of people are skeptical of crypto for reasons that have nothing to do with energy. Maybe they know someone who lost a fortune betting on Dogecoin or Luna. Maybe all the stories of hacks and scams have scared them away. Maybe they're intimidated by crypto's complexity, or put off by the lack of obvious uses for it. Or maybe they're just philosophically opposed to a new form of money that doesn't have the backing of a government.

Case 1:24-cv-01838-ACR Document 34-4 Filed 06/20/25 Page 259 of 601
Right now, the biggest threat to crypto — in the United States, at least — is that the people who are in charge of regulating the industry seem to want to ban it. These regulators are worried about stablecoins, Ponzi schemes, state-sponsored ransomware attacks and investors losing their money to opaque crypto-lending schemes.

The merge doesn't address any of that. And while you might be able to change some politicians' minds about crypto by telling them that Ethereum now uses 99.95 percent less energy, I'm not sure it will move the needle at all with the people whose opinions matter most. For example, Gary Gensler, the head of the Securities and Exchange Commission, didn't mention environmental concerns at all in an opinion essay he wrote for The Wall Street Journal last month about why the crypto industry should be more tightly regulated.

The merge could also stoke internecine tensions within the crypto community. Already, there are some Bitcoin fans — "maxis" — who believe that Ethereum's switch to a proof-of-stake algorithm was a calculated P.R. move designed to make Ethereum look good while throwing Bitcoin under the bus. (Bitcoin, which runs on a proof-of-work system, has no plans to switch to a new consensus mechanism, so its energy consumption is likely to stay high, at least for the foreseeable future.)

Because it is secured by investors staking large pools of Ether, rather than by networks of puzzle-solving computers, the new Ethereum could also increase the crypto industry's overall centralization, giving more power to large firms like Coinbase, Kraken and Lido — and potentially making it easier for governments to crack down on Ethereum itself, by pressuring those firms to censor certain transactions. (Coinbase's chief executive, Brian Armstrong, has already said he will shut down the company's Ethereum-staking business rather than comply with government censorship requests, if it comes to that.)

And, of course, the merge won't put money-losing crypto investors back in the black or recover the assets lost by investors in failed crypto projects like Luna and Celsius Network.

Make no mistake, the merge was a technological marvel, a genuine boon to the environment and a testament to the power of cooperative open-source development. I'm glad that it happened, and the developers who toiled away for years to make it work should feel proud of how smoothly it went.

But crypto will need more than a successful merge to turn its fortunes around. Sorry to take the fizz out of the champagne.

[Back to Top](#)

POLITICO Pro

7. SEC's Gensler backs accelerating U.S.-China audit deal timeline

15 Sep 2022 (1:47 PM), Declan Harty

SEC Chair Gary Gensler called for accelerating the timeline for kicking Chinese and Hong Kong companies off American stock exchanges if the firms fail to allow U.S. inspectors to review their financial audits as promised.

While Washington and Beijing have struck a preliminary deal to permit the Public Company Accounting Oversight Board to conduct on-the-ground inspections of the companies, the top Wall Street regulator told lawmakers Thursday that he's not sure whether the Chinese will hold up their side of the arrangement.

PCAOB inspectors are expected to head to Hong Kong on Friday to carry out the investigations, which will take between eight and 10 weeks, Gensler said at a Senate Banking Committee hearing.

He also reiterated his support for cutting down the amount of time that foreign companies can stay listed in the U.S. without allowing the PCAOB complete access to their audit working papers, as mandated by the 2020 bipartisan Holding Foreign Companies Accountable Act. Doing so, Gensler said, would provide officials with "the right leverage" to keep the pressure on Beijing.

"Even if the Chinese regulators allow for compliance this year, what about next year?" Gensler said at the

Currently, the Holding Foreign Companies Accountable Act calls for companies to be booted off the New York Stock Exchange and Nasdaq if they have failed to comply with the law for three straight years. However, lawmakers like Sen. John Kennedy (R-La.), one of the legislation's original backers, have pushed to amend that to two years with the Accelerating Holding Foreign Companies Accountable Act, which has already passed the Senate and is awaiting action in the House.

The legislation, if enacted, could set the stage for hundreds of additional Chinese companies to be removed from U.S. markets as soon as 2023 if they don't comply.

"The ultimate proof is in the pudding, right?" Sen. Chris Van Hollen (D-Md.) said at the hearing.

[Back to Top](#)

8. [Republicans blast SEC chair over climate disclosure plan](#)

15 Sep 2022 (11:31 PM), Declan Harty

Republicans on Thursday stepped up their attacks on one of the country's top financial regulators over his plan to press companies to disclose more about their carbon footprint.

GOP lawmakers called on SEC Chair Gary Gensler to justify his agency's draft rule to require publicly traded firms to release more standardized information about the climate risks their businesses present, warning that the proposal is unlikely to stand up to court challenges once finalized.

"The SEC is wading into controversial public policy debates that are far outside its mission and its expertise and without the legal authority to do so," Sen. Pat Toomey (R-Pa.) said at a Senate Banking committee hearing. "In doing so, the SEC risks politicizing the agency, slowing economic growth, increasing inflation, and even undermining national security."

Environmental, social and governance issues — which have drawn increasing attention from investors in the face of rising sea levels, racial injustice and labor disputes — have become a lightning rod with Republicans across the country.

Lawmakers and other officials in Florida, Texas and West Virginia have all threatened to crack down on or block the states from doing business with investment firms and banks that use ESG principles in their businesses or have spoken about moving away from fossil fuels.

In Arizona, Blake Masters, the Peter Thiel-backed Republican candidate for Senate, said ESG scores for companies "have absolutely no place in our country." And Republicans on Capitol Hill have indicated that the rise of ESG investing, and the SEC itself, will face intense scrutiny if their party takes control of either chamber after the midterm elections.

Under Gensler, the SEC has been treading deeper into ESG, with the March climate proposal marking one of the most aggressive overhauls of corporate disclosure rules in years. Gensler said the regulator is not aiming to curb the use of fossil fuels, however, but rather to explore how to get companies to release more standardized information because investors are demanding it.

"[The proposal's] about actually helping investors get more consistent information," he said, "even if they want to invest in what might be a brown asset rather than green assets."

Democrats, large asset managers like BlackRock and investor advocacy groups have championed the SEC's proposal.

Senate Banking Chair Sherrod Brown (D-Ohio) said the "understanding of risk can provide transparency and comparability," adding that "if only a subset of companies provides disclosures and they do so in whatever form they want, that doesn't serve anyone."

"The mandatory climate disclosure rule positions investors and companies to reduce their financial risks," said Steven Rothstein, managing director of the Ceres Accelerator for Sustainable Capital Markets, a part of the sustainable investment advocacy group Ceres, in a statement. "We know the cost of doing nothing is severe: last year, the U.S. saw \$145 billion in damages from climate-related extreme weather disasters. It is also important to look at the cost — \$1.3 million — that investors are currently spending as part of their fiduciary responsibility to address climate risk."

Republican lawmakers have opposed the proposal since its introduction, and they've been backed by many companies, which have lobbied against it. In April, GOP members of the Banking committee urged Gensler in a letter led by Sen. Kevin Cramer (R-N.D.) to scrap the plan.

One of the most contentious parts of the proposal is the inclusion of indirect greenhouse gas emissions, known as scope 3, that stem from a company's suppliers and customers.

The SEC is not mandating outright that all public companies begin reporting such information, only larger ones that deem those emissions "material" or have adopted a plan to lighten their climate footprint.

Yet lawmakers, including Sen. Jon Tester (D-Mont.), are still worried about what that reporting would mean for the small businesses and private companies that are part of those larger entities' supply chains.

Gensler told Tester that a public company would "not have any obligation" to specifically ask about, for instance, how much fuel a farmer they buy from uses. The company can instead use estimates, he said, while reiterating that the SEC is still sifting through the feedback it has gotten on the climate disclosure proposal before finalizing it.

Sen. Elizabeth Warren (D-Mass.) urged Gensler to broaden the reporting of scope 3 emissions — something that progressives and environmental advocates have been pushing the SEC to do.

"You need all three scopes because otherwise a company could just stop doing the filthiest part of their business and hire some smaller non-reporting company to do the same filthy work and then report themselves as greener," Warren said.

Republicans disagree.

At the end of the hearing, Toomey raised concerns that the SEC lacks the authority to pursue the climate disclosure proposal, citing the Supreme Court's recent decision in *West Virginia v. EPA*, which effectively declared that agencies need explicit approval from Congress before addressing sweeping areas of economic or political significance.

And while Gensler said climate disclosures squarely fit within the SEC's jurisdiction, Toomey ended with a simple warning: "If you go ahead with something substantively similar to the proposed rule, you're going to find a very unsympathetic court."

[Back to Top](#)

9. Senate Ag moves to put crypto under CFTC oversight

15 Sep 2022 (9:12 PM), Sam Sutton

In a major first step for Congress, the Senate Agriculture Committee on Thursday held an initial hearing on bipartisan legislation that would force crypto startups that manage trades for Bitcoin and Ether to register with the Commodity Futures Trading Commission.

The bill, S. 4760, sponsored by Committee Chair Debbie Stabenow (D-Mich.) and Sen. John Boozman (R-Ark.), marks Congress' clearest effort to set rules for crypto marketplace that crashed amid a series of scandals and bankruptcies earlier this year. The measure would task the CFTC as the industry's top regulator even as SEC Chair Gary Gensler angles to bring high-profile digital exchanges under his agency's jurisdiction.

“This is not about us at the CFTC. It’s not about the SEC. It’s about the regulatory framework. It’s about financial markets. It’s about protecting customers,” CFTC Chair Rostin Behnam told senators Thursday, later adding the new bill provides his agency with additional resources to address digital spot markets. “If we keep that goal in mind, I think we’ll be able to accomplish what we’re tasked with,” he said.

The bill would grant the financial derivatives regulator sweeping new authorities to set consumer protection rules to crypto exchange operations, including how marketplaces list new digital tokens. And industry players say they’re encouraged that Congress might finally offer clarity to an asset class that’s currently overseen by a patchwork of state and federal agencies.

“The hope is that this will result in a pivot away from the kind of regulation by enforcement that we’re seeing from other parts of other agencies,” Crypto Council for Innovation CEO Sheila Warren said in an interview after testifying at the hearing. CCI, whose members include Coinbase, Fidelity’s digital assets arm and crypto-focused venture firms like Andreessen Horowitz and Ribbit Capital, is “generally supportive” of the measure, Warren added.

The potential movement on crypto legislation also comes as Wall Street behemoths like Citadel Securities and BlackRock launch new products targeting digital asset markets that have largely been dominated by startups and foreign-domiciled exchanges.

“While I was CFTC chair, we brought nearly 20 crypto-related enforcement cases to protect market integrity, but we couldn’t write any rules to stop bad behavior before it happens,” former CFTC Chair Heath Tarbert, who’s now the chief legal officer for Citadel Securities, told the committee. “This bill addresses that glaring regulatory gap.”

The United States has lagged other countries in developing specific rules for crypto trading platforms that amassed huge followings after spending billions of dollars on endorsement deals, stadium naming rights and attention-grabbing ad campaigns during the pandemic.

This summer’s crypto market crash, accelerated by the collapse of several top digital asset startups, resulted in more than \$1 trillion in losses that wiped out retail investors and put new pressure on policymakers to develop rules and bring the industry’s excesses to heel.

“We’ve got people out there investing in this and don’t have a clue what they’re doing, including me,” Sen. Tommy Tuberville (R-Ala.) said during the hearing, later adding: “This is not a phase. This is not going away.”

Gensler, who led the CFTC during the Obama administration, has repeatedly cited crypto’s risk to consumers in an attempt to persuade digital trading platforms like Coinbase, FTX and Binance to register with his agency — a move that could force the companies to spin off parts of their businesses to avoid violating securities laws.

The industry has resisted the efforts, at least in part, on the grounds the most widely traded digital assets bear more resemblance to commodities that are overseen by the CFTC.

The Stabenow-Boozman bill specifically would maintain the SEC’s authority over digital assets that resemble securities. The bill also would allow for joint registration of crypto businesses whose platforms offer both digital commodities and products resembling traditional stocks and bonds.

The legislation has garnered the support of industry associations and some progressive groups, most notably the Center for American Progress, other organizations have maintained the SEC remains better suited to take lead in overseeing digital exchanges.

“The SEC, with its mandate for investor protection, should remain the primary agency regulating cryptocurrency, and Congress should resist the demands of this industry’s lobby for privileged treatment. Any role the CFTC has should be a narrow one,” Mark Hays, senior policy analyst at Americans for Financial Reform and Demand Progress, said in a statement.

On Thursday, Behnam pushed back on the argument that his agency, which is dwarfed by the SEC in both size and budget, would take a “light touch” with digital asset startups that the bill would require to register with the

“We are one of the toughest cops on the beat in the world and we are known for that,” he said, responding to a question from Sen. Cory Booker (D-N.J.). “Our enforcement statistics speak for themselves.”

CFTC staff consulted with both Stabenow and Boozman’s staff as they crafted the measure, called the Digital Commodities Consumer Protection Act, in the weeks leading up to its introduction in early August. Behnam was Stabenow’s senior counsel before joining the CFTC as a commissioner in 2017.

Sens. Kirsten Gillibrand (D-N.Y.) and Cynthia Lummis (R-Wyo.), as well as top members of the House Agriculture Committee, have also introduced legislation, S. 4356, that would give the CFTC a leadership role in crypto regulation moving forward.

“We saw last year a lot of volatility in the marketplace,” Stabenow said during the hearing. “This is a really important opportunity for us to move forward. And I’m hoping our colleagues will join us on this bipartisan bill so we can get the CFTC to work.”

[Back to Top](#)

10. Railroad unions, freight carriers reach deal to avoid massive work stoppage

15 Sep 2022 (8:00 AM), Sam Sutton

The clock is winding down toward a potential work stoppage that could throw freight trains, commuter rail lines and the U.S. economy to a screeching halt.

As of Wednesday night, freight carriers and 13 unions representing railroad workers had yet to agree to terms that would keep critical infrastructure to domestic supply chains intact. If they don’t hammer out a compromise by 12:01 a.m. Friday, a potential strike or lockout would throw kerosene on inflation and potentially send the U.S. into a recession.

The White House says it’s pulling out all the stops to avoid that outcome, calling Labor Secretary Marty Walsh away from a planned trip to Ireland for an all-day meeting with union leaders and freight representatives in the hopes of reaching a compromise. While some of the unions have reached tentative agreements with carriers — which largely follow recommendations put forward by a Biden-appointed emergency board — others say those recommendations do little to address outstanding concerns affecting on-call policies, paid leave and more.

Failure will have severe consequences, write POLITICO’s Ben White and Eleanor Mueller.

Take it away, Ben and Eleanor: “If Biden succeeds, he’ll be able to claim a much-needed win for U.S. consumers. If he fails, Americans will be facing shuttered railroads unable to deliver food to grocery stores, feed to animals, chlorine for drinking water or coal for power plants immediately before the high-volume harvest and holiday seasons ...

“In a sign of how dire the situation is, the private sector has significantly amped up efforts to convince lawmakers to step in. Congress has the ability to intervene in the event a service disruption appears imminent, and has done so in the past.

“A nationwide rail shutdown that could cost the U.S. economy billions of dollars a day and adversely affect millions of Americans,” Business Roundtable CEO Joshua Bolten said. “Bringing national rail operations to a halt would lead to widespread plant shutdowns, supply chain challenges, retail product shortages and lost jobs and productivity — a crisis that would exacerbate the economic downturn.”

Wednesday’s developments were hardly encouraging.

The members of a key district of the International Association of Machinists on Wednesday rejected the terms of a proposed settlement and authorized a strike. Even though other union leaders have OK’d the emergency board’s recommendations, they’ll be “unlikely to cross picket lines for other unions that may take a different path

Meanwhile, commuter rails from California to Virginia have already prepared to curtail service in preparation of a strike. Amtrak on Wednesday announced it would preemptively shut down its long-distance lines starting today. (Northeast Regional and Acela trains — whose riders are this newsletter’s core audience — run on dedicated Amtrak lines and will be largely spared).

The White House told reporters that negotiations remained ongoing on Wednesday night.

While Congress has the power to impose a settlement, the White House as of Wednesday was urging Democratic leaders to stay out of the fray and allow the negotiations to proceed without interference.

Democratic leaders aren’t protesting.

“We’d rather see negotiations prevail so there’s no need for any actions from Congress,” House Speaker Nancy Pelosi said.

IT’S THURSDAY — And it’s a packed day for financial services policy in Washington. Please send tips, story ideas and feedback to ssutton@politico.com.

DRIVING THE DAY

Jobless claims data will be released at 8:30 a.m. ... Philadelphia Fed and Empire State manufacturing data out at 8:30 a.m. ... The Senate Banking Committee has an SEC oversight hearing at 10 a.m. ... The Senate Agriculture Committee will hold a hearing on its crypto bill at 10 a.m. ... The House Agriculture Committee will hold a hearing on the farm bill at 10 a.m.

GENSLER GOES TO THE HILL — SEC Chair Gary Gensler heads to Capitol Hill this morning for an annual checkup with the Senate Banking Committee that could be a preview of what’s to come should Republicans flip the Senate in November.

Republicans will grill Gensler for the SEC’s sprawling and ambitious agenda on everything from the Treasury market and ESG investing to private market funds. This time, the lawmakers will take aim at the SEC chair for failing to appease the growing calls for “regulatory clarity” around the \$1 trillion cryptocurrency market while pursuing reforms like the climate disclosure proposal, a Republican aide to the committee said. GOP senators claim that the SEC lacks the regulatory authority to justify its climate disclosure proposal.

The veteran financial regulator is not expected to bite, though.

Prepared testimony indicates that Gensler plans to defend the “gold standard of capital markets” that are the securities laws — a message he has been delivering with growing frequency in the face of a mounting backlash against the SEC’s approach to crypto and climate disclosure. It’s also one that Gensler plans to use Thursday to argue that the SEC needs more resources, writing in the testimony that the SEC had a smaller staff in 2021 than in 2016 despite the increase in activity the regulator oversees.

“Markets don’t stand still. The world isn’t standing still. Our resources can’t stand still,” Gensler is set to say. — POLITICO’s Declan Harty

CRYPTO LEGISLATION GETS ITS DAY — While Gensler squares off with Senate Banking, CFTC Chair Rostin Behnam will go before the Senate Agriculture Committee to testify on bipartisan legislation that would give his agency sweeping authority to set new rules for crypto exchanges where Bitcoin and other digital commodities are traded. The bill — which Morning Money has covered extensively over the last few months — tasks the CFTC with oversight of retail-facing trading platforms and brokerages that face growing scrutiny following this summer’s market collapse.

Behnam — a former adviser to the bill’s Democratic sponsor, Committee Chair Debbie Stabenow (D-Mich.) — has been pushing Congress for more authority and funding to police digital markets. While they’ll likely have

SPEAKING OF CRYPTO, HERE COMES "THE MERGE" — From Bjarke Smith-Meyer and me:

"Cryptocurrencies are facing scrutiny from lawmakers on both sides of the Atlantic. But a switch by one of the largest crypto networks, Ethereum, to more eco-friendly processing techniques is being welcomed by lawmakers ... After years of planning, Ethereum's operators Thursday are switching over to a new system that uses a tiny fraction of the energy consumed by the old one, without taking the network offline. That switch — or 'merge,' as it's being called by enthusiasts — has been widely anticipated by lawmakers in Europe and the United States, who are concerned about cryptocurrencies' massive carbon footprint and energy demands at a time of skyrocketing energy prices."

— WSJ's Vicky Ge Huang and Caitlin Ostroff: "Many investors see the Ethereum network's 'Merge' as a make-or-break moment for the crypto market. The upgrade is intended to create a more efficient and less energy-intensive blockchain. A high-profile failure could send ether plunging and pummel investor confidence."

AFGHANISTAN — The Treasury and State Departments, along with international partners, on Wednesday announced the establishment of a fund to manage and disburse \$3.5 billion of Afghanistan's central bank reserves for the benefit of the people of Afghanistan. The "Afghan Fund," which will maintain an account through the Bank for International Settlements, has been set up with safeguards to preclude interference from the Taliban.

The structure of the Afghan Fund is drawing fire from Sen. Pat Toomey (R-Pa.), the top Republican on the Senate Banking Committee: "While the administration maintains there will be safeguards put in place to prevent the funds from being used for terrorist financing, in reality, the future of these funds rests in the hands of four individuals—only one of whom is a U.S. government official. Given that the Taliban was just caught harboring the leader of al-Qaeda, the last thing the Biden administration should be doing is opening the door to billions of dollars potentially flowing to a terrorist organization," Toomey said in a statement.

ECONOMY

CLASH OF THE TITANS — "More than 1,600 merchants including Walmart Inc. and Target Corp. are urging U.S. lawmakers to pass legislation that aims to break the hold that Visa Inc. and Mastercard Inc. MA have over the credit-card market. The bill, which Sen. Richard Durbin (D., Ill.) and Sen. Roger Marshall (R., Kan.) introduced in July, would give merchants the right to route many credit-card payments over networks other than Visa and Mastercard."

MARKET POWER — POLITICO's Jeremy White: "California is challenging Amazon in a case that could reshape the e-commerce giant's business model by forcing it to lift restrictions on third-party vendors. State Attorney General Rob Bonta announced on Wednesday that his office was suing Amazon for requiring merchants to enter agreements that penalize them if they offer their products elsewhere for lower prices."

GETTING CHOPPY — POLITICO's Victoria Guida: "Pessimism among U.S. executives is building, with a new survey of CEOs showing businesses expect to hire less, invest less and sell less over the next six months. Companies still aren't expecting a recession this year, according to the survey from the Business Roundtable."

LOPSIDED REGIONAL RECOVERY — NYT's Nicole Hong and Matthew Haag: "While the country as a whole has recently regained all of the jobs it lost early in the health crisis, New York City is still missing 176,000, representing the slowest recover of any major metropolitan area."

MARKETS

TRE-CENTRALIZATION — Our Declan Harty: "Wall Street's top regulator wants to expand central clearing in the world's largest — and recently rattled — government debt market. The SEC on Wednesday voted to propose new rules aimed at improving trading conditions and risk management within the \$24 trillion U.S. Treasury market by focusing on the clearinghouses that sit between buyers and sellers to ensure that trades are completed and to head off default concerns."

CITI ON FIRE — WSJ's David Benoit: "Regulators are frustrated with the progress Citigroup Inc. has made in the two years since they reprimanded the bank for problems with the systems it has in place to prevent costly mistakes, according to people familiar with the matter."

JOBS REPORT

Mark Adler is stepping in as acting director of the Public Company Accounting Oversight Board's Division of Enforcement and Investigations after Director Patrick Bryan departs on Sept. 15. Adler previously spent almost a decade at PCAOB before retiring in March 2020.

CRYPTO

CONFLICTS OF INTEREST — Bloomberg's Annie Massa, Anna Irrera and Hannah Miller on the close ties between Sam Bankman-Fried's FTX and a Bankman-Fried-owned quant trading firm that's one of the exchange's biggest customers: "At a minimum, some say Alameda is able to benefit from a dearth of regulation, a claim that carries even more weight as Bankman-Fried strives to use his position and influence in the crypto community to shape US oversight of the sector ... Amplifying these concerns, the collapse in crypto has revealed a tangle of interconnections between Alameda, FTX and the broader virtual-currency markets — and a larger role behind the scenes for both firms than many had previously known."

TERRA FALLS TO EARTH — Bloomberg Law's Hooyeon Kim: "A court in South Korea issued an arrest warrant for Do Kwon, the founder of the Terraform Labs cryptocurrency ecosystem, whose implosion earlier this year sparked a global crypto rout."

[Back to Top](#)

Bloomberg

11. US to Start Review of Chinese Audit Documents Next Week, Gensler Says

15 Sep 2022 (6:02 PM), Lydia Beyoud

US watchdogs will review the audit documents of Chinese businesses that trade in New York starting next week, according to Securities and Exchange Commission Chair Gary Gensler.

The inspections, which will take place in Hong Kong under a preliminary agreement reached between American and Chinese regulators, are a first step to avoiding the delisting of about 200 firms from US markets. Their possible removal stems from Beijing's longstanding refusal to let the US Public Company Accounting Oversight Board review the audit work papers of firms based in China and Hong Kong.

"I don't know if the Chinese are going to comply," Gensler told lawmakers on the Senate Banking Committee on Thursday, adding that the officials and regulators in Beijing have told them they would. "It's pretty clear: no redactions in the work papers, take testimony from whomever the PCAOB needs to take testimony from, they can onward share the information with us and they can pick which ever companies they want to look at."

A 2020 US law set a three-year timeframe for booting public companies from American markets if PCAOB inspectors can't review their audit documents as required by the 2002 Sarbanes-Oxley Act. That legislation was passed in the wake of the Enron Corp. accounting scandal and it's meant to prevent fraud and wrongdoing that could wipe out shareholders.

China and Hong Kong are the lone two jurisdictions worldwide that haven't allowed the PCAOB inspections, with officials there citing national security and confidentiality concerns.

Key US lawmakers have proposed shortening the period in which non-compliant firms would face delisting to two years, from three years under current law. When asked about the plan during the hearing on Thursday, Gensler said that he supported the change because "it will continue to have the right leverage."

[Back to Top](#)

12. New Crypto Fund Takes US a Step Closer to Spot Bitcoin ETF

15 Sep 2022 (5:50 PM), Katherine Greifeld

Holdouts for a physically backed US Bitcoin exchange-traded fund saw a glimmer of hope on Thursday with the launch of a new futures-backed product.

The Hashdex Bitcoin Futures ETF (ticker DEFI), developed with Teucrium, began trading on Thursday, according to a statement. Unlike existing derivatives-backed crypto ETFs, DEFI was filed under the Securities Act of 1933, rather than the Investment Company Act of 1940.

That detail matters to industry watchers because the 1940 law has been the preferred format for Securities and Exchange Commission Chair Gary Gensler, who has cited its greater investor protections. Since a physically backed Bitcoin ETF, which the SEC has repeatedly denied, would fall under the 1933 act, DEFI's launch could potentially be a stepping stone to approval.

“The launch of this Teucrium product only bolsters the case for a spot Bitcoin ETF since it's utilizing the exact same fund structure,” said Nate Geraci, president of The ETF Store, an advisory firm. “That said, a ‘bolstered case’ doesn't mean the SEC will budge from their hard-line stance. I'm still in the camp that a spot product simply won't be approved until the SEC has regulatory oversight of crypto exchanges.”

The latest high-profile rejection came in June, when the SEC denied a bid from Grayscale Investments to convert its Bitcoin trust into an ETF. The digital-asset manager announced it was suing the agency within hours of the decision.

DEFI launches at a volatile time in the crypto universe. Bitcoin has plunged over 57% in 2022, weighed down by sky-high inflation and an aggressive Federal Reserve.

[Back to Top](#)

13. Barclays Is Buying Back \$7.7 Billion of Securities After Mistake

15 Sep 2022 (1:20 PM), Leonard Kehnscherper

Barclays Plc is close to concluding a buyback of securities after the bank accidentally issued billions of dollars more structured and exchange-traded notes than it had registered with the Securities and Exchange Commission. The total cost of the error is still unknown.

The British lender said in a filing Thursday that \$7.7 billion of securities have been submitted for the so-called rescission offer through a tender process, out of a total of \$9.5 billion eligible. These will be settled today, it added.

Some investors have submitted their claims by other means and are under review, the bank added. In total, \$17.7 billion of securities were affected.

“Barclays is currently evaluating the financial impact of the rescission offer and will provide an update in due course,” the bank said. In a second-quarter results presentation, Barclays had put the loss at £751 million (\$864 million). The estimate included a £165 million provision for an expected fine from the SEC.

The bank disclosed in late March that it had issued about \$36 billion of investment products after registering with US regulators in August 2019 to sell up to \$20.8 billion. The firm was therefore required to buy back affected securities -- a so-called rescission offer -- at their original price.

The mistake has been called "basic", "bizarre" and "embarrassing" by analysts and led Barclays to delay a billion-pound share buyback, suspend the sales of dozens of exchange-traded notes and halt market-making activities in its own debt securities.

The bank also started an external review into the blunder, saying it will "take appropriate actions."

[Back to Top](#)

14. [Senator Pat Toomey Still Sees Stablecoin Legislation This Year](#)

15 Sep 2022 (11:00 AM), Joe Weisenthal and Tracy Alloway

Senator Pat Toomey believes there's still a chance for Congress to pass a meaningful bill regulating stablecoins this year.

In an interview with the Odd Lots podcast, the retiring Pennsylvania Republican and ranking member of the Senate Banking Committee said that the implosion of the Luna algorithmic stablecoin this spring served to galvanize interest in Washington, D.C. for bringing regulatory clarity to the crypto industry.

"The fact that there was a sort of sensational bad event did move this up the list of priorities — put it on people's radar, who didn't have it on their radar," he said. "I still think there's a chance to get stablecoin legislation done this year. I think the administration would like to get something done."

While the Senator favors a light touch approach to crypto in general, he argues that asset-backed stablecoins in particular are a good first place to begin putting rules down. His preferred legislation, he says, would require rules "about disclosure, what is the nature of the asset? It would require that you'd have to be licensed to issue it. And then we go through how you could go about obtaining such a license. And if you have them, then you'd have to have high-quality assets, liquid assets backing it — cash and cash equivalents."

Overall, however, Toomey criticized others in D.C. for having a "paternalistic" stance towards crypto investors, in contrast to his stance which he characterized as "respect for consumers" and their ability to make their own decisions when it comes to putting their money in the space.

The Senator's comments come as the banking committee conducts a hearing on oversight of the US securities watchdog, at which regulation of crypto is expected to be a major topic.

Earlier in the year, Senator Toomey wrote a letter to Securities and Exchange Commission Chairman Gensler, in which he criticized his approach to policing crypto. "The SEC has pursued a capricious and ineffective approach to consumer protection known as regulation-by-enforcement that is chilling financial innovation and contributing to significant financial losses for unsuspecting American consumers," Toomey wrote.

As he sees it, Gensler has an overly broad view of what constitutes a security, while at the same time the SEC failed to protect consumers from disasters such as Voyager Digital Ltd. and Celsius Network LLC, which he believes fell squarely under the agency's authority. The two crypto lenders went bust earlier this year, setting off a wave of thorny bankruptcy proceedings that are likely to culminate in losses for customers.

"So Celsius and Voyager, when they're taking crypto deposits, paying an interest rate on it, using those deposits to then lend to, I suppose, hedge funds and other institutions, that definitely, I think, falls under the SEC's brief," Toomey said. "And frankly, I think there are questions about why after an enforcement action against BlockFi early in the year, nothing happened to Celsius and Voyager until they blew up."

On the flipside, when it comes to defining what is and isn't a security, Toomey believes Gensler is missing two important points. One is that due to their decentralized nature, many crypto projects aren't actually companies. The other is that unlike traditional securities such as bonds or stocks, many crypto projects don't have any kind of real claim to assets or cash flows.

The Howey Test stems from a famous 1946 case involving an offering of shares in a citrus grove project. As the SEC describes it, the Supreme Court ruled then that “an ‘investment contract’ exists when there is the investment of money in a common enterprise with a reasonable expectation of profits to be derived from the efforts of others.” The SEC has used this framework in ascertaining whether some cryptocurrencies and tokens are in fact securities or not.

“That’s my fundamental difference with Chairman Gensler. He maintains that virtually all crypto currencies are securities. He will acknowledge that Bitcoin is not,” said Toomey. “I have not been able to get him to identify a single other token that is not a security.”

Setting aside specific tests and questions about regulatory authority, Toomey is broadly supportive of some of the libertarian underpinnings of crypto, including the right to transaction privacy. He also said he anticipates innovations in the space that could benefit consumers.

“When the internet was first being developed, I don’t think too many people envisioned Amazon and Uber and Netflix and, and the things that have totally transformed consumption,” he said. “I think that could happen here as well.”

[Back to Top](#)

15. ETFs That Track Stock Trades of US Congress Members Planned

15 Sep 2022 (11:42 PM), Katherine Greifeld

A pair of exchange-traded funds that would mirror the personal portfolios of members of Congress may be coming soon.

The Unusual Whales Subversive Democratic Trading ETF (ticker NANC) and the Unusual Whales Subversive Republican Trading ETF (KRUZ) would analyze the financial disclosure of lawmakers from both parties and their spouses and dependent children to construct a portfolio of between 500 and 600 holdings, according to a regulatory filing Thursday. When a position is reported as sold, the ETFs will offload the security as well.

The proposed funds would tap into a controversy over stock transactions made by lawmakers that sparked a flurry of bills to overhaul or update a 2012 law that governs disclosure, which have largely stalled despite bipartisan support. Currently, members of Congress are required to disclose any securities transactions valued at more than \$1,000 within 45 days.

While it’s unclear if packaging lawmakers’ portfolios into an ETF will generate returns, it will almost certainly produce buzz, said Bloomberg Intelligence ETF analyst James Seyffart.

“It’s a fixation of the online trading community and financial Twitter to track what politicians are doing,” Seyffart said. “I’m not sure what kind of longevity this strategy will have, but I think they will drum up a lot of interest and if these things start beating the market, I think they could garner more than enough assets to be profitable.”

The funds will only focus on equity holdings, the filing said. Both ETFs would charge a 1% expense ratio.

[Back to Top](#)

16. SEC Sues Chicago Crypto Over Alleged Illegal Securities Sales

15 Sep 2022 (4:56 AM), Mary Anne Pazanowski

Chicago Crypto Capital violated various securities laws by illegally selling unregistered securities to unsophisticated buyers between August 2018 and November 2019, the SEC says in a new lawsuit.

The US Securities and Exchange Commission alleges in a complaint filed in the US District Court for the Northern District of Illinois that CCC, company president Brian Amoah, and two salespeople raised \$1.5 million through the illegal offers and sales.

The BXY crypto asset securities didn't qualify for any exemption from the SEC's registration requirement, and none of the defendants were registered securities brokers, the agency alleges.

Additionally, the individual defendants misstated information a reasonable investor would have wanted to know, such as the custody and delivery of BXY, the markup charged by CCC, the delivery of account statements, CCC's liquidation of an investor's BXY, and their personal investments in the securities, the SEC says.

The defendants also failed to tell investors about financial and management problems at BXY's issuer, Beaxy Digital Ltd., in late 2019, Wednesday's complaint says.

Causes of Action: Securities Act of 1933, Securities Exchange Act of 1934, and Rule 10b-5.

Relief: Bar future violations of the securities laws and participation in future offerings of crypto asset securities, disgorgement of gains, prejudgment interest, and statutory civil penalties against all defendants. Entry of an officer and director bar against Amoah.

Response: CCC didn't immediately respond to Bloomberg Law's request for comment.

Attorneys: The SEC's Chicago Regional Office represents the agency.

The case is SEC v. Chicago Crypto Capital LLC, N.D. Ill., No. 22-cv-2975, complaint filed 9/14/22.

[Back to Top](#)

17. SEC Sues Ex-New Yorker Alleging \$4.4 Million Digital Asset Fraud

15 Sep 2022 (9:00 PM), Matthew Bultman

The SEC sued a resident of Spain over claims he raised almost \$4.4 million in "Ponzi-like fashion," targeting investors who thought they were investing in digital assets.

Gabriel Edelman told investors their money would be invested in digital assets, like WAX tokens, that he could obtain at a discount, the Securities and Exchange Commission said in a complaint filed Thursday in the US District Court for the Southern District of New York.

But just a small portion of the \$4.39 million was actually invested in digital assets, the SEC said. Edelman used at least \$1.5 million for personal expenses, including...

[...]

[Back to Top](#)

18. SEC Advisory Panel Pushes Accounting Rulemaker Oversight Plan

15 Sep 2022 (4:13 PM), Nicola M. White

The Securities and Exchange Commission needs to put a tighter leash around the US accounting rulemaker so it focuses on investor needs instead of business needs, a group of investors and academics that advise the regulator said in a draft plan released Thursday.

The SEC's Investor Advisory Group is poised to vote Sept. 21 on a plan it says would improve the work of the Financial Accounting Standards Board, the private-sector body the SEC delegates to write accounting rules. The panel recommends that the SEC establish a committee devoted specifically to making accounting rule recommendations; require FASB to study...

[Back to Top](#)

19. SEC Body Plans to Back Corporate Reporting of Indirect Emissions

15 Sep 2022 (11:06 PM), Andrew Ramonas

The SEC's advisory panel on investor issues is poised to support agency plans for large company disclosures on greenhouse gas emissions from supply chains and other indirect sources.

Scope 3 emissions information is "critical" for investors, the Securities and Exchange Commission's Investor Advisory Committee said Thursday in a draft recommendation. The SEC has received pushback from companies over its proposed Scope 3 reporting, which the agency would require companies to include with Scope 1 and 2 emissions disclosures about their direct operations and power usage.

"We recognize the concerns that some have raised about the implementation costs of these...

[...]

[Back to Top](#)

20. Gensler Raises Concerns Over 'Staking' Model on Ethereum (1)

15 Sep 2022 (8:07 PM), Lydia Beyoud

Crypto investors who have been celebrating this week's overhaul of Ethereum's blockchain may have to deal with an unwelcome guest at their party: US Securities and Exchange Commission Chair Gary Gensler.

Gensler on Thursday signaled that a feature of the network's software could lead to tokens being considered securities by the SEC. While Gensler was careful to say he wasn't speaking about any digital coin specifically, his comments add to questions about the Wall Street regulator's views on Ether, which is the second-biggest virtual currency.

[...]

[Back to Top](#)

21. SEC Readies Diversity Guidance for Asset Managers, Gensler Says

15 Sep 2022 (2:53 PM), Clara Hudson

The Securities and Exchange Commission will soon release guidance to promote diversity among asset managers, the agency's chairman Gary Gensler told lawmakers Thursday.

"I feel that the staff will probably shortly be putting out that guidance" on diversity, Gensler said before the Senate Banking Committee. He said the agency has made "some good progress" but declined to provide further details.

Gensler was responding to questions from Senator Bob Menendez, a Democrat from New Jersey. Menendez has pressed the SEC to require disclosures on gender and racial diversity in the asset management industry, in line with recommendations from an agency...

[...]

[Back to Top](#)[Reuters](#)

15 Sep 2022 (7:41 PM), Pete Schroeder and Michelle Price

U.S. Securities and Exchange Commission (SEC) Chair Gary Gensler defended his agency's position on cryptocurrencies and its push to include climate risks into public company disclosures before the U.S. Senate Banking Committee on Thursday.

Gensler appeared before the panel for its regular oversight duties, but the hearing comes at a time of Republican frustration over his agenda. They claim he has overstepped his authority with a broad assault on U.S. capital markets and adopted a hostile stance toward the financial industry.

But in prepared testimony released ahead of the hearing, Gensler insisted his new rules are critical to ensuring the U.S. capital markets remain the global "gold standard."

Democratic Senator Sherrod Brown applauded Gensler's ambitious agenda. "If Wall Street and its allies are complaining, it probably means you're doing your job," he said.

Republicans are especially concerned about a draft SEC rule requiring public companies to disclose climate-related risks, including greenhouse gas emissions. Corporate groups say it is onerous and exceeds the agency's authority.

"The cost of compliance will be more material to the investor than the information itself," the committee's top Republican Pat Toomey said in his opening remarks.

He also warned that the SEC should be "nervous" about legal challenges in light of a recent Supreme Court decision to curb the Environmental Protection Agency's power, which some legal experts say undermines the SEC's authority on its climate rule. [read more](#)

Jon Tester, a Democratic U.S. Senator from Montana, also raised concerns about the potential impact of the climate rule on small business owners like farmers who could be ensnared by its requirement for public companies to disclose emissions in their supply chains.

But Gensler, in his testimony, said the rule would provide needed clarity and consistency to an issue important to investors and being disclosed by some companies under disparate frameworks, and later added the agency was considering all feedback.

CRYPTOCURRENCY CRITICISMS

Republicans also pressured Gensler on what they see is his increasingly hawkish stance on cryptocurrency oversight.

Gensler made headlines last week when he said crypto companies may need multiple SEC registrations and split their operations into separate legal entities. [read more](#)

Gensler said such "disaggregation" could enhance investor protections and guard against conflicts of interest. He added that SEC staff was working with traditional market intermediaries interested in entering the crypto market, and urged Congress to not inadvertently undermine existing investor protections while crafting cryptocurrency legislation.

Toomey, though, said the SEC has failed to provide regulatory clarity in the crypto market and accused the SEC of being asleep at the wheel as crypto lending platforms Celsius Network and Voyager Digital collapsed this summer, leaving thousands of retail customers unable to access their assets.

Gensler also struck a cautious tone on a recent deal between U.S. and Chinese officials on auditing U.S.-listed Chinese firms, noting the accord is meaningful only if U.S. officials actually are permitted to fully investigate Chinese auditors.

[Back to Top](#)

23. U.S. SEC's crypto guidelines push up costs for lenders, disrupting projects

15 Sep 2022 (6:34 AM), Hannah Lang and Michelle Price

Banks' cryptocurrency projects have been upended by U.S. Securities and Exchange Commission (SEC) accounting guidance that would make it too capital-intensive for lenders to hold crypto tokens on behalf of clients, according to more than half a dozen people with knowledge of the matter.

A slew of lenders including U.S. Bancorp (USB.N), Goldman Sachs Group Inc , JPMorgan Chase & Co , BNY Mellon , Wells Fargo & Co , Deutsche Bank (DBKGN.DE), BNP Paribas (BNPP.PA) and State Street Corp (STT.N) offer or are working on crypto products and services for clients in a bid to tap in to the \$1 trillion crypto market, according to their public statements and media reports.

But on March 31, the SEC said public companies that hold crypto assets on behalf of clients or others must account for them as liabilities on their balance sheets due to their technological, legal and regulatory risks. read more

While the guidance applies to all public companies, it is especially problematic for banks because their strict capital rules, overseen by bank regulators, require them to hold cash against balance sheet liabilities. The SEC did not consult the banking regulators when issuing the guidance, according to four of the people.

The SEC's move complicates banks' efforts to jump on the digital asset bandwagon, and could keep them on the sidelines even as they report increased demand from clients looking to access the burgeoning market.

"This has thrown a huge wrench in the mix," one of the sources said. Lenders building out crypto offerings have had "to cease moving forward with those plans pending any kind of further action from the SEC and the banking regulatory agencies," they added.

Custody banks State Street and BNY Mellon, which have been building digital asset offerings, are among those whose projects have been disrupted, according to three people with knowledge of the matter.

While the accounting guidance does not stop State Street from offering crypto custody services, it would make doing so uneconomical, said Nadine Chakar, head of State Street Digital. "We do have an issue with the premise of doing that, because these are not our assets. This should not be on our balance sheet," said Chakar.

A spokesperson for BNY Mellon declined to comment on the status of its crypto custody project. "BNY Mellon believes digital assets are here to stay, and increasingly becoming part of the mainstream of finance," he added.

When asked about the SEC guidance, a U.S. Bancorp spokesperson said it is still servicing existing clients for which it offers bitcoin custody services. "However, we are pausing intake of additional clients in this service as we evaluate the evolving regulatory environment."

One executive at a European bank looking to launch crypto custody services said it would now be prohibitively costly for the bank to do so in the United States due to the SEC guidance.

Spokespeople for the SEC and the other banks declined to comment.

The problems the SEC guidance is causing for banks, which have not previously been reported, underscore the broader challenges lenders face in trying to capitalize upon the growing crypto market amid ongoing regulatory confusion and skepticism.

"We've heard from a wide variety of stakeholders, banks among them, about how challenging this new staff

Case 1:24-cv-01858-ACR Document 34-4 Filed 06/20/25 Page 274 of 601
accounting bulletin would be for them to be able to enter in to the space of custodying crypto assets," U.S. Representative Trey Hollingsworth, who sent SEC Chair Gary Gensler a letter in July expressing concern about the guidance, said in an interview.

"This edict came down without guidance, without input, without feedback, without conversation being had with industry."

CAPITAL PUNISHMENT?

As the cryptocurrency market ballooned in 2020, financial institutions were eager to cash in. Despite the crypto market contracting significantly this year, lenders still see an opportunity for their services.

Offering to hold clients' digital assets appeared the safest way to enter the market. Banks commonly offer custody for a variety of financial instruments and have generally not been required to reflect them on their balance sheet, unless they are commingled with the bank's own assets. [read more](#)

The SEC guidance departed from that practice. At a conference last week, the SEC's acting chief accountant said that custodied crypto assets present "unique" risks which meet the definition of a liability under U.S. accounting standards.

In a June letter to bank regulators, however, the Securities Industry and Financial Markets Association, American Bankers Association and the Bank Policy Institute said such risks are already mitigated by strict bank supervision and rules.

Factoring in planned international Basel capital rules, the guidance could cost more than \$1 of capital for every \$1 of digital assets held, the groups estimated, meaning crypto custody "effectively would be prohibited."

The SEC guidance also appears to apply where lenders outsource the custody function to a third party, such as Anchorage Digital, the sources said.

Diogo Mónica, president of Anchorage Digital, said the capital cost was "completely unworkable" and that "every single bank" Anchorage works with is now waiting on regulators before proceeding to work with Anchorage on crypto custody solutions.

Industry groups have been lobbying the SEC to carve banks out of the guidance, according to four of the sources and industry letters, although the agency appears unpersuaded, one of those people said. Some lenders, instead, are seeking individual exemptions, two people said.

The industry is also lobbying the banking regulators to issue guidance that would neutralize the capital impact of the SEC guidance, although changing capital rules would be a major undertaking which looks unlikely in the short term, the people said.

The Federal Reserve, the Office of the Comptroller of the Currency and Federal Deposit Insurance Corp declined to comment.

[Back to Top](#)

24. [Analysis: U.S. SEC draft rules could boost resilience of \\$24 trillion Treasury market](#)

16 Sep 2022 (6:35 AM), Karen Brettell

Proposed rules by the U.S. Securities and Exchange Commission (SEC) to boost central clearing in Treasuries could help to shore up resiliency in the \$24 trillion market and may pave the way for more trading that bypasses the large banks that have traditionally dominated the market.

The SEC's proposed reforms, unveiled on Wednesday, are part of an effort by multiple regulators, the Treasury Department and the Federal Reserve to increase liquidity and reduce volatility in the world's largest bond market.

The SEC proposed expanding the number of market participants that are required to centrally clear Treasuries to hedge funds, principal trading firms and some other types of leveraged accounts. The regulator also will require central clearinghouses and their members to develop rules and methods that expand clearing access to all investors. [read more](#)

Clearinghouses mitigate systemic risks by sitting in the middle of trades and guaranteeing payments. They take margin from each counterparty to help reduce risks.

It will take months if not years to refine and implement the final details of the rules. However, they should improve "the financial stability of the market, its transparency and arguably cost," said Darrell Duffie, a finance professor at Stanford University.

The Treasury market is currently bifurcated between bilateral trading, where an investor deals directly with a big bank, and 'all-to-all' platforms where banks, principal trading firms and some hedge funds trade anonymously with each other through a centralized order book - similar to stocks and futures exchanges.

With a central clearing house guaranteeing more trades, more of the Treasury market could migrate to "all-to-all" trading venues, which may offer better liquidity and lower trading costs. Large dealers that trade bilaterally with most fund managers are facing more balance sheet constraints at the same time as the market is rapidly expanding.

The Treasury market has grown from \$5 trillion in 2007 and is expected to reach \$40 trillion by 2032, according to estimates by the Congressional Budget Office.

"Central clearing is an important step that can enhance the stability and resiliency of the market, improve efficiency, expand intermediation capacity and allow further evolutions to occur with respect to trading," said Stephen Berger, global head of government and regulatory policy at Citadel Securities, one of the largest market makers in Treasuries.

Pacific Investment Management Company (Pimco) said in a note last week that it wants the entire Treasury market to move to all-to-all trading, saying that intermediated trades make the market "more fragile, less liquid, and more susceptible to shocks."

COMPLEX, COSTLY

Still, the bond trading giant said it did not agree with a clearing mandate, arguing that Treasuries do not have "meaningful" counterparty risk and that the costs of clearing could discourage some participants from entering the market.

The DTCC-owned Fixed Income Clearing Corp (FICC) is the only clearinghouse that currently clears Treasuries, but it focuses on trades between its members. The SEC's proposal would require the FICC and its members to enable clearing by other market participants, such as fund managers who are typically not direct members.

"In order to have mandatory clearing as proposed, we first have to open up clearing to all," said Graham Harper, head of public policy and market structure at DRW. Success will largely depend on how the FICC implements the changes and how its members interpret and implement those changes with respect to their clients, he said.

The DTCC said that they welcome "further discussions" with the industry and regulators regarding the clearing proposals.

For many investors, meanwhile, the benefits of clearing will need to be weighed against the costs, including clearing fees, additional margin, and the expense of building the technology and legal infrastructure.

"The cost of operations, technology and compliance upgrades in the medium term could be substantial. The

[Back to Top](#)
The Hill

25. SEC chair spars with senators over climate rules

15 Sep 2022 (2:30 PM), Saul Elbein

Securities and Exchange Commission (SEC) Chairman Gary Gensler faced a grilling on Capitol Hill on Thursday, with the agency head defending the SEC's approach to issues including climate disclosure and cryptocurrency regulation.

The SEC's proposed climate disclosure rules — which it released in March — would require publicly traded companies to calculate and publish the risks that climate change poses to their operations and what they are doing to address it.

Republicans have criticized the rules as onerous, arguing they are an example of the SEC conducting policy beyond its mandate. Gensler joined two other Democratic commissioners in voting for the proposed rules in March, while the SEC's lone Republican commissioner, Hester Peirce, voted no.

GOP lawmakers on the Senate Banking Committee on Thursday attempted to paint SEC climate disclosure policy as a backdoor and likely ineffectual attempt to reduce global temperatures.

"What bothers me is why we're spending trillions of dollars of scarce resources while China gets 60 percent of its energy from coal," Sen. John Kennedy (R-La.) said. "We spend all this money and world temperatures are not reduced."

Gensler sidestepped the line of questioning, saying he refused to accept the premise that the SEC is attempting to influence global temperatures — a key tenet of broader Republican charges that the agency is pursuing policymaking beyond its mandate.

He stressed that neither he nor his deputies were "motivated" by the drive to reduce global temperatures.

"It's about actually helping investors get more consistent information, even if they want to invest in what might be 'brown' assets rather than 'green' assets," Gensler said, referring to fossil fuels and other carbon-intensive investments.

Such investors "will get more consistent information and will probably avoid some of the greenwashing that's out there," he added, referring to misleading marketing of unsustainable investments.

In a later exchange with Sen. Catherine Cortez Masto (D-Nev.), Gensler steered away from a question about whether the purpose of environmental, social and governance disclosure was to help newer investors who are focused on "going green."

"There are also investors that are just thinking that because of climate risk, it could affect the financial performance of a company. It could affect their supply chain, it could affect their competition, it could affect regular future regulation, Gensler said.

"So they're thinking about how to value today that future transition risk," he added, referring to the financial risk that the transition from fossil fuels could pose to a company's bottom line.

He emphasized that the SEC's primary immediate goal is to ensure "truth in advertising."

"There are asset managers managing trillions of dollars that are saying to the public, 'We will invest your

"And so we put out some proposals earlier this year to address what is what stands behind a name — literally the name of a fund. And are you living up to the obligations that you made or commitments you've made to investors when you ask for their money?"

During the hearing, Gensler weighed in on the concept of "materiality" — the idea that the SEC should only require the disclosure of information that is relevant to an investor's decision to buy or sell. He argued that climate risk is material because investors consider it material.

"Many investors are considering it — and why are they considering it? Because there's a future chance of transition risk. [Companies] might have changed their operations. Competitors might change their operations. Laws might change. These companies that are listed here in the U.S. operate around the globe."

Gensler said that "the Supreme Court says investors get to decide what risks they take," adding that 14,000 investors had written the SEC in support of the proposed climate disclosure rule.

"If you look at the top 300 or 400 of the investors, the big asset managers, that adds up to \$50 trillion of assets under management that have come in mostly supportive of this," he added, arguing many are looking for "the ability to make an informed choice."

The SEC head also addressed cryptocurrencies, another issue where the agency has taken fire from the GOP for pursuing new financial tools that Republicans argue go beyond its mandate.

Gensler countered that most cryptocurrencies are "securities" that fall well within the agency's purview.

"It's a fairly straightforward, because of these 10,000 crypto tokens — without prejudging any one of them — I believe that the vast majority are securities, because there's a somebody in the public is betting on a better future. They are betting on anticipating profits on a common enterprise with a group of entrepreneurs in the middle."

He noted that such middlemen can hold securities in the same trading platforms they operate, raising the risk of the sort of manipulations that would be illegal on traditional exchanges.

"Frankly, there's a fair amount of noncompliance, and so we're going to continue to try to work with the intermediaries get them inside and regulated — and if need be use our regulatory toolkit," he said.

[Back to Top](#)

Law360

26. SEC's Gensler Suggests Crypto Rules Could Be Years Away

15 Sep 2022 (7:07 PM), Jessica Corso

U.S. Securities and Exchange Commission Chair Gary Gensler indicated Thursday that the crypto market could be waiting years for an industrywide rulemaking process, saying the agency's preference of working with individual market participants mirrors the decadelong process that brought another budding industry into compliance.

In an appearance before the U.S. Senate Banking Committee, Gensler defended the agency's approach of issuing enforcement orders and registering individual companies as a way of bringing the crypto industry into compliance with securities laws.

He said the approach was not without precedent, pointing to the way the agency dealt with the asset-backed securities market when it was on the rise.

The agency first proposed a rule laying out disclosure and reporting requirements for asset-backed securities in 2004, but not before taking action against individual market participants beginning in the mid-1990s, according to a history of the rule the SEC has on its website.

Gensler pointed to that history when addressing concerns from ranking member Sen. Pat Toomey, R-Pa., that the agency was relying on "one-off" discussions with crypto market participants when it should be initiating a public rulemaking process.

"The SEC in the asset-backed securities market took 10 or 11 years, where they did these exemptive orders or relief to individual issuers, and did a rule at the end of that 10 or 11 years based upon all that experience," he said. "So we actually believe it's worthwhile to talk to the [crypto] industry, talk to the market participants and get them registered."

Gensler's statement suggests that the crypto industry could be waiting several more years before seeing a rule proposal, given that, by Gensler's account, the SEC first signaled its intent to regulate the industry with the issuance of a 2017 investigative report on a virtual currency known as DAO tokens.

Many in the industry have called for the rules, as have Toomey and Republican SEC Commissioner Mark Uyeda, who said last week that the crypto industry and the public deserved a chance to comment on the SEC's approach to regulating the industry.

Gensler also used Thursday's hearing to update senators on a collective effort with the Public Company Accounting Oversight Board to audit Chinese companies listed on U.S. exchanges.

He said the PCAOB is sending auditors to China to begin reviews on Monday, and that the result of those audits will likely be known sometime between Thanksgiving and early December.

The Chinese government promised to open corporate books to American auditors in August following the passing of a law in 2020 threatening to ban foreign securities issuers from U.S. exchanges if they don't comply with U.S. auditing standards.

Gensler said the SEC was told the PCAOB would have full access to audit work papers and personnel, and could pick whichever companies they wanted to look at, though he couldn't guarantee that the Chinese government would hold up its end of the bargain.

"I don't know if the Chinese are going to comply," he said. "The Ministry of Finance have told me directly on Webex calls and the China Securities Regulatory Commission has said they will comply."

[Back to Top](#)

27. CFTC Head Calls Crypto Bill First Piece In A Regulatory Puzzle

15 Sep 2022 (7:28 PM), Sarah Jarvis

U.S. Commodity Futures Trading Commission Chairman Rostin Behnam told U.S. senators during a Thursday committee hearing that a bill to grant the agency broad oversight over the cryptocurrency industry is an important first step in building a larger regulatory regime for digital assets.

Behnam said during a hearing of the U.S. Senate Committee on Agriculture, Nutrition and Forestry that a bill titled the Digital Commodities Consumer Protection Act of 2022 is "a huge step in the right direction," but noted there are unaddressed issues related to the larger digital asset ecosystem, including stablecoins, security tokens, payments, custody and settlements.

"We need to complete the larger puzzle because if we're going to see advancements in the technology and the innovation coupled with the customer protections, the market resilience and ultimately financial stability depending on the size of the market, we need to have this patchwork all plug together so that we have the full lens into the space from a regulatory perspective and from a prudential perspective," Behnam said.

Thursday marked the first committee hearing for the bill, which was introduced last month by the committee's top senators, Debbie Stabenow, D-Mich., and John Boozman, R-Ark., as well as Sens. Cory Booker, D-N.J., and John Thune, R-S.D. The bill would define cryptocurrencies bitcoin and ether as commodities and put oversight of most cryptocurrency brokers, custodians, dealers and trading facilities under the CFTC's purview.

The Digital Commodities Consumer Protection Act was introduced after another major piece of legislation that would assign most oversight of cryptocurrencies to the CFTC. That bill, known as the Responsible Financial Innovation Act, is co-sponsored by Sens. Kirsten Gillibrand, D-N.Y., and Cynthia Lummis, R-Wyo., and was introduced in June.

That bill was heard in the Senate Committee on Banking, Housing, and Urban Affairs in July, congressional records show.

Behnam said the Digital Commodities Consumer Protection Act is important because it creates clarity around commodity markets and the definition of a digital commodity. The bill provides the CFTC with a sense of what constitutes a digital commodity, which Behnam said other financial market regulators could use as a marker for how digital asset regulations may look more broadly.

He noted that there would probably be dually registered platforms regulated by both the CFTC and the U.S. Securities and Exchange Commission, pointing to the agencies' experience in the swaps markets as an example of working with such entities. But he said a distinction needs to be drawn between commodities and securities, noting that the two have very different disclosure regimes and requirements.

The bill creates several registration categories for cryptocurrency companies, such as "digital commodity trading facility" and "digital commodity custodian," and requires them to register with the CFTC. The firms would be required to monitor for market abuse, undertake measures to prevent and disclose conflicts of interest and maintain "adequate" financial resources, among other things.

They also wouldn't be allowed to list digital commodities that are "readily susceptible to manipulation" and would be subject to CFTC rules on their marketing and advertising practices, according to a committee overview of the bill.

When asked at Thursday's hearing how much money the CFTC needs to regulate cryptocurrency, Behnam said the estimated cost is \$112 million over the first three years for rulemaking, hiring and training expertise, among other things. He said the first year would be about \$40 million.

Regarding the estimated cost, Sen. Dick Durbin, D-Ill., told Behnam, "I honestly believe that you're low-balling it."

"If you're serious about regulation of an industry where one in five Americans now has invested and had some risk — and we're now getting into retirement accounts and 401(k)s and the like, and the major brokers like Fidelity and others are starting to include this in their plan — there's a lot more exposure and a lot more risk than just a year or two ago," Durbin said.

Behnam stressed the \$112 million figure isn't a hard number, adding that he would welcome additional funds and noting that time will tell how the market will consolidate or grow if the bill is passed.

Christine Parker, deputy general counsel at Coinbase and former Reed Smith LLP partner, said the Digital Commodities Consumer Protection Act offers an important framework for spot markets for digital asset commodities. But she said the bill could be strengthened by further defining digital asset commodities to ensure assets that don't meet the definition of securities are regulated by the CFTC, rather than by enforcement from the SEC.

"We urge Congress to draw these distinct lines between the different types of digital assets to ensure they are overseen by the appropriate federal regulator," Parker said.

Heath Tarbert, chief legal officer with Citadel Securities and former chair of the CFTC, also offered proposed changes to the bill during Thursday's hearing, including that the committee refine the definitions of digital

Boozman broached that topic in the hearing, saying the lawmakers don't intend to include proprietary trading firms that invest only for their own accounts in the definition of "dealer." Behnam said the bill is drafted to include that carveout for proprietary traders.

Tarbert also said the bill should have safeguards to protect those who trade digital commodities that have been self-certified or otherwise approved but are later re-classified as securities. And he said Congress should make its intent "crystal clear" that the bill doesn't grant a license for reactive rulemaking by enforcement.

While the committee members overwhelmingly spoke positively about the bill during the hearing, Gillibrand noted that definitions regarding so-called decentralized finance, or DeFi, in the current draft of the bill may be overly broad. DeFi refers to financial products underpinned by distributed ledger technology.

Sheila Warren, CEO of the industry group Crypto Council for Innovation, said those definitions are currently unworkable given how DeFi operates. She said she's concerned there will be offshoring of DeFi, adding that the space requires a lot of study and more time to settle.

[Back to Top](#)

28. SEC Claims Real Estate Loan Co. Misused Investors' \$100M

15 Sep 2022 (5:34 PM), David Holtzman

The U.S. Securities and Exchange Commission accused a California investment firm on Thursday of allegedly selling tens of millions of dollars in real estate loans that it was supposed to maintain...

[...]

[Back to Top](#)

29. SEC Eyeing Public Country-By-Country Reporting, Chair Says

15 Sep 2022 (5:43 PM), Kevin Pinner

The U.S. Securities and Exchange Commission is looking at whether, to mitigate risks, investors need large multinational corporations to publicly report each country where they book profits and pay taxes, SEC...

[...]

[Back to Top](#)

30. Lawyers Join In Reimagining Role Of Public Companies

15 Sep 2022 (4:00 PM), Sue Reisinger

Speakers cited everything from the late Queen Elizabeth's commitment to the environment to the founder of Patagonia giving away his \$3 billion company, but the focus of Thursday's daylong conference at Harvard Business School was dialogue and debate on how companies can best serve their shareholders and the world at the same time.

The concept of ESG — environment, social and governance — arose early and often.

Titled "Reimagining the Role of Business in the Public Square," the forum considered "not just why we should do things, or what we should do, but how we should do it," explained Brad Smith, the vice chair, president and chief legal officer of Microsoft Corp., who opened the conference.

Smith worked with Harvard Law Professor David Wilkins, vice dean for global initiatives on the legal profession and director of Harvard Law School's Center on the Legal Profession, for about a year to put together the conference. About a thousand people signed up for the forum, and hundreds or more watched online, Wilkins said.

In a pre-recorded session, Kenneth Chenault, an attorney who served 17 years as chairman and CEO of American Express and is now CEO of the venture capital firm General Catalyst, asked about "the core issue facing CEOs today, which is when should you speak out?" on controversial issues.

Answering was Kenneth Frazier, now executive chairman of Merck's board of directors and formerly the company's president and CEO after serving as its general counsel. Chenault said Frazier was the first CEO to take a stance against President Donald Trump's defending the white nationalist violence in Charlottesville, Virginia, in 2017, and among the first to advocate for voters' rights in 2020.

Frazier said most CEOs don't want to get involved in politics. But on Charlottesville, "the President made statements not consistent with the company's core values, and I wanted to speak up. Our board unanimously wanted me to speak out."

The two men agreed that "ESG and social responsibility have become a battleground ... with a counterculture attack out there." Facing such risk, is it the role of a CEO to speak out? Frazier asked.

"I'm not saying CEOs should get involved in a wide range of political issues, but I do believe there are basic values that a company should" stand up for, Chenault replied.

"We are at a critical point in the ESG movement," Chenault continued. "Are we going to say we should default and not be advocates? That is a decision that each CEO, in consultation with the board, needs to think about intentionally. And my view is, take a stand."

In a separate talk, Smith questioned Joshua Bolten, an attorney and CEO of the Business Roundtable, on the purpose of corporations in the modern world. Three years ago the Roundtable released a statement saying the corporate purpose is to serve four stakeholders – the employees, the customers, the community and the shareholders. But it is a tricky balance. Of 187 CEO members, 181 signed the statement.

As to criticism that the statement "demoted" shareholders, Bolten said, "if you don't make money for shareholders, you don't exist, [and] it doesn't matter how much you care about society."

On speaking out on issues, Bolten said, "The best practice begins with having a clear set of values and making sure employees are brought in. Every CEO is under pressure to speak out about abortion or civil rights or policing. Have a set of values that your employees buy into," and that will guide the decision.

Next, Harvard Professor Lucian Bebchuk, who teaches law, economics and finance and is the founding director of the program on corporate governance at Harvard Law School, discussed six research projects that, he said, show that all the good corporate intentions are not achieving much. Bebchuk called it the "illusory promise of stakeholder governance."

While he said that he agrees with the objectives of social responsibility, he is skeptical "that corporate pledges will make a material difference in the environment," diversity or elsewhere. Instead, he urged the attendees to "direct your energies and efforts toward government regulations that could meaningfully contribute to that."

Wilkins, the conference leader, then interviewed Dina Powell McCormick, the global head of sustainability and inclusive growth as well as global head of sovereign business at Goldman Sachs. He asked McCormick, who has held several high-level government posts advising presidents, why she chose to make sustainability and inclusiveness "central to this phase of your career."

She spoke of her family bringing her to the United States as an immigrant from Cairo, and of Goldman Sachs' commitment to the issues "through a client focus." That means finding a market opportunity, locating a gap that needs to be filled, and deciding how Goldman Sachs can uniquely do that.

Case 1:24-cv-01858-ACR Document 34-4 Filed 06/20/25 Page 282 of 601
She offered examples relating to the environment, women and black women entrepreneurs, especially in Latin America. McCormick emphasized two key points: focusing on measurable results and combining the public and private sectors in an effort to achieve results.

"Rather than focusing on our differences," McCormick said, "approach this that we all want a healthy and equitable economy. What that means is finding market bases that are sustainable."

In the final morning session, Harvard law and economics professor John Coates queried Gary Gensler, chair of the U.S. Securities and Exchange Commission, about corporate disclosure, especially regarding climate change and human capital. Coates formerly served as general counsel of the SEC as well as acting director of its division of corporate finance.

Coates asked about the materiality needed for such disclosures.

"As to climate risk disclosures," Gensler replied, "we've already found investors tell us it's material [to them]. Now it's trying to get the balance, lowering information search costs for investors, while keeping costs in check for the issuers."

Many companies are disclosing climate risks on their own, he said, but the information is not consistent nor comparable. Rules that would make such disclosures consistent and comparable would aid both investors and issuers, he added.

Coates noted that some other countries, especially the U.K. and European Union, are considering what to do about ESG.

"If we finalize some rules here, and do it well," Gensler said, "issuers can [urge foreign regulators] to recognize their home country regime. If we don't, or if courts stay it, then our issue base, especially larger companies, will have to comply with rules based on other authorities and political systems."

Coates said public company value is increasingly shifting to include human capital, and he asked Gensler about possible SEC disclosures on that topic.

The chairperson said the SEC since 2020 has asked companies to make a human capital disclosure, but without requiring details. "Some disclosures are very detailed," he said, "and some are simply a number. We've asked staff to look at it [the requirement] and enhance it."

He said that market analysts sometimes include "variable pages about the workforce" and that "buyers of companies want that type of information" as well. So why not disclose it to public shareholders, he said.

Afternoon sessions were scheduled for groups to discuss how they could put their ideas into action.

[Back to Top](#)

American Banker

31. Toomey predicts Supreme Court will overturn SEC's climate risk plan

15 Sep 2022 (9:05 PM), Brendan Pedersen

The top Republican on the Senate Banking Committee told the chair of the Securities and Exchange Commission to expect the U.S. Supreme Court to eventually throw out the agency's landmark climate disclosure proposal on Thursday, accusing the markets regulator of overstepping its statutory bounds.

SEC Chair Gary Gensler was testifying before the committee on Thursday morning when Sen. Pat Toomey, R-Pa., argued that the climate disclosure rulemaking the agency introduced in March would not survive judicial scrutiny in the long term.

Case 1:24-cv-01838-ACR Document 34-4 Filed 06/20/25 Page 283 of 601
"The SEC may not want to answer to Congress on its climate disclosure rule, but ultimately, the SEC will have to answer to the courts — which should make it nervous," Toomey said, adding later: "The SEC should consider itself to be on notice by [the Supreme Court] that the separation of powers still exists and will be upheld."

The SEC's climate disclosure proposal would require public companies to calculate certain forms of their emissions and disclose potential exposure to climate risks, including from societal energy transition. As proposed, the disclosures would include Scope 1, 2, and 3 emissions, which cover a firm's direct emissions, indirect emissions in the form of purchased energy, and emissions from "upstream and downstream activities in a registrant's value chain," according to the proposal's text.

Banks have urged the SEC to retool its proposed approach to Scope 3 emissions, arguing that the regulatory burden could be immense if financial institutions are responsible for calculating the emissions of their clients and borrowers.

Gensler spent much of the hearing defending the SEC's climate disclosure proposal from criticism by Republican senators. Gensler argued that basic climate risk information amounts to "material" information as investors around the world have become more attuned to the long-term risks of climate change.

"It's material because — as the Supreme Court says, [there is] substantial likelihood that a reasonable investor is considering it significant in their mix of information," Gensler said, referring to previous Supreme Court decisions around the SEC's authority to require information from public companies.

"It's really remarkable, what's happened in the last 10 to 20 years. So many investors are considering it, and why are they considering it?" Gensler continued. "They're considering it because there is a future chance of transition risk. They might have to change their operations. Laws might change."

Toomey's anticipation of support from the Supreme Court is notable for a sitting U.S. lawmaker, particularly in the absence of an actual legal challenge and before the agency rule has been finalized.

But the threat is also a testament to the considerable power of the Supreme Court's conservative supermajority, a Republican-appointed bloc of six justices that has acted aggressively in recent months to overturn long-running precedent in several areas, including reproductive health, tribal law, and environmental regulation.

Toomey pointed to a recent decision — *West Virginia v. the Environmental Protection Agency* — in which the Supreme Court ruled 6-3 to limit the ability of the EPA to direct certain power plants to reduce their emissions or adopt cleaner sources of energy.

That case rested on a legal theory sometimes called the "major questions" doctrine, in which jurists have argued that matters of political or economic significance should not be left to regulatory decision-making alone. *West Virginia v. EPA* was closely watched for years as a potential bellwether for how the Supreme Court will treat questions of federal agency authority and deference in the coming years.

"Among the factors [the Supreme Court] used to decide that something is a major question is [whether] it involved a novel approach, involved technical and policy expertise not traditionally needed by the agency," Toomey said. "Chairman, it looks to me that the climate you have proposed, under the major questions doctrine, just doesn't have the congressional authority."

Gensler responded by saying that the SEC and its staff "take seriously the courts, particularly the Supreme Court."

Later, Gensler had a warning of his own for opponents of the climate risk disclosure framework: American courts would not be able to prevent European authorities from requiring U.S. firms with international footprints from complying with their own climate disclosure regimes.

"We want something here in the US [where] we adopt a rule and it's sustained in court, because if we don't, large U.S. issuers will probably have to comply with that European regime," Gensler said.

32. SEC slaps B-D with \$100,000 penalty for not registering as muni adviser

15 Sep 2022, N/A

The Securities and Exchange Commission has charged Chicago-based Loop Capital Markets for providing advice to an unnamed Midwestern city without registering as a municipal adviser. The action marks the first time the SEC has charged a broker-dealer for violating the municipal adviser registration rule.

Without admitting or denying the findings, Loop agreed to be censured and to pay disgorgement of \$5,456.73 as well as a civil penalty of \$100,000.

According to the SEC's order, between September 2017 and February 2019, Loop Capital advised the city to purchase particular fixed-income securities. The city paid for the securities with money it raised through its issuance of municipal bonds.

The Commission's order found that Loop Capital did not maintain a system reasonably designed to supervise its municipal securities activities and had inadequate procedures, including insufficient methods to identify potential violations of the municipal adviser registration rules.

[Back to Top](#)

33. Gensler stands ground on climate disclosure despite lawmaker concerns

15 Sep 2022, Mark Schoeff Jr.

Although he was pressed by a Republican lawmaker to drop a climate disclosure proposal, SEC Chair Gary Gensler stood his ground on the rule Thursday in a Capitol Hill appearance.

Sen. Patrick Toomey, R-Pa. and the ranking Republican on the Senate Banking Committee, asked Gensler at a panel hearing if he would rescind the proposal given a recent Supreme Court decision that held that government agencies must have a clear directive from Congress before pursuing major rulemakings.

Toomey suggested the Securities and Exchange Commission lacks the authority to promulgate the climate rule, which would require public companies to disclose for the first time how climate change could impact their business performance and how they contribute to climate change.

Gensler responded that the agency is considering the proposal in light of the agency's authorities and the law. He added that investors are demanding the disclosures, pointing to feedback the SEC has received in more than 14,000 comments.

"Most of the comments are supportive," Gensler said. "Investors are using this information now and they want the information. And I think it does fit into our 80- or 90-year history of how we do disclosures. The disclosures are already being made. I think we have a role to ensure that ... the actual disclosures are not misleading and the like."

Toomey countered that the SEC is headed for legal trouble if it issues a final rule.

"As I've predicted, I think if you go ahead with something substantively similar to the proposed rule, you're going to find a very unsympathetic court with regard to the authority you have," Toomey said.

The exchange came at the end of a two-hour hearing focused on SEC oversight of the financial markets. Most of the questions Gensler received from lawmakers centered on climate disclosure.

Under the proposal, companies would have to report their so-called Scope 1 and 2 greenhouse gas emissions,

Case 1:24-cv-01858-ACK Document 34-4 Filed 08/20/25 Page 285 of 601
or those that emanate from their operations and the energy source they use. They also would have to report Scope 3 emissions — those produced throughout their supply chain — if they are material to company performance or the company has made commitments to reducing them.

It wasn't just Republicans who questioned Gensler on the climate proposal. Sen. Jon Tester, D-Mont., raised concerns about whether farmers would have to disclose their greenhouse gas emissions if they sold crops to public companies. Tester is a working farmer when he's not in Washington on Senate business.

For the most part, Democrats posed questions about the climate proposal that allowed Gensler to defend it. For instance, Sen. Sherrod Brown, D-Ohio, invited him to explain why the proposal is not an attempt by the SEC to make environmental policy.

Hundreds of companies are making climate disclosures now and they're influencing tens of trillions of assets under management, Gensler said.

"Investors get to decide," he said. "We're not a merit regulator. We're a disclosure-based regulator. Investors truly want to know about climate risk because it matters to the future path of financial and other performance. We have a role to help bring consistency to those disclosures that are already happening."

Gensler also addressed proposals that would require ESG disclosures by investment advisers and funds. He said the thrust was to prevent so-called greenwashing and ensure that ESG promises that are made to investors are kept.

Sen. Catherine Cortez Masto, D-Nev., raised a question about ESG integration into portfolios.

"To me, it's about truth in advertising," Gensler said.

[Back to Top](#)

ThinkAdvisor

34. SEC Chief Presses Senators to Fund More Reg BI Exams

15 Sep 2022 (2:48 PM), Melanie Waddell

Securities and Exchange Commission Chair Gary Gensler told senators Thursday that the agency needs more resources, noting that the exam division's "work is essential to ensuring strong compliance across the board," including "work to test for compliance with Regulation Best Interest."

In testimony before the Senate Banking Committee, Gensler said that the enforcement division "is doing more with less." For example, "more cases are being litigated and going to trial. The SEC has tried the same number of cases to verdict in federal courts in FY22 (14) as we did in the prior three fiscal years combined."

In fiscal 2021, Gensler said, the agency received 46,000 tips, complaints and referrals from the public, up from about 16,000 five years earlier.

As to the exam division, Gensler said that in the most recent completed fiscal year, this division exceeded the previous year's numbers by completing more than 3,000 exams.

The exam division "grew modestly (4%) since FY16," Gensler said. The fiscal 2023 budget request supports an additional 4% increase in full-time examiners compared with fiscal 2021, he said.

The SEC, Gensler told the lawmakers, oversees 24 national securities exchanges, 99 alternative trading systems, 10 credit rating agencies, seven active registered clearing agencies, five self-regulatory organizations and other external entities.

"We review the disclosures and financial statements of more than 8,200 reporting companies," Gensler said.

For instance, since 2016, Gensler said, “the number of private funds managed by registered investment advisers has increased 40%, to 50,000.”

Further, he continued, “the amount of data that the SEC processes has swelled by 20% annually for each of the last two years. And yet, our agency has shrunk. Last year, the agency had 4% fewer staff than it did in 2016. We can’t shrink when we’re trying to maintain a gold standard.”

[Back to Top](#)

Other Outlets

35. [Republicans grill SEC Chair Gensler over climate change rules, crypto regs](#) (Yahoo! Finance)

15 Sep 2022 (5:04 PM), Jennifer Schonberger

SEC Chair Gary Gensler faced a grilling from Republicans on climate disclosure rule proposals and crypto regulations at a hearing before the Senate Banking Committee on Thursday.

Ranking Member Senator Pat Toomey (R-PA) accused the Biden administration of using the SEC as a tool to advance a liberal agenda, pointing to newly proposed climate-related disclosure rules.

Toomey asked whether the recent ruling from the Supreme Court that the EPA lacked authority under the Clean Air Act to regulate greenhouse gas emissions calls into question the climate disclosure rules.

“In light of the EPA versus West Virginia case, have you given any consideration to rescinding that rulemaking?” Toomey asked.

“We take seriously the courts, and particularly the Supreme Court,” Gensler replied. “We’re considering 14,000-plus comments in that comment docket. We’re considering it in light of our authorities and the law.”

Gensler said most of the comments have been supportive of investors using climate-disclosure information, and that it fits into the SEC’s history of how disclosures are made.

On the crypto front, Toomey also questioned Gensler over what constitutes a security, asking if it’s fair to look at whether a token is centralized as the basis for the categorization. Gensler said it’s not just whether a token is centralized or not, adding he also consults Supreme Court decisions and whether the investing public is anticipating profits.

Chair Gensler also revealed that there are only six crypto companies that have registered with the SEC in the wake of his repeated requests that crypto companies to proactively register with the agency.

Given that most crypto tokens are securities, Gensler said it follows that many crypto intermediaries, including exchanges and broker dealers — whether they call themselves centralized or decentralized — are transacting in securities and have to register with the SEC in some capacity.

Gensler told the Senate that the SEC is talking to a “wide swath” of crypto intermediaries to get them registered and properly regulated as well.

Senator Cynthia Lummis (R-WY), who along with Senator Kirstin Gillibrand (D-NY), has proposed comprehensive legislation to regulate cryptocurrencies, asked Gensler for his thoughts on proposed disclosures in the senators’ crypto bill for digital assets.

Gensler said the SEC is setting up a new industry office to help define disclosure rules for crypto within the agency’s corporate finance area.

The bill proposes disclosure obligations that would hold responsible those who benefited from raising funds, not

Case 1:24-cv-01858-ACR Document 34-4 Filed 06/20/25 Page 287 of 601

the users of digital assets. Gensler agreed that exchanges and intermediaries should have the obligation to disclose, not investors, and said disclosures similar to the ones proposed in Senator Lummis and Gillibrand's bill would work with some small differences.

Gensler said that, in general, crypto assets should have a different set of disclosure requirements, as is the case in other areas like asset-backed securities.

[Back to Top](#)

36. [Doubts Over XRP's Future As Ripple's Battle With the SEC Continues](#) (Newsweek)

15 Sep 2022 (1:43 PM), Daniel Mark Harrison

One of the largest cryptocurrencies by market cap may bounce back after a hiatus. XRP, the world's seventh-largest cryptocurrency, is hoping an out-of-court legal settlement will turn around its recent lackluster performance. Opinions among crypto investors are divided about where the digital currency is headed next.

Since December 2020, XRP has been weighed down in a protracted legal battle with the U.S. Securities & Exchange Commission (SEC). The SEC has said that Ripple's currency is unregistered security, which the company—the ledger which employs XRP—denies.

Ripple may reportedly be close to settling out of court with the SEC. Legal action by the SEC has brought many cryptocurrency issuers such as Kik, a messaging app, to what amounts to sudden death. A settlement would be good news for the thousands of XRP holders around the world, said analysts, and is seen as the more likely outcome.

"From now until November...the cards will be on the table," Paul Hogan, a crypto legal expert, told *The Daily Hodl*, a trade publication. Hogan also said that a settlement between XRP and the SEC could be "imminent."

"Something Cooking Behind The Doors"

Analytics Insight, a cryptocurrency analytics firm, predicts the coin could reach as high as \$1.04 by 2025.

"XRP Price prediction is solid," wrote the firm's analysts in a recent report. Still, the analysts sounded cautious about loading up on the digital asset.

"The fact is that the crypto community does not look too favorably on this crypto, so it is still advised to invest in some crypto that is more accepted by users," they wrote.

Other reports suggest that some XRP whales may be gearing up to sell after 500 million XRP, representing 1 percent of the nearly 50 billion digital coins in issue, was transferred recently by large holders between cryptocurrency wallet addresses.

Still, in Latin America, Ripple has been teaming up with local money transmission agents to enable swifter and cheaper international currency transfers. The company said in April that it has teamed up with Travelex Bank, a regional Latin American financial services firm, to offer currency exchange services between Mexico and Brazil.

Insiders in Latin American money transmissions agree that the deal with Travelex and other similar money transmission firms is significant.

"I like XRP," wrote one Mexico City-based money transmitter, who uses the handle *feri*, on Bitzur Telegram, a popular cryptocurrency insider forum.

"[XRP is a] bridge currency. Non-prefunded accounts need it [for] crossborder payments in many settlement process[es]. Ripple's sales [are] higher and higher every quarter even with the SEC issue."

The Mexican money transmission professional and cryptocurrency investor added that there were "more than 400 banks and some central banks" that had been signed up to the digital currency platform for a prospective

The Ripple Blockchain, on which XRP is run, was founded by a reclusive blockchain pioneer called Jed McCaleb. McCaleb also founded Stellar, a copycat Blockchain in a technical process known as "blockchain forking," in 2014.

Before he wrote the code for Ripple and Stellar blockchains, McCaleb founded Mt. Gox, a Bitcoin exchange he shortly sold to Tokyo-based French entrepreneur Mark Karpelles in 2012.

Mt. Gox went bankrupt two years later after 800,000 BTC, then worth \$460 million, went missing. Ultimately, creditors of the exchange ended up being reimbursed after the Bitcoin community donated an equivalent number of BTC to the victims of the exchange hack.

To add fuel to what is one of the largest scandals in Bitcoin history, 80,000 BTC was reportedly missing even before Karpelles took over the exchange. Karpelles was ultimately given a suspended sentence by the Japanese courts for his role in the exchange's downfall. He said in May that investors may end up receiving up to \$6 billion back as a result of renewed plans to create an NFT-based digital currency rating agency for the sector. Investors in Mt. Gox would receive lifetime access to the service in the form of tokens, he said.

[Back to Top](#)

37. Q&A with Hester Peirce, part two: crypto regulation should not be enforcement-led (IFLR)

15 Sep 2022, Alice Tchernookova

In the second part of this Q&A, commissioner Peirce examines the latest progress on cryptoasset regulation in the US and reflects on her legacy within the agency...

[...]

[Back to Top](#)

38. SEC Charges RIA With Stealing Nearly \$750,000 From Pro Baseball Player (Barron's)

15 Sep 2022 (11:35 AM), Kenneth Corbin

The Securities and Exchange Commission has filed fraud charges against a former registered investment advisor who allegedly stole nearly \$750,000 from two clients, one of whom was a Major League Baseball player.

The commission alleges that Marc J. Frankel breached his fiduciary duties through a fairly straightforward scheme in which he siphoned off small amounts of money from his clients' checking accounts to pay for personal expenses, including Los Angeles Lakers tickets, college tuition for his children, jewelry, and travel.

Frankel used his late mother's American Express card to make those purchases and then used stolen client funds to pay off the card, according to the SEC's complaint.

Court records indicate that Frankel has not formally hired an attorney to represent him in the case. Frankel could not be immediately reached for comment.

Frankel is no longer registered with the SEC or brokerage regulator Finra. His LinkedIn profile identifies him as an independent consultant with Brooklyn, N.Y.-based Sam Financial Group, an advisor group run by his son, Jake Frankel.

Sam Financial Group is not registered with the SEC as an RIA, though it advertises common advisor services like wealth management and retirement planning. Marc Frankel appears on the firm's website identified as a consultant, but the email address and phone number listed are not in service.

Frankel was suspended from the brokerage industry in 2013 for not paying an arbitration award or responding to

After a stint at Wells Fargo that ended in 2010, Frankel spent about 10 years as an advisor representative with Partnervest Advisory Services but was fired in 2020 after the fraud allegations came to light. Partnervest, which has since been acquired by Changepath, said that fraudulent activity was detected in Frankel's client's accounts connected with the American Express card.

"The representative was asked in a face-to-face meeting if he was aware of the use of the card and ultimately admitted he was responsible," Partnervest says of Frankel in the SEC's Investment Advisor Public Database.

All told, Frankel stole around \$730,000 from the MLB player, taking numerous steps to conceal the fraud, the SEC's complaint alleges. At one point, Frankel allegedly modified the amounts he was siphoning from the baseball player's account to make them even-dollar withdrawals that matched the sums the client was paying his personal assistant, the SEC said. Following its practice of not disclosing victims' names, the agency did not reveal the identity of the baseball player.

Later on, when Frankel was questioned by the player's agent about the money going missing, he tried to blame the disappearances on the player's assistant, the SEC said.

Amid intensifying scrutiny of Frankel's role in the vanishing funds, Frankel allegedly targeted another client, ultimately stealing more than \$4,700 from her, according to the commission's complaint.

The SEC alleges that the fraud ran from December 2017 through June 2020.

The commission is suing Frankel in the U.S. District Court in California's Central District, asking for an injunction against him as well as disgorgement of the stolen money and civil penalties.

[Back to Top](#)

39. [Wilmington man sentenced for role in decade-long Ponzi scheme](#) (Wilmington StarNews)

15 Sep 2022 (5:00 PM), Jamey Cross

A Wilmington man faces up to 30 years in prison for his role in a \$7 million investment fraud scheme.

Shawn Edward Good pleaded guilty Thursday to wire fraud and money laundering, according to a news release from the U.S. Department of Justice.

A complaint filed by the Securities and Exchange Commission in April accused Good of running a decade-long "Ponzi scheme" that resulted in the loss of at least \$2 million in investments.

"We are cracking down on fraudsters who scam unwitting investors," said U.S. Attorney Michael Easley in Thursday's release. "This investment advisor breached the trust of at least a dozen clients, taking over \$7 million – money he promised would go to low-risk investments – and used it to line his pockets, buying real estate, luxury cars, and vacations. This decade-long scam has finally come to an end."

Good was a registered representative and investment advisor for Morgan Stanley Smith Barney, LLC in Wilmington. From December 2012 to February 2022, Good solicited funds from clients to his personal bank account for "low-risk investments," which he then used for personal expenses.

According to the release, Good used the more than \$7.2 million he frauded from at least 12 victims to pay for his Wilmington residence, condo in Florida, luxury vehicles and vacations, among other expenses.

[Back to Top](#)

40. [SEC's Gensler Signals Extra Scrutiny for Proof-of-Stake Cryptocurrencies: Report](#) (CoinDesk)

U.S. Securities and Exchange Commission (SEC) Chair Gary Gensler on Thursday said that staked cryptocurrencies may be subject to federal securities regulations, repeating a pro-oversight stance in the wake of Ethereum's transition to just such a method.

According to the Wall Street Journal, Gensler said that proof-of-stake (PoS) blockchains, which generate new coins for inventors who pool their holdings, take on investment contract-like attributes that could bring them under his agency's purview. He said he wasn't talking about a specific coin, according to the Journal.

Still, the comments, which came hours after Ethereum completed its PoS transition via the Merge, indicate that the milestone tech upgrade may carry greater ramifications for the second-most popular blockchain than simply cutting its energy usage. As a proof-of-work chain, its native ether token was one of only two cryptos – the other being bitcoin – clearly defined as commodities by federal regulators.

[Back to Top](#)

41. [CFTC Already Preparing to Be Crypto Watchdog, Benham Tells US Senators](#) (CoinDesk)

15 Sep 2022 (9:00 PM), Jesse Hamilton

Rostin Behnam, the head of the U.S. Commodity Futures Trading Commission, said he has already directed his agency to begin preparing to be the major, fully funded regulator for much of the crypto market, as anticipated in Senate legislation.

"The volatility in the market, and its impact on retail customers – which may only worsen under current macroeconomic conditions – emphasizes the immediate need for regulatory clarity and market protections," Behnam is set to tell members of the Senate Agriculture Committee in testimony set for delivery on Thursday. A bill being pushed by committee leaders to create new rules for the crypto industry, putting Behnam's agency at the center of federal oversight, recognizes "the CFTC's expertise and experience make it the right regulator for the digital asset commodity market," he added.

Committee Chairwoman Sen. Debbie Stabenow (D-Mich.) unveiled legislation last month with the panel's ranking Republican, Sen. John Boozman (R-Ark.), that would give the agency substantial reach to regulate digital assets trading, including authorizing the CFTC to oversee crypto spot markets.

However, it wouldn't let the agency define which tokens it would police, still giving the courts and the Securities and Exchange Commission leeway to figure out which assets would be defined as SEC-regulated securities.

Still, Behnam praised the legislation and its plan for additional agency funding that will allow the CFTC to "move swiftly" to establish the new oversight over digital commodity assets, which the courts, lawmakers and regulators conceded includes bitcoins, though other assets' status are less clear. "All digital commodity platforms must maintain adequate financial, operational, and managerial resources, segregate customer funds, and comply with commission requirements for the treatment of customer assets," Behnam said. "These tools have proven effective in preserving customer funds and market operations in times of instability, uncertainty, or market misconduct."

This Senate panel only has sway over the CFTC, and the Stabenow-Boozman bill stuck to that jurisdiction, unlike other efforts that have sought more sweeping regulations for the industry. Stabenow noted that keeping the bill in a single committee streamlines its ability to reach the Senate floor for a wider vote.

"This is a glaring hole in our financial system, and I believe we must close it," Stabenow said during the hearing, agreeing with Behnam that the CFTC is the "right regulator" for this work. "This is a big responsibility with a lot at stake."

One aspect of the bill would call for the agency to examine the environmental problem of high energy usage in crypto mining, though Behnam nodded toward the Ethereum Merge as a positive sign.

Similar legislation has been introduced in the House, but the legislative session is waning as midterm elections approach, leaving little time for bills to clear Congress before the end of the year. However, multiple bills have now suggested the CFTC take a central position in crypto oversight, and that momentum is expected to continue as the efforts get closer to the finish line.

Behnam said his agency, with a current budget of about \$320 million a year, would need an extra \$112 million for the first three years of putting this new oversight into place. The legislation would set up industry fees to pay for that extra cost, which would largely come from training and hiring people to handle the new crypto workload.

Several figures from the crypto industry also testified before the committee on Thursday, including representatives from U.S. crypto platform Coinbase and trading giant Citadel Securities.

"We are at a crossroads when it comes to crypto," said Christine Parker, a vice president and deputy general counsel for Coinbase. She asked the lawmakers to set a clearer border between commodities and securities in the bill, arguing it could "be strengthened by further defining digital asset commodities to ensure assets that do not meet the definition of securities are regulated by the CFTC and not by enforcement through the SEC."

The Blockchain Association, a Washington-based crypto advocacy group, agrees with that point, including it among a list of concerns the association outlined in a Thursday statement. The Stabenow-Boozman effort's definition of digital commodities is "too narrow and vague and must be clarified to draw a clear dividing line between the CFTC and SEC." The group also contends the bill could threaten decentralized finance (DeFi) by "applying the same rules to centralized intermediaries and decentralized protocols."

[Back to Top](#)

42. [Powers On... Insider trading with crypto is targeted — Finally! Part 2](#) (CoinTelegraph)

15 Sep 2022, Marc Powers

This is the second part of my column about the crackdown on insider trading involving crypto. In the first part, I discussed the criminal indictment of Nathaniel Chastain, a former product manager at the OpenSea NFT marketplace. I also discussed the SEC's allegations against former Coinbase employee Ishan Wahi, his brother and his friend, based on the "misappropriation" theory of insider trading.

Powers On... is a monthly opinion column from Marc Powers, who spent much of his 40-year legal career working with complex securities-related cases in the United States after a stint with the SEC. He is now an adjunct professor at Florida International University College of Law, where he teaches "Blockchain & the Law."

Since the *United States v. O'Hagan* Supreme Court case in 1997, the misappropriation theory of insider trading liability has been explicitly recognized. Both before that date and after, "misappropriation" of company secrets or confidential information used in connection with stock trading has been an active area of Securities and Exchange Commission enforcement and criminal prosecutions.

Examples include a former writer for *The Wall Street Journal* in *United States v. Winans*; employees at the magazine stand Hudson News in *Securities Exchange Commission v. Smath*; a printer at a company that printed tender offer documents in *Chiarella v. United States*; and more recently, financial analysts in *United States v. Newman* and *Salman v. United States*. On the same date as the SEC filing against Ishan Wahi and his two associates, the U.S. attorney for the Southern District of New York unsealed a parallel criminal indictment that charged these same three defendants with wire fraud and wire fraud conspiracy.

Tippees that receive material, nonpublic or confidential information from a tipper violate insider trading rules if they know the tipper breached a duty they owed to another and received some sort of personal benefit from the tip. The Supreme Court said in the 2016 *Salman* case that the personal benefit need not be financial or pecuniary. The benefit requirement is satisfied by bestowing a gift of this information on a trading relative or a close friend.

Frankly, it's about time that the SEC and U.S. attorney's offices focused on real crimes and fraud. This is precisely what insider trading is: fraud. It's an unfair trading advantage by someone who learns confidential information and trades on it for economic gain and profits. But this Wahi case begs the question of what exactly insider trading is. As I stated before, insider trading involves trading in "securities." Accordingly, to bring its case, the SEC is alleging that at least nine of the tokens listed on Coinbase and traded in advance by the defendants fit within the "investment contract" analysis of the Howey test. But do they really?

The SEC says that some of the tokens are "purported" to be governance tokens but are "securities." So, it is worth noting this warning shot. For those token issuers taking comfort from lawyers who have decreed their tokens non-securities because they are governance tokens, beware — and perhaps get another opinion from a qualified securities lawyer.

Apart from the interesting aspects of this particular case, what does it mean for others, such as Coinbase itself? Well, the SEC is claiming that certain tokens on its exchange are "securities." If that is so, then Coinbase should be registered as a "securities exchange" pursuant to the Securities Exchange Act of 1934. Not surprisingly, a few days after the SEC filing, it was reported that Coinbase was under SEC investigation.

My view is that SEC Chairman Gary Gensler is using this case as a further "land grab" to take jurisdiction over digital assets — and crypto specifically — away from the Commodity Futures Trading Commission. I have said this before. Indeed, CFTC Commissioner Caroline D. Pham also sees through the SEC's efforts.

On the day of the complaint filing, she issued a public statement, saying: "The SEC's allegations could have broad implications beyond this single case, underscoring how critical and urgent it is that regulators work together. Major questions are best addressed through a transparent process that engages the public to develop appropriate policy. [...] Regulatory clarity comes from being out in the open, not in the dark."

Pham also said, "SEC v. Wahi is a striking example of 'regulation by enforcement.'" Four days later, on July 25, CFTC Chair Rostin Behnam spoke at the Brookings Institute and echoed the view that the CFTC would be the natural and best regulator to have oversight over crypto.

What about those nine "issuers" of the nine tokens the SEC claims are securities? Well, they, too, can expect to be subject to independent investigations by SEC staff looking into registration violations. Each of their ICOs or offerings is within the five-year statute of limitations for the SEC to bring enforcement actions against them. Stay tuned.

[Back to Top](#)

43. [Republicans plan legal assault on climate disclosure rules for public companies](#) (The Guardian, UK)

15 Sep 2022 (11:00 AM), Adam Lowenstein

Republican officials and corporate lobby groups are teeing up a multi-pronged legal assault on the Biden administration's effort to help investors hold public corporations accountable for their carbon emissions and other climate change risks.

The US Securities and Exchange Commission (SEC) proposed new climate disclosure rules in March that would require public companies to report the climate-related impact and risks to their businesses.

The regulator has since received more than 14,500 comments. Submissions from 24 Republican state attorneys general and some of the country's most powerful industry associations suggest that these groups are preparing a series of legal challenges after the regulation is finalized, which could happen as soon as next month.

"I would expect a litigation challenge to be brought immediately once the final rule is released," Jill E Fisch, a business law professor at the University of Pennsylvania, told the Guardian. "They probably have their complaints already drafted, and they're ready to file."

Some opponents claim that requiring companies to publish climate-related information infringes on their right to

Both critiques feature prominently in comments from the Republican attorneys general and the US Chamber of Commerce, which spent more than \$35m lobbying the federal government in the first half of 2022, according to OpenSecrets. The Republican letter warns that if the new disclosure requirements are finalized, "capitalism will fall by the wayside".

The SEC proposal does not establish environmental policy or require that companies take any climate-related actions other than making more information publicly available.

The free speech and legal authority objections have been met with profound skepticism from legal experts and former SEC officials.

In a letter to the commission, John Coates, a Harvard Law School professor and former SEC general counsel, said that instead of challenging the climate disclosure rule on its merits, "critics have resorted to mischaracterizing the proposal, and inventing their own, fictional rule".

In another letter, a bipartisan group of former SEC officials, legal scholars, securities law experts and corporate lawyers noted that "the SEC has mandated environmental disclosure at least as far back as the Nixon administration." Even though not all of the letter's authors support the substance of the rule-making, they agreed without exception "that there is no legal basis to doubt the commission's authority to mandate public-company disclosures related to climate".

"The SEC is promulgating a disclosure rule that's square within its wheelhouse," said Fisch, of the University of Pennsylvania. "It's exactly what Congress told it to do, and which it has done consistently since 1933."

But the legal authority and free speech charges, however tenuous, are not the only grounds on which opponents of the climate disclosure rule have hinted at litigation.

In a recent analysis, the Guardian revealed how the Business Roundtable, a lobbying group for CEOs of America's biggest companies, opposes a key provision of the SEC proposal that would require some large companies to measure and report emissions generated throughout their supply chains – known as Scope 3 emissions.

In addition to challenging the substance of the rule, the Business Roundtable also rejects the SEC's estimate of how much it would cost businesses to comply. (The organization said in an email that its comments "[are] focused on identifying challenges in the proposed rule in the hopes the SEC will address them".)

The SEC projects that companies will face compliance costs of \$490,000 to \$640,000 in the first year of climate reporting, and less in subsequent years. (By comparison, a 2019 study predicted that climate change could cost firms about \$1tn over the following five years.)

A detailed assessment from Shivaram Rajgopal, Columbia Business School professor of accounting and auditing, concluded that even without taking into account any benefits from the climate disclosure rule, the costs would prove negligible for most firms. "The loss in market capitalization, if any, from compliance costs is likely too tiny for any outsider to detect and to separate from daily volatility in the stock returns for unrelated reasons," Rajgopal wrote.

Last quarter ExxonMobil earned nearly \$18bn in profit, the largest quarterly earnings in the company's history. Over the same period, General Motors generated more than \$35bn in revenue, while Walmart reported revenues of nearly \$153bn. The Economist recently reported that after-tax corporate profits as a share of the US economy have surged to their highest level since the 1940s.

ExxonMobil, GM and Walmart are members of the US Chamber of Commerce and the Business Roundtable. According to a report from the non-profit Center for Political Accountability, during the 2020 election cycle each company donated at least \$125,000 to the Republican Attorneys General Association, which supports the political campaigns and legal agendas of GOP attorneys general across the country.

In their letter to the SEC, 24 of these attorneys general called the commission's cost-benefit analysis "woefully unfinished" and warned that finalizing the climate disclosure rules "will undoubtedly draw legal challenges".

The Business Roundtable, meanwhile, described the analysis as "fundamentally flawed" and said that its member companies "believe [the costs of the rule] will be orders of magnitude more than what the SEC estimates". The chamber issued a similar condemnation, writing in its voluminous submission that the SEC's "economic analysis ... is incomplete and substantially underestimates compliance costs".

Asked to comment, neither organization responded specifically to questions of whether it planned to pursue legal action against the SEC if the final rule is not changed significantly.

Trade associations might be expected to instinctively oppose new regulations, but in the past such statements have proven to be more than routine political rhetoric. On multiple occasions in response to prior rule-makings, the chamber and the Business Roundtable have successfully sued the SEC on cost-benefit grounds.

In 2011, following a suit filed by the two groups, the DC circuit struck down an SEC rule that would have made it easier for shareholders to consider new board members for public companies, deeming the rule "arbitrary and capricious". The decision in *Business Roundtable v SEC* said that the commission "neglected its statutory obligation to assess the economic consequences of its rule", citing, among other figures, a cost estimate submitted to the SEC by the chamber.

In their comments on the climate disclosure proposal, the Republican attorneys general and the chamber each cite *Business Roundtable v SEC* in claiming that the SEC's cost-benefit analysis is flawed.

The Republican letter is co-led by Patrick Morrissey, the West Virginia attorney general who recently helmed a successful legal challenge to the Environmental Protection Agency (EPA).

In *West Virginia v EPA*, the supreme court endorsed a relatively novel legal notion – the so-called "major questions doctrine" – to halt an EPA effort to regulate greenhouse gas emissions from power plants. As the *Bulletin of the Atomic Scientists* explained, "Under this doctrine, when a regulation crosses a certain threshold of being 'major' – a line which remains poorly defined – the court rejects the regulation unless it has been clearly authorized by Congress."

The major questions doctrine looks to be the basis of Morrissey's campaign against the climate disclosure rule. In a July TV appearance, Morrissey said that the Biden administration "can't get the congressional majorities behind their policies, so they're trying to resort to the [regulations]. But as we saw with *West Virginia v EPA*, I don't think the courts are going to let that happen." (Morrissey's office did not respond to emails requesting comment.)

"I don't think there's any natural reason to infer that the court's decision [in *West Virginia v EPA*] would have any implications for the SEC," said the University of Pennsylvania's Jill Fisch. "At the same time, you can read the *West Virginia* case, and you can say: 'This is part of the supreme court, and the federal courts generally, taking a different look at government agencies. This is cutting back on the fourth branch, on the power of the administrative state.' And if that's true, in theory, everything is up for grabs."

"Historical legal precedent suggests that the SEC has a pretty strong case," Tyler Gellasch, the president and CEO of the non-profit Healthy Markets Association, said. "But if you're the Business Roundtable, you don't necessarily need historical legal precedent on your side. You just need a court today. And that seems far more likely today than it would have been at any time in modern history."

[Back to Top](#)

To: Harrington, James (b)(6) [redacted]; Busdoj.gov (b)(6); Hansen, Philip (b)(6) [redacted]; Hansen, Philip (b)(6) [redacted]; Millman, Phillip (b)(6) [redacted]; Millman, Phillip (b)(6) [redacted]
Lars (b)(6) [redacted]; Bloch, David (b)(6) [redacted]; Bloch, David (b)(6) [redacted]; Millman, Phillip (b)(6) [redacted]; Millman, Phillip (b)(6) [redacted]
From: Nigro, Daniel
Sent: 2022-09-07T12:48:01Z
Subject: Markets Daily: Dollar Screams Higher, Stocks Aim to 8th Straight Lower Day, 1st MoM Decline in Housing Prices Since '11; Bitcoin < \$19K Reflects Lower Risk Appetite Across Sectors
Received: 2022-09-07T12:48:02Z
[Ethereum Aims to Become the Internet of Crypto With 'The Merge' Barron's.pdf](#)
[What It Might Take to Chase Away the Three Bears.pdf](#)
[Why are Europe's power producers running out of cash Financial Times.pdf](#)
[Energy Trading Stressed by Margin Calls of \\$1.5 Trillion.docx](#)
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[FT - How do household energy bills compare across Europe - 09-06-2022.pdf](#)
[FT -EU seeks windfall tax trigger well below market rate - 09-07-2022.pdf](#)
[Law360 -Retail Investors Need More Info About Complex Products - 09-06-2022.pdf](#)
[FT - Liz Truss puts finishing touches to £100bn energy package - 09-06-2022.pdf](#)
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Wall St. Breakfast Summary: Futures are moving lower and the dollar is resuming its rise as markets digest perceived risks to the global economy. Covid-19 lockdowns in China are curtailing economic activity at the same time that Europe is enduring an energy crisis. Meanwhile, investors are fretting that the U.S. economy remains sufficiently strong that the Federal Reserve will continue to aggressively lift interest rates. The Fed on Wednesday will release its "beige book" report of recent economic data, including inflation and employment figures. GameStop earnings are due after the closing bell. [Read our live markets coverage here.](#)

Good news is bad news? There has sure been a lot of choppy trading since the beginning of September, with the bears taking the bulls by the horns in an intense fight over market direction. Traders continue to assess market data - before the FOMC meeting at the end of the month - to see how far the central bank will go in its battle against inflation. The more positive the economic figures, the less the Fed will have to worry its aggressive hiking cycle will trigger a downturn... or so the thinking goes. **The latest:** The S&P 500, along with the major indices, fell Tuesday for its seventh consecutive day of losses, marking the longest losing streak since November 2016. It followed an ISM survey that showed the U.S. services industry picking up for the second straight month in August due to increases in business activity, new orders and employment. The focus now turns to Fed Chair Jerome Powell's speech tomorrow, after the central bank telegraphed that it would be extremely data dependent given a road ahead that'll "bring some pain to households and businesses." Traders now see a 70% chance of a third 75-basis-point move in September, up from 57% a week ago, according to the CME Group's FedWatch tool that measures pricing in the fed funds futures markets.

Commentary: "The Fed will be surprised by the growth damage caused by its tightening, in our view," wrote analysts at Blackrock. "When the Fed sees this pain, we think it will stop raising rates. It will be too late to avoid a contraction in economic activity by then, we think, but the decrease won't be deep enough to bring PCE inflation down to the Fed's target of 2%... That's a big deal. We think getting inflation back to central bank targets means crushing demand with a recession. That's bad news for risk assets in the near term."

BMO Commentary: Treasuries were marginally better during the overnight session with 10-year yields retracing after reaching as high as 3.36%. Well shy of this cycle's yield peak for 10s at 3.50%; however, that's not the case for other benchmarks. 2s touched 3.50% overnight and remain within striking distance of the 3.549% cycle high seen last week. 10-year real yields edged up to 87.5 bp - effectively matching the 87.7 bp upper bound established in mid-June. The long-bond has established a new peak at 3.506% on Tuesday as the 30-year sector offered its highest yield since July 2014. We're encouraged by the comparative outperformance of 10s, particularly as investors ready for another round of aggressive rate hikes from the major central banks. This morning, the Bank of Canada is anticipated to deliver a 75 bp hike, bringing policy rates to 3.25%. There is a compelling case to be made for another 100 bp hike to get rates to terminal as quickly as feasible and take advantage of the market's perception that global central bankers maintain an especially hawkish disposition at the moment.

The fact that investors are debating the merits of another above consensus hike is very telling as to the broader balance of risks as the end of Q3 comes into focus. Let us not forget tomorrow's ECB decision - similarly expected to result in a 75 bp hike; albeit one that results in a 1.25% rate. The unique set of circumstances facing Europe as the energy crisis looms has left the ECB in a challenging position with plans being made to cope with a significant drop in energy from Russia in the winter months. Putin's stance is that Russia won't supply energy to any country that introduces price caps - tactfully describing any such efforts as "another stupidity." Needless to say, the inflationary implications go beyond heating and gas and policymakers are undoubtedly worried about pass-through to a variety of sectors where energy represents a significant input cost.

This backdrop makes a compelling case to lean bearishly on Treasuries. In addition, the corporate issuance calendar has picked up this week as widely anticipated. **Rate-locking and selling Treasuries in anticipation of rotating into new issue corporates has been thematic; a process that has been particularly acute as the September is not only expected to be a heavy issuance month, but also front-loaded as the timing and uncertainty of the FOMC decision provides an incentive to bring forward bond offerings.** This

dynamic will remain a meaningful influence for the balance of this week – especially given the light data calendar in the US. The 2s/10s curve has continued to claw its way back from the depths of August’s inversion. At -15 bp this morning, the curve is its least inverted since late-July and the move has triggered more questions than answers. On some level, it follows that the closer the FOMC gets to terminal, the less inverted the curve will become; although that move would more likely have a bullish tone in the front-end as investors moved on to contemplating the next stage of the cycle (i.e. rate cut watch). Alas, the bearish nature of the current price action indicates a different underlying motivation. Beyond the supply narrative, Powell’s emphasis on keeping terminal in place for an atypical length of time during this cycle can be credited for a recalibration toward higher real yields – a move that’s brought nominals along for the ride, even as breakevens continue to compress. Layering on the near-term outlook for 75 bp from the BoC and ECB, the case for higher US rates to start September can be convincingly made.

Is this the moment to buy 10s or will yields backup further, creating a more attractive entry point? Scaling in buying as 10s cross above 3.40% with designs on 3.50% is attractive; all the more so given that any foray above 3.50% will be a short-lived affair. That said, going long at 3.30% 10s given the event risk between now and the September 21 FOMC meeting is difficult; instead we’re anticipating an in-range consolidation in the 3.20% to 3.40% zone until next week’s CPI figures are revealed.

Tactical Bias: The widely anticipated bearish start to the week in the Treasury market played out in steepening fashion as 10-year yields traded above 3.34% with the move effectively entirely a function of the selloff in TIPS as real yields climbed an impressive 14 bp in the 10-year sector. Aside from the moves in rates, the price action in the yen crossed the 142 milestone as the first break of 140 led to some follow on selling with all that implies for currency hedging costs and demand for Treasuries from Tokyo. The heavy flow of corporate issuance and 19 deals in the primary market also added to the selling pressure in rates as investors prepared to take down the re-started issuance calendar. We won’t stand in the way of downtrade just yet, but expect the price action is reaching the point when we will start to see dip buying emerge more materially.

This week is the final opportunity for Fed rhetoric to refine expectations going into the September meeting and the deluge of Fed speakers on Wednesday will provide the Committee an opportunity to refine their telegraphed messaging following the jobs report. We’ll argue the most macro-relevant details of the employment situation report on Friday were the increase in both the unemployment rate and participation rate, as well as the underwhelming look at nominal wages. On the former, the increase in the rate of unemployment was not a function of higher joblessness, but rather more people actively engaged in seeking employment. Through this lens, the fact that the participation rate is back to matching the post-pandemic highs at a level last seen in March 2020 is encouraging as the Fed endeavors to bring up labor supply, moderate labor demand, and slow wage growth. A slower pace of nominal wage increases will help take the upward pressure off a demand driven acceleration in inflation, and the progress already witnessed in this regard will offer backing for a slowing pace of rate hikes “at some point.”

This point will not be the September meeting, and instead the more germane question that the market will grapple with among Wednesday’s headlines is how the balance of opinions favor a 50 bp or 75 bp hike on the 21st. We maintain that NFP kept the chance of 75 bp alive, and while there was some chatter surrounding whether a massive upside surprise would lead to the market pricing some chance of a 100 bp, the increase in the unemployment rate and deceleration in wage gains still leaves the fed funds futures market between 50 bp and 75 bp. In fact with 75 bp hike ~76% priced, we’ll argue the market is priced to perfect, from the Fed’s perspective, and this will leave Barkin, Barr, Mester and Brainard to not rock the proverbial boat of the Committee taking its data in “totality”. This means that if the market affords the FOMC the opportunity to deliver another super-size hike, we expect Powell will take it. To put a number on it, current levels or more aggressive pricing would represent enough cover for the Fed to follow through.

As such, even after 2-year yields rose above 3.50% as the market returned from the long-weekend and momentum continues to trade firmly in oversold territory, we won’t fade the front-end selloff yet. ***The nearest level to beat in terms of further bearishness is Thursday’s high yield at 3.549%, and in the event we see that level broken the next technical stop is not until 3.75%.*** Beyond the size of the September hike ***there is what we expect will increasingly become the ‘it’ trade of the year ahead; the Fed’s endeavors to battle to keep rates on hold in restrictive territory even as the market attempts to pull forward rate cuts (fine tuning or otherwise).*** It is the timing of the eventual capitulation on the Fed’s part that will be the main driver behind what we expect will be the cyclical bullish re-steepening of the curve that remains the operative uncertainty, but with inflation still so high and likely to remain elevated we expect that will be a late 2023 development at the earliest. - Ian Lyngen and Ben Jeffery
Futures at 8:40, Dow -.3%. S&P -.3%. Nasdaq -.3%. Crude -.6% to \$86.27. Gold +0.1% to \$1714.50. Bitcoin -1.2% to \$18,741. Ten-year Treasury Yield -4 bps to 3.31% VIX +4.3%% at 27.10

[Bearish Tech, Bullish Energy: Analysts’ Earnings Estimates Reflect First Half Performance \(WSJ\)](#) Analysts have been quite bearish on third-quarter corporate earnings, revising down their estimates throughout the summer.

[Conflicting Surveys Paint Mixed Picture of Services Providers \(WSJ\)](#) One shows they are thriving, while other shows them struggling

[What It Might Take to Chase Away the Three Bears: Macro Man \(Bloomberg, attached\)](#) “It’s understandably disappointing, therefore, when good news fails to have the expected impact. It all rather suggests that the three bears remain very much at home, which raises the question of what it might take to chase them away. “

[Why are Europe’s power producers running out of cash? \(FT, attached\)](#) **[Euro Energy Trading Stressed by Margin Calls of \\$1.5 Trillion \(Bloomberg, attached\)](#)**

[Europe’s Odds of Dodging Natural-Gas Shortage Hinge on Winter Weather \(WSJ\)](#) Early forecasts point to mild, dry weather during

Liz Truss puts finishing touches to £100bn energy package (FT - attached, Ling Yu)

FT - EU seeks windfall tax trigger well below market rate + How do household energy bills compare across Europe? (attached, Ling Yu)

Can Truss Make the Shorts Look Silly? Just Maybe (See also comments on Euro Natural Gas Prices & Powell's Jackson Hole Comments) John Authers (Bloomberg, attached) The UK's new leader will inevitably invite comparison to Thatcher and Merkel, but she'll have to find their luck in a terrible environment to prove it.

CoreLogic July home prices: US sees first negative MoM HPA since 2011 (BoAML, attached) **While Case Schiller is more well-known, the CoreLogic data comes out at the beginning of the month (vs. C-S EOM), and is very accurate** (Dano)

- Our 2022 HPA forecast revised lower to 5-10% after YTD HPA of 10% in 2022 (NSA); negative monthly HPA in July
- National home prices see negative HPA MoM for the first time since 2011 after 3 consecutive months of YoY deceleration

- Tampa, Miami, and Charlotte lead in terms of YoY HPA; Miami and New York the fastest MoM, Seattle the biggest HPA decline MoM

Mortgage demand drops further as interest rates shoot back to June high (CNBC, Ling Yu) The average contract interest rate for 30-year fixed-rate mortgages with conforming loan balances increased to 5.94% last week from 5.80% the previous week, according to the Mortgage Bankers Association.

- Mortgage applications to refinance a home loan fell another 1% for the week and were 83% lower than the same week one year ago.

Junk-Loan Defaults Worry Wall Street Investors (WSJ) Missed loan payments point to a hard landing for companies squeezed by rising interest rates

More Bifurcation in Credit Trading on the Way as Fed Tightens (Bloomberg, attached)

Bitcoin Price Falls Below \$19,000; Ether Slumps Ahead of Network Upgrade (WSJ)

Ethereum's Big Moment Is Coming With 'The Merge.' What It Means for Crypto. (Barron's, attached)

Commerce Secretary Embraces a Beefier Industrial Policy to Combat China and Russia (WSJ) Gina Raimondo, former Rhode Island governor, has courted constituencies that have a testy relationship with the administration, to the unease of progressives

SEC Warns Chinese Companies About Risks of Auditor Changes (WSJ) As businesses switch auditors to avoid U.S. delistings, the agency's acting chief accountant cautions of potential investigations and enforcement actions

Apple's iPhone 14 Lineup to Headline Wednesday Product Event (WSJ) The tech giant is seen revealing its most expensive 5G-capable smartphones

Wall Street Banks Lead Return-to-Office With Labor Day Push (Bloomberg, attached) As summer ends, New York-based companies are renewing efforts to bring employees back — this time for real.

Sustainable Funds Are Flunking ESG-Risk Test, Morningstar Finds (Bloomberg, attached)

Law360 - Retail Investors Need More Info About Complex Products (attached, Ling Yu)

CREDIT DAYBOOK AMERICAS: High Grade Sales; Citrix Loan Launch (Bloomberg) -- The high-grade primary market may see another busy day after nineteen borrowers priced more than \$35 billion Tuesday. Bank of America has told investors it will kick off the sale of the leveraged loan portion of the \$15 billion debt financing for Citrix Systems this week.

- The spread on the Markit CDX North American Investment Grade Index, which rises with increased credit risk, tightened by nearly a basis point to about 90 basis points at 7:20 a.m. in New York
- The secured bond portion of the Citrix debt sale is expected to follow the launch of the leveraged loan. Banks have floated a yield in the high-8% range, according to people with knowledge of the matter
- A group of banks led by Deutsche Bank will be holding a lender call for a \$1.5 billion leveraged loan on Wednesday to fund the buyout of animal health company Covetrus by private equity firms Clayton, Dubilier & Rice and TPG Capital
- United Airlines bonds may benefit in secondary trading after the airline boosted its estimate for third-quarter revenue growth
 - The company also sees an adjusted operating margin of about 10.5%, higher than its prior estimate of 10%
- The Geo Group has delivered a notice of redemption for all of the remaining \$125.7 million in outstanding aggregate principal amount of its 5.125% senior notes due April 2023, according to a statement
 - The redemption price for the 2023 senior notes will be equal to \$1,000 per \$1,000 original principal amount, plus any accrued and unpaid interest up to, but excluding, the redemption date
- Sustainable Fitch's system will allow granular assessment of ESG factors for leveraged finance borrowers and labeled issuance in North America and Europe
- Sunac China Holdings received a winding-up petition in Hong Kong, adding to turmoil at the developer as it crafts a debt-resolution plan

US HY OPEN: Countdown for Citrix Debt Roll Out Begins (Bloomberg) -- The US junk bond market continues to wait in anticipation of the launch of Citrix Systems Inc.'s long-expected debt offering to finance its leveraged buyout by Vista Equity Partners and Elliott

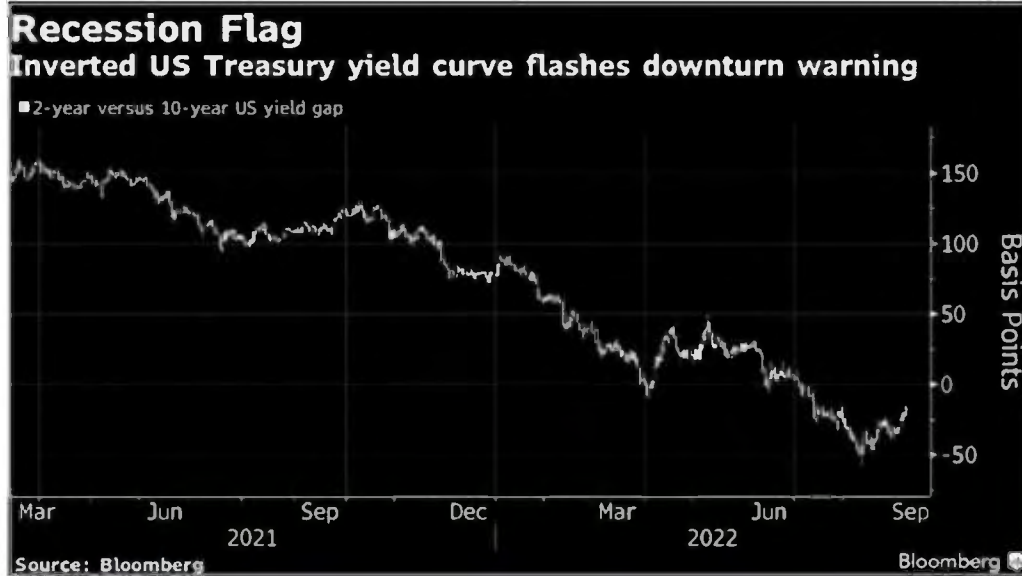
- Even as bankers look for a short window of opportunity to begin marketing highly levered Citrix's \$15b debt, US junk bonds extend the big August decline and post losses across ratings amid a broader risk-off move
 - US junk bonds opened September on a weak note, with a month-to-date loss of 0.39%, after steadily falling in two of the last three trading sessions this month
 - CCC yields, the riskiest of junk bonds, closed at 13.53% on Tuesday and spreads hovered near distress levels at +984bps
- While Citrix mulls a marketing campaign for the \$15b debt sale this week or early next week, cautious investors look to exit the asset class
 - US high yield funds estimate a cash outflow of \$789m at Friday's close before the onset the long Labor Day weekend, JPMorgan wrote, citing Refinitiv Lipper
 - Should the cash withdrawal continue, this would be the third straight week of outflows
 - HYG and JNK, the two big high yield exchange-traded funds, reported a combined outflow of \$623m on Tuesday
 - Investors pulled \$5.04b from junk bond funds for the week ended August 31, the biggest weekly withdrawal in more than two months
 - The last two weeks of August saw a combined outflow of \$9.6b, the biggest two-week exodus since March 2020, JPMorgan wrote on Friday
- The fragile primary market priced a mere \$10b between July and August
 - August priced about \$8b, the slowest August since 2014, amid macro uncertainty, fears of an imminent recession and rising rates
 - Year-to-date supply stood at around \$78b, the lowest since 2008
- US junk bonds may be on hold and wait for direction from equities. US equity futures drifted higher as investors assessed prospects for aggressive Federal Reserve monetary tightening, while US dollar climbed to a record for a third day. Meanwhile, oil erased a decline after Russian President warned that he may stop the supply of oil and fuel if price caps on the country's exports are introduced

STRUCTURED PIPELINE: Holiday-Shortened Week Sees Modest Start (Bloomberg) -- Affirm is out with price guidance on the \$250 million addition to its 2022-A point-of-sale transaction. Pricing is expected Thursday. Marlette Funding may begin premarketing later on Wednesday while Amur Equipment Finance filed an ABS-15G for an upcoming transaction. US ABS sales flow is expected to pick up next week.

- Bridge Debt Strategies plans to price a CRE CLO on Thursday
- A new single asset, single borrower from Industrial Logistics Properties Trust is also expected to price this week
- Freddie Mac is expected to price a trio of CMBS deals this week including the K-J42, K-F142 and the WI-K151
- Deutsche Bank is marketing a new issue CLO for LCM EURO II. Pricing is expected around September 15
- Natixis priced a new issue CLO for Invesco on Tuesday to bring YTD new issuance to approximately \$92.6 billion, according to data compiled by Bloomberg News
- The following issuers recently filed ABS-15Gs:
 - Amur Equipment Finance, Inc.: ABS-15G 2022/09/06
 - Gls Auto Receivables Llc: ABS-15G 2022/09/01
 - Hyundai Hk Lease, Llc: ABS-15G 2022/09/02
 - Santander Drive Auto Receivables Llc: ABS-15G 2022/09/02
 - Marlette Funding Trust 2022-3: ABS-15G 2022/09/02
 - Bhg Securitization Funding Llc: ABS-15G 2022/09/01
 - Continental Finance Credit Card Abs, Llc: ABS-15G 2022/08/30
 - Bp Pace Iii Llc: ABS-15G 2022/08/11
 - Fip Master Funding Iv, Llc: ABS-15G 2022/08/01

DISTRESSED DAILY: All of Serta Simmons Debt Matures in 2023 (Bloomberg) -- Serta Simmons Bedding faces \$2.2 billion in debt maturing in less than a year, increasing the odds of a financial restructuring or a bankruptcy filing amid the company's ongoing struggles. The Atlanta-based mattress maker and marketer saw sales fall nearly 13% in the second quarter of the year, according to a note by S&P Global Ratings. It has about \$345 million in cash on hand, and its entire debt load of more than \$2 billion matures in 2023. Analysts only see demand sliding further as the housing market slows and a faltering economy pushes would-be customers to delay purchases, S&P's Luis Medal and Bea Chiem wrote last week. Over the next year, the company is expected to face a "material deficit" unless Serta can refinance or raise fresh capital. The analysts believe a default, distressed debt exchange, restructuring or bankruptcy filing is "likely within the next six months" due the sheer size of Serta's debt pile and its weak operating

performance. The company's \$200 million first-out super priority bank loan was last quoted at 98 cents on the dollar, while its \$851 million second-out super priority bank loan was quoted around 63 cents, according to data compiled by Bloomberg. Its \$1.95 billion first-lien term bank loan was quoted at about 17 cents. In 2020, Serta tried to wrangle its debt load with an amended ABL and debt exchange in a restructuring that has become an infamous example of transferring collateral from some lenders to ink a deal with others. The transaction shaved off about \$240 million in gross debt, and analysts at the time said the company's new balance sheet would be "unsustainable beyond the next 12 months." The company did not respond to requests for comment.



- QUOTABLE
- "We can think about having a soft landing." But it's "a very hard bet to place. And the markets are not necessarily calling for that."
 - Jim Caron, chief fixed income strategist at Morgan Stanley Investment Management Inc., on whether the economy can be steered into a soft landing
- DEADLINES AND DOCKETS
 - All times are U.S. Eastern unless specified and are subject to late revision or cancellation.
- Wednesday, Sept. 7
 - SAS AB, bankruptcy hearing, 3 p.m.
 - Sungard AS New Holdings, bankruptcy hearing, 11:30 a.m.
 - Aearo Technologies, motion for expedited hearing, 1:30 p.m.
 - Boy Scouts of America, status conference, 10 a.m.
- READING LIST
 - News, research and insight relevant to distressed investing
- Cerberus, Bayside in Settlement Talks Over Bankrupt TPC Group
- JPMorgan's Bea Exiting as Head of Distressed, Special Situations
- Cadwalader Adds King & Spalding Restructuring Head in New York
- Latam Seeks to Emerge From Chapter 11 No Later Than November

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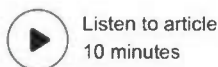
CRYPTOCURRENCIES | FEATURE

Ethereum's Big Moment Is Coming With 'The Merge.' What It Means for Crypto.

By [Joe Light](#) [Follow](#) Updated September 5, 2022 / Original September 2, 2022



Illustration by Timo Lenzen



If Bitcoin [BTCUSD +0.78%](#) is crypto's answer to gold, Ethereum is the closest thing it has to its own internet. Anyone who wants to mint a new token, launch a crypto app, or spend \$150,000 on a [Bored Ape](#) nonfungible token, or NFT, probably uses the Ethereum network. More than \$3 billion in transaction volume flows through Ethereum daily, traded in the network's native token, Ether [ETHUSD +4.60%](#). About \$60 billion in crypto assets sit on its blockchain through third-party apps. Aside from Bitcoin, no other network is more critical to crypto's infrastructure or its future.

Tinkering with Ethereum is no trifling matter. Yet the network's developers aren't just about to tinker—they're on the cusp of overhauling the core plumbing and mechanics of Ethereum in an upgrade that enthusiasts call The Merge.

MORE CRYPTO NEWS

The change, slated to happen around Sept. 15, is a big technological risk and could be a transformative moment for crypto. Companies like Coinbase

Bitcoin Prices Are Falling. Why Analysts Say a 'Massive Capitulation' Is Coming.

Global [COIN -0.41%](#) (ticker: COIN) will feel the impact almost immediately.

Forget Bitcoin. Ether Is Booming Ahead of 'The Merge.'

And there are likely to be ripple effects throughout the industry, touching everyone from crypto miners to chip makers like Nvidia [NVDA -2.08%](#) (NVDA), and investors with some Ether in their portfolios.

NFTs Are a Favorite With Crooks. But Crime Isn't the Biggest Problem.

IRS Asks a Contentious Question About Digital Assets in This Disasterous Year

Commentary: What Survives the Crypto Winter Will Be Stronger

"The Merge is the most significant upgrade in crypto history," says Sami Kassab, an analyst for crypto research firm Messari. "It's similar to changing the engines on an airplane in midflight. One flaw in the code could wreak havoc on the crypto ecosystem."

Years in the making, The Merge may be crypto's answer to critics who say the industry is a colossal waste of energy. Ethereum, with a market value of nearly \$200 billion, now uses the same method of validating transactions as Bitcoin.

In that process, known as proof of work, computers compete to solve cryptographic puzzles. The network reaches a consensus on the winner, proving that a block of transactions is valid and should be added to the chain. The winner then receives some Bitcoin, a practice known as mining.

It's highly energy-intensive, requiring a massive amount of computing work and electricity. Ethereum was built on the same system, and it is also an energy hog, using roughly the same amount of electricity in a year as countries like the Netherlands.

Now, developers are scrapping that model and moving to a much greener system for processing transactions, called proof of stake. Instead of mining, Ether owners use their tokens as collateral to validate transactions, "staking" them to the network in exchange for a yield, paid in the Ether token. To participate, a staker must deposit 32 Ether tokens, worth about \$50,000, and run some software. The system randomly selects validators, like a lottery. Crypto exchanges and other firms run staking pools, allowing anyone to participate with smaller amounts of Ether.

The shift should eliminate Ether mining. In doing so, it will cut Ethereum's energy usage by more than 99%, according to the Ethereum Foundation, sharply reducing the network's carbon footprint.

That's just the start of a larger makeover. The Merge should also reduce the newly minted Ether that's produced each year. And developers are planning more upgrades over the next few years that aim to increase Ethereum's throughput and lower its usage fees. Ideally, they aim to turn Ethereum into the internet of crypto—a base layer for apps, financial services, and many more digital assets like NFTs.

"Today, we talk about decentralized finance. In 10 years, if we are successful, people will just call it finance, full stop," says Justin Drake, a researcher for the Ethereum Foundation who's helping with the project. "For almost any financial transaction, they will use Ethereum."

Yet The Merge may also have casualties. It could cause glitches, outages, or losses of tokens as the current Ethereum blockchain merges with a new one, called Beacon. "A laundry list of elements will need to keep working seamlessly post-Merge to keep exploits and liquidations at bay," says Sean Farrell, head of digital assets at Fundstrat Global Advisors.

The stakes are high because so much of the crypto industry has a stake in its performance—from exchanges like Coinbase to mining operations, NFT platforms, and stablecoin issuers. "Usually, when you push out a change for a website and it breaks—oh well, it's not the end of the world. In this case, you can lose a lot of money," says Katie Talati, director of research at Arca, a crypto-asset manager.

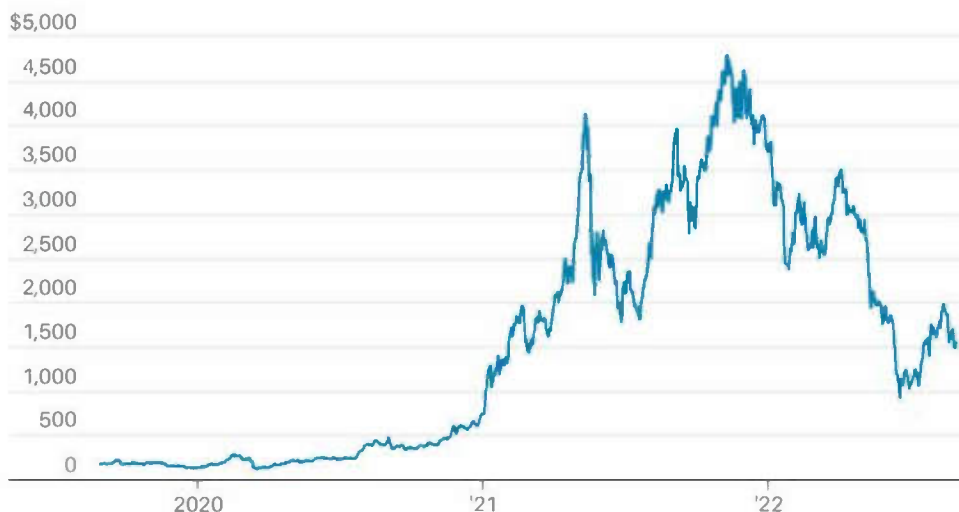
The most immediate effect could be on Ether's price. Since mid-June, the token has soared more than 50%, while Bitcoin has stayed flat. Both tokens are down about 60% this year, under pressure from rising interest rates and weaker demand for highly speculative tech.

A successful Merge could make Ether ripe for another run, some analysts say. That's partly because moving to proof of stake should reduce token issuance to about 0.5% a year, down from 4.5% currently. Reducing the issuance could push up the price. "In the

current market, supply and demand is relatively in balance," says Steve Goulden, a senior analyst for Cumberland, the crypto arm of trading firm DRW Holdings. "Post-Merge, there will be a material supply deficit."

Ether's Ups and Downs

The Ethereum network's token has pushed higher lately on hopes for "The Merge."



Source: Bloomberg

Demand, meanwhile, could get a lift as owners stake their tokens in return for a yield. Investors may earn 4% to 8% by staking, depending on how much revenue the network generates and other factors, according to Talati. Institutional funds with a mandate to invest in environmentally friendly assets could also buy Ether as the blockchain's carbon emissions become less of an issue.

The upgrade could be a boon to companies like Coinbase. The exchange is developing a service that makes it easy for investors to stake their Ether, with Coinbase taking a 25% cut of any income generated. The staking business has already "grown into a great source of subscription and services revenue and is growing nicely," said CEO Brian Armstrong on an earnings call in August.

As in any tech upgrade cycle, however, there will be a legacy of obsolescence. Some of the biggest losers in this cycle could be mining companies that spent hundreds of

millions of dollars on hardware that might be rendered worthless. Leaders of Hut 8 Mining (HUT), which mines both Bitcoin and Ether, said in August that they were studying how to adapt their Ether mining machines to other tokens or projects. Hive Blockchain Technologies [HIVE -1.41%](#) (HIVE), another miner, said a shift to proof of stake “may render our mining business less competitive.”

Chip maker Nvidia looks like another [casualty](#). The company’s graphics chips and cards have been adopted by the industry to mine Ether. But demand now appears to be evaporating. Nvidia, whose stock is already ailing from a slowdown in gaming and other core areas, said on its recent earnings call that it couldn’t predict how reduced crypto mining might hit demand. Analysts for investment bank Baird say The Merge is likely to “generate a wave of mining GPUs [graphics processing units] on the secondhand market, compounding the inventory woes.”

Longer term, Ethereum may pose more of a threat to rival blockchain networks. Blockchains and tokens such as Solana, Avalanche, and Tezos launched with the promise of being faster and more efficient than Ethereum. All run on proof of stake and have established various uses, but if Ethereum pulls off its upgrades, they may run out of time to prove their relevance. “Now that Ethereum has caught up with proof of stake, there’s less of an argument for many other blockchains,” Kassab says.

Some crypto companies aren’t taking The Merge lying down. The threat has led a few miners to launch a competing Ethereum blockchain, called a fork, using the proof-of-work method. The idea is to create an Ether spinoff and a parallel universe of smart contracts, NFTs, and decentralized-finance, or DeFi, applications.

The potential for dueling Ether blockchains is forcing companies to choose sides or declare neutrality. Exchanges like Coinbase, Binance, and FTX say they will apply their usual listing standards to forked tokens and may allow them to trade. Creators of crypto apps such as Uniswap, Compound, and stablecoin USDC have pledged to recognize only the new Ethereum blockchain.

An Ethereum split has some crypto leaders worried that scammers could find new ways to perpetuate theft and fraud. “Somebody’s going to spend 80 real Ether on a fake

Bored Ape,” says Robert Leshner, founder and CEO of Compound Labs, a DeFi company. “There will be all sorts of disasters,” he says, advising investors to wait for the kinks to be ironed out and “do nothing.”

Another unknown is how Washington will react. Officials at the Securities and Exchange Commission have indicated that Bitcoin and Ether should be treated as commodities—potentially removing those tokens from SEC oversight. But because many investors will buy Ether with the expectation of a yield, some attorneys believe it could make the token look more like a security. If the SEC agrees, crypto exchanges like Coinbase could be vulnerable to lawsuits or enforcement actions if they let it trade on their platforms anyway.

Changes of this size are an “opportunity to try to distinguish the prior analysis from the current analysis,” says Teresa Goody Guillén, a partner at BakerHostetler and former SEC attorney, who believes that Ether still wouldn’t qualify as a security. The SEC declined to comment.

As with all things in crypto, the hype around The Merge already exceeds the reality. Proponents say it could be the start of a Renaissance of useful apps and services—finally silencing the critics bemused at a multibillion-dollar industry that has yet to find a raison d’être apart from speculation. Conversely, if it flops, it would be another setback for a technology long on complexity and short on real-world utility.

“The most important part of The Merge is the narrative,” Kassab says. “It’s something that everybody is talking about that could bring people back into Web3 and crypto, assuming it’s successful.”

The crypto market is now suffering from a crisis of confidence, having lost \$2 trillion in value over the past year and drawn the ire of governments worldwide. A successful Merge may not revive the market or its reputation. But it could make crypto a bit greener, at the least, on its path forward.

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From: Nigro, Daniel
Sent: 2022-10-24T13:00:03Z
Subject: Markets Daily: Signs that the Fed May Pause After Jan Has Equities Rallying - If the UK & Emerging Markets' Debt Markets are at Risk in Response to \$ Strength & Higher Rates...
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Wall St. Breakfast Summary: Futures [edge higher](#) as investors await a [packed week of earnings](#) reports from major names including Apple and Amazon. Hong Kong's Hang Seng plunged [more than 6%](#) after Chinese leader Xi Jinping [cemented his control](#) over the ruling Communist Party over the weekend, with technology shares particularly hard hit. U.K. government [bonds are rallying](#) after Boris Johnson dropped out of the race to become the country's next prime minister. [Read our live markets coverage here.](#)

Earnings Season: The stakes this week couldn't be higher as Big Tech gets ready to dominate earnings season. While third quarter reports will pour in from every corner of the market, results from Microsoft, Alphabet, Meta, Apple and Amazon are likely to define investing direction for many a trader. Combined revenue growth of the newly found FAANG family, now called MAMAA by *Mad Money's* Jim Cramer, is expected to have slowed to just under 10%, compared to a 29% increase in 2021 that took sales to \$1.4T.

Bigger picture: Earnings from Snap already set a somber tone heading into the big parade, especially following the end of the pandemic digital boom that was compounded by soaring inflation. Fearful about a coming recession, many Big Tech companies have imposed hiring freezes, though some feel that the heavyweights have diversified their businesses enough to shield themselves from any advertising slowdown. A miss on estimates could still trigger panic, with outsized gains and losses becoming a trademark of this volatile market. "The bar was set really low going into earnings season," noted Gene Goldman, chief investment officer at Cetera Investment Management. "We were hoping for easier beats because everything had been revised lower, but the earnings releases we're seeing now have not been that great." **Market movement:** According to FactSet, S&P 500 companies that have missed expectations this earnings season have fallen 4.7% on average in the two days before their report through the two days after, compared with the five-year average of 2.2%.

Cementing Power in China: Stocks in Hong Kong and Shanghai closed out Monday's session down 6.4% and 2%, respectively, amid a slew of concerns over the country's economy. While third-quarter GDP growth beat expectations at 3.9%, the figure was way below China's official full-year target of 5.5%, which is already its lowest goal in three decades. A large-scale property crisis and strict zero-COVID strategy have weighed on consumer spending, and there are additional economic fears as President Xi Jinping tightens his grip on power. **Quote:** "This is panic selling," said Dickie Wong, executive director of research at Kingston Securities. "Quite obviously investors are simply not confident about the future of the Chinese economy." During China's 20th Party Congress, Xi was awarded with a third five-year term as leader of the ruling Communist Party, while the new Politburo Standing Committee was stacked with allies, loyalists and protégés. Xi also reaffirmed his Common Prosperity drive by pledging to "standardize wealth accumulation mechanisms" and by promoting "Chinese-style modernization." Meanwhile, the Communist Party's constitution was amended with strengthening "fighting spirit and ability," while deterring separatists seeking independence in Taiwan.

Commentary: "Foreign investors and businesses have desperately searched for signs that liberals or 'reformers' will play a role in shaping the economy or bringing back an old economic order that prioritized foreign investment and liberalization of the economy," said Drew Thompson, a visiting senior research fellow at the National University of Singapore. "It is clear from the outcome of the 20th Party Congress that national security and the party's political security will take precedence over economic growth." (See [Xi's Power Grab Spurs Historic Market Rout as Foreigners Flee](#) Bloomberg, attached)

Futures at 8:50, Dow +.7%. S&P +.6%. Nasdaq +.3%. Crude -2% to \$83.32. Gold -0.1% to \$1654.70. Bitcoin -.7% to \$19,373. **Ten-year Treasury Yield** -4 bps to 4.18%
Last Week: Dow +4.9% to 31,083. S&P 500 +4.7% to 3,753. Nasdaq +5.2% to 10,860. Russell 2000 +3.6% to 1,742. CBOE Volatility

BMO Commentary: The bearish repricing that has brought most of the major Treasury benchmarks to ~4.50% will be challenged in the coming days as investors contemplate whether this is the dip to buy. To be fair, it hasn't been a year in which attempting to lock in higher yields on each incremental backup in rates has been fulfilling. In fact, since closing 2021 at 1.51%, 10-year yields have increased by nearly 300 bp as inflation has proven to be far more stubborn than initially anticipated. It's been striking the eagerness with which investors were willing to price in another 75 bp hike in December based on the recent core-CPI print. We're certainly sympathetic to the notion that the market believes it finally has an understanding of the Fed's reaction function to realized inflation; hence penciling in another 75 bp move in December follows intuitively based on the Committee's prior hawkishness. It wasn't until the WSJ/Timiraos article outlining the argument for downshifting to 50 bp in December that the market pushed back against the assumption of another three-quarter point hike to cap the year.

The terminal rate debate is much more fluid. To a great extent, the Fed has been willing to take whatever opportunity the market has offered to move policy rates higher throughout the year. While that has unquestionably proven a reasonable operating assumption thus far, now that monetary policy has shifted past the neutral level and into restrictive territory, **Fed officials are becoming increasingly apprehensive. For context, before Friday's WSJ article, the market priced terminal >5%; this morning, the level is just 4.87% -- much closer to the SEP indication of 4.6%. We continue to see 75 bp in November, 50 bp in December, and a quarter-point to end the cycle in February. This implies that, unlike during most of the cycle, the market is overpricing what the Fed will ultimately deliver. Our logic here is straightforward – the key drivers of inflation (OER/rents, used autos, and medical care) are poised to cease delivering upside surprises, allowing for the pace of consumer price increases to moderate to more typical levels. More importantly, the Fed's response to higher realized inflation is evolving; no longer will we see the Committee addressing upside core-CPI print with three-quarter point hikes, instead emphasizing the higher for longer narrative will become the new norm.**

Let us not forget that rent and OER accounted for ~60% of September's gain in core consumer prices; a fact that further complicates the Fed's price stability objective. On one hand, higher housing costs have defined the post-pandemic experience for most consumers and therefore moderating these pressures are key to the Fed's successful campaign against inflation. On the flipside, for the average US consumer the real estate sector represents the bulk of household savings/wealth and by overshooting on the tightening side, the Fed risks a degree of de-wealthing that will have larger consequences for real spending as the next stage of the cycle unfolds. Unchecked inflation is destabilizing for the economy; however, so is overtightening to the extent demand destruction triggers ongoing economic/employment uncertainty. Suffice it to say, the Committee is on the highway to the policy danger zone and cruising at a comfortable 75 bp... for now.

More immediately germane to trading in the US rates market will be the post-Timiraos consolidation that will be this morning's first order of business. 10-year yields peaked at 4.34% on Friday and retraced as low as 4.12% overnight. This 22 bp roundtrip will, if nothing else, function as a reminder of the volatility that will remain persistent in rates until there is greater clarity from monetary policymakers as to the pace of December's hike and the terminal objective. Adding to this dynamic will be this week's earnings releases; nearly a third of companies in the S&P 500 are reporting this week and the unifying theme is expected to be that of caution as a dimmer economic outlook is expected to replace post-pandemic optimism.

HIGHLIGHTS FROM THE LYNGEN US RATES WEEKLY: In the week ahead, financial markets will grapple with the fallout of 10-year yields reaching 4.34% only to rally back <4.20%, and market conditions that continue to deteriorate in response to the level of uncertainty and central banking hawkishness that are defining the macro backdrop - fraught, but functioning. Despite investors' reaction to the latest opinion offered by Timiraos, and the reversal of what had been a consistent climb in terminal rate assumptions, it is still too soon to rule out either a 75 bp December hike or a 5-handle finish line for the fed funds target band this cycle. There is a lot of data yet to be realized during the intervening period, and while the fourth consecutive three-quarter point rate raise on November 2nd is a foregone conclusion, beyond that rate decision, the policy outlook is anything but certain. This all with the backdrop on ongoing volatility in the UK and Europe where a changing political landscape is coinciding with a quickly approaching winter and the unknowns associated with energy security on the other side of the Atlantic.

In conversations with a variety of clients over the past several weeks, along with liquidity laments, the one consistent theme is a preference to either stay overweight cash or keep duration portfolios as short as possible. Notably, it is not a lack of investable capital that is keeping buyers on the sidelines – rather an unwillingness to reach further out the curve given the risk that the next leg toward higher rates is around the corner. During the year so far, this has proved the prudent strategy, although as we are increasingly hearing, sentiment is turning more neutral as hard landing worries become more poignant and the downtrade in Treasuries has reached an appealing level. Over the longer-term, this serves as a reminder of the potential for the move into duration to be larger and faster than would otherwise be expected. Particularly for those type of buyers who are more trend followers than setters (think foreign official money), there is the specter of a larger rally into or out of year-end.

However, that will not be this week's story, and instead we expect the setup for the FOMC will combine with front-end supply and the first look at Q3 GDP to dictate the price action. It is not a trading environment where macro fundamentals are driving the moves, but the expected rebound in real growth last quarter will nonetheless contribute to the ongoing debate on terminal. With Bloomberg's estimate at 2.3% and GDPNow at 2.9%, the clear consensus is for real growth to return to positive territory. We'll be cautious of how a strong read on economic output may drive the shape of the curve and risk asset valuations as positive data will

While the height of the volatility in the UK appears to have abated and new leadership in London is broadly expected to be decided early in the week, we're reminded that if one of the world's most developed debt markets is at risk in response to the dollar's strength and higher rates, then so too are emerging markets. Currency defense and default risk is only going to increase in relevance the longer the dollar and yields stay at current levels, and while the gilt meltdown of 2022 has been relatively contained, the next crack in the system may not be so easily repaired. Unlike the vast majority of the post global financial crisis period when inflation was low and borrowing was cheap, access to cheap money is no longer available to offset extraneous shocks to the global economy. War in Europe, tensions in East Asia, and a still-susceptible global supply chain leave no shortage of potential flashpoints heading into the closing months of 2022 and into the year ahead.

Tactical Bias: It is not a market environment that is being driven by the fundamentals, and we're skeptical that will be a dynamic that shifts ahead of the November FOMC meeting during a week when market function will occupy a larger share of the conversation than the state of the real economy. 10-year yields opened October at 3.80% only to head into the final full trading week of the month with a solid chance of reaching 4.50%, and with little to stand in the way of a larger selloff both in terms of the technicals and investor behavior, we certainly won't advocate catching the falling knife yet. As if an additional reason for concern was needed going into what we expect will be another tumultuous trading week in the Treasury market.

The only pivotal macro input of note in the week ahead and before the Fed meeting will be the first look at Q3's GDP data that will be coming after 3-month/10s dropped below 5 bp over the past week. The first half's economic contraction and the lack of any significant response in terms of pricing to what was formally a recession diminishes the tradability of next Thursday's print, but as an indication of the real economy's response to the earliest days of tighter (if not necessarily tight) monetary policy, the read will be informative. Within the details, as we continue to monitor the spread between new orders and inventories within the ISM series and what that means for waning demand, we'll be eager to see how the inventory drag in Q2 developed in Q3. As additional evidence of this dynamic the Beige Book's observation this past week that, "Some contacts noted solid pricing power over the past six weeks, while others said cost pass through was becoming more difficult as customers push back", reinforces the notion that discounts may be increasingly necessary to clear unsold goods. Net exports will also be topical as the dollar's strength continues to deliver an outsized impact on the balance of trade.

Coming out of Friday's selloff and going into Monday we'll be mindful of an early concession for supply and the final coupon auctions of October. \$42 bn 2s, \$43 bn 5s and \$35 bn 7s will once again be coming as the market is setting new cycle high yields and terminal assumptions are climbing with the backdrop of deteriorating market conditions. It was not so long ago that 5-handle fed funds would have been an unthinkable outcome in even the most aggressive hiking estimates; the market is now nearly priced to that reality and given the Fed's demonstrated willingness to take the tightening opportunities that the market affords it we won't fade that pricing even after the WSJ article moderated some of that pricing. This leaves the main unknown going into Tuesday's 2-year auction the extent to which this is already reflected in current valuations, and if primary market participants in 2s are willing to call the extremes of the hawkishness already priced in.

If recent history is any indication, 2-year auction buyers have demanded a larger discount as the last two auctions have tailed by over a basis point with end user allocations well below average - after the latest leg of volatility, we see little reason to fade this trend. There will eventually come a point at which those investors who have shown a clear preference for overweight cash or staying as short on the curve as possible will begin to reach for upside in yield offered in the 2-year sector, but at the risk of broken record strategy, that will not be until there is greater clarity on where terminal will ultimately emerge. - Ian Lyngen and Ben Jeffery **Talk of Fed Rate Slowdown Offers Respite for Bonds and Stocks (WSJ)** Investors hope for further stability after year's damaging rise in Treasury yields

After \$13 Trillion Stock Crash, Signs of a Turn Are Now Mounting (Bloomberg, attached)

- Bullish bets on the up, with inflation and Fed hikes priced in
- Demand for bearish options looks muted all things considered

Early Earnings Reports Worry Investors Already Battered by Stock Selloff (WSJ) Hopeful economic signs compete with challenges to profits including inflation, rising rates and a strong dollar

Companies Focus On Constant-Currency Metrics to Soothe Investors' Nerves (WSJ) As the strong \$ pinches earnings, more companies emphasize figures that strip away the negative impact of exchange rates

Companies Take Different Strategies to Navigate High Inflation (WSJ) P&G is ramping up advertising for premium brands; Verizon is raising prices for wireless services

Higher Interest Rates Can Take a Long Time to Bring Down Inflation (WSJ) Lags between rate increases and real-world impacts raise the twin risks of tightening too much and too little

How Front-Loading Rate Hikes Risks Instability: Mohamed El-Erian (Bloomberg, attached) Inflation requires faster increases, which intensify the threat of large financial accidents that can have nasty economic spillovers.

Will Jerome Powell Be Like Volcker or Burns?: Bill Dudley (Bloomberg, attached) The Fed chair can't escape the fundamental trade-off: Ensuring victory against inflation will require economic sacrifice.

Fundamentals 'Flashing Red' as Last Pillar of Credit Crumbles (Bloomberg, attached)

- Janus Henderson downgrades indicator of cash flow from amber

FT - Danger of defaults looms larger for private credit funds (attached, Ling Yu) Borrowers' exposure to rising rates heightens risk for managers with less defensive portfolios. Whether known as private debt, non-bank lending, alternative lending, shadow lending, or private credit, the investment class has witnessed eye-popping growth in the space of two decades. It grew from just \$41bn in December 2000 to \$311bn by December 2010, according to figures from data provider Preqin. As of December 2021, it had swelled to \$1.22tn

Boris Johnson Drops Out of Race for U.K. Prime Minister, Giving Rishi Sunak the Edge (WSJ) Former treasury chief could win contest as soon as Monday after large portion of Tory lawmakers said they wouldn't back Mr. Johnson's return to power Who Is Rishi Sunak? (read) **Rishi Sunak closes in on Downing Street after Boris Johnson pulls out of leadership race** (CNBC, Ling Yu)

FT Alphaville - Could the LDI Debacle happen in the US? - Nah, argues JPMorgan (attached, Ling Yu)

FT - China's GDP growth below target as property and zero-Covid woes mount (attached, Ling Yu)

FT - Eurozone business activity slides faster than feared (attached, Ling Yu)

Fears of a severe recession deepen as European business activity slows on surging energy costs (CNBC, Ling Yu)

FT - The market in Treasuries is storing up trouble (attached, Ling Yu) Questions raised by policymakers are a sign of mounting unease about American government bonds

FT - Traders brace for further volatility as bond markets turn bearish (attached, Ling Yu) Impact of quantitative tightening adds to concerns as liquidity continues to fall. Liquidity in the US Treasuries market has fallen to its lowest level since spring 2020, when markets were in turmoil at the onset of the coronavirus pandemic, according to JPMorgan data.

Crypto Is More Attractive as SEC Gets Aggressive: Bloomberg MLIV Pulse Survey (attached) Bitcoin will trade between \$17,600 and \$25,000 until the end of this year, survey of market participants shows.

Crypto's \$2 Trillion Wipeout Cuts a Path Through the C-Suite (Bloomberg, attached) After a period of tumult that is still shaking crypto companies to the core, a wave of management turnover is now sweeping across the industry.

Law360 - Full 5th Circ. Won't Rehear SEC In-House Courts Challenge (attached, Ling Yu)

Law360 - Pre- And Post-Closing Acquisition Due Diligence Is Vital After DOJ Memo (attached, Ling Yu) In an en banc poll, 10 judges supported leaving in place the decision and six voted in favor of rehearing it, according to an **order** denying the SEC's petition for rehearing issued Friday. The SEC had hoped to eventually convince the full appellate court to undo the May decision, in which a split, three-judge Fifth Circuit panel freed George R. Jarkey Jr. and his advisory firm Patriot28 LLC from a nearly \$1 million SEC judgment.

Global Junk-Bond Sales Drop Most Ever With No Signs of Recovery (Bloomberg, attached)

- Central bank rate hikes hindering prospects for transactions
- Banks also reluctant to take on risk by underwriting deals

CREDIT DAYBOOK AMERICAS: Wall Street Banks May Sell Fresh Debt (Bloomberg) -- The biggest banks on Wall Street may be the latest to tap debt markets after emerging from earnings blackouts. High-grade syndicate desks expect \$20 billion in new bond sales this week.

- The spread on the Markit CDX North American Investment Grade Index, which rises with increased credit risk, tightened by about .7 basis point to about 93.5 basis points at 7:20 a.m. in New York
- Morgan Stanley is so far the only major US lender to tap corporate-debt markets since the latest round of earnings releases, raising \$6.5 billion earlier this month. Bloomberg Intelligence estimates sales could reach as much as \$30 billion this quarter
 - JPMorgan, Citigroup, Goldman Sachs and Bank of America are among the Wall Street giants that could soon come to market, according to Bloomberg Intelligence credit analyst Arnold Kakuda
- Option-adjusted spreads on US high-yield bonds narrowed 15 basis points to 507 basis points over Treasuries in the past week, according to the Bloomberg US, Corporate High Yield index
- US credit ratings improved last week as the main ratings companies issued 47 upgrades and 32 downgrades
 - Investment grade issuers led the upgrades with 37, according to data compiled by Bloomberg from Moody's Investors Service, S&P and Fitch
- Concerns are starting to mount in Asia about real-estate financing, as surging global interest rates raise repayment concerns in a region already battered by China's property debt crisis
- In US leveraged loans, there are no lender meetings and commitments currently due. The US high-yield bond pipeline is empty**
 - Vericast's amend and extend transaction to partially refinance its capital structure, may close this week

US HY OPEN: Riskiest Junk Yields Rise at a Two-Year High (Bloomberg) -- US junk bonds posted modest gains following a rally in equities last week, even as Federal Reserve officials repeatedly stressed the need to keep tightening policy to curb inflation. But **the riskiest junk bond yields soared to a fresh 30-month high of 15.82% suggesting many investors remain deeply risk-averse.**

- Continuing macro uncertainty and the rising cost of debt have kept the primary market for US junk bonds practically frozen

- The year-to-date supply stood at \$90 billion, also the lowest since 2008
- Risk aversion for highly levered debt in the high-yield market has compelled banks to hold onto unsold debt for leveraged buyouts this year. Estimates suggest banks have been saddled with about \$30b of unsold debt

Read Banks Saddled With \$30 Billion in Unwanted Debt in Risk Exodus

- Junk bond yields fell 8bps to close the week at 9.62% and spreads narrowed 15bps to +507. Spreads tightened as US benchmark Treasury yields jumped to the highest since 2007 on Thursday
 - Spreads have been tight even in the face of poor macro data, indicating that this may not last, Brad Rogoff of Barclays wrote on Friday
 - Single B yields dropped a mere 4bps over the week to close at 9.98% and BB yields closed at 7.75%
- Junk bonds may pause to assess the developments in the UK and China and corporate earnings. US equity futures fluctuated as investors await earnings from some of the biggest global companies

STRUCTURED PIPELINE: ABS Sales Set to Rise; CMBS Waiting Game (Bloomberg) -- US ABS issuance is set to resume following a light week with a major industry conference in Miami. This week's supply will include a mix of auto, consumer loan, insurance premium and timeshare transactions. Consumer Portfolio Services and Freedom Financial were the only issuers to sell debt last week. At \$235.8 billion, this year's volume is running 7.2% lower, year-over-year, according to data compiled by Bloomberg News.

- **The narrative from ABS issuers in Miami was unchanged from July's industry conference in Las Vegas as "credit normalization is continuing slowly, sellers/servicers are preparing for possible recession, and sponsors are maintaining sufficient corporate liquidity,"** JPMorgan analysts Amy Sze and Akshit Jaisinghani wrote in their Oct. 21 securitization research report
 - "On the investor side, there was plenty of due diligence done on credit with many questions on stress testing and some pushback on consumer credit "normalization" versus "deterioration" for some sectors/sponsors (particularly in unsecured or nonprime consumer ABS)"
 - Investors expressed a preference for up-in-quality trades to the relative safety of high quality and liquid ABS asset classes and sponsors
 - Spreads widened further this week and are still struggling to reestablish an equilibrium given the broad market volatility
 - Spread pickup in investment grade benchmark ABS over corporates is attractive; BBB subprime auto subordinate ABS (3- year) at Treasury +300bp currently offer 100bp pickup on comparable unsecured BBB financials (BBB prime auto offers 20bp pickup)
- Private-label CMBS supply in 2022 has remained at \$92.8 billion since Oct. 7. This compares to \$116.4 billion at this time in 2021
 - Despite the gapping out of spreads across the credit spectrum, some investors are still waiting for better entry points, particularly in the conduit space
 - After investors reacted earlier to what turned out to be false signals for potential Fed pivots, "a number of them have developed a distinct preference for cash or else low duration, low-risk assets, which has imparted something of a steepening bias to the CMBS capital stack," said Chris Sullivan, chief investment officer at the United Nations Federal Credit Union
 - Sullivan added the combination of lower liquidity, ongoing quantitative tightening, lower investor participation, greater uncertainty and new and unexpected changes in loan status within retail, hotel and office sectors should keep a bias for spreads to move wider for a while longer until there is actual certainty on the rate and macro outlook
 - JPMorgan CMBS research analysts began the year with a \$360 billion total US CMBS gross issuance forecast and revised it down through the course of the year to \$276 billion currently
 - "The velocity and the degree of the rate move has clearly hampered both CRE acquisition and CMBS issuance activity," the team wrote in their weekly securitization report
- New issue CLO sales are roughly 22.3% lower year-over-year at \$110.8 billion
- Private-label RMBS supply is down approximately 27% year-over-year at \$121.8 billion, according to data from Bloomberg LEAG
 - Freddie Mac and Reverse Mortgage Funding are among the issuers expected to price this week
- EUROPE ABS PIPELINE: Possible Issuance in Coming Weeks

Structured Highlights Last Week:

- ABS East Was a 'Slightly Bearish' Gathering: Structured Weekly
- Used-Car Dealer DriveTime Brings Back Paused Subprime Deal

- JPMorgan Says CLO Spreads Are Returning to Fair Value
- Housing Sentiment Shifts Very Quickly to Negative, MS Says
- Sluggish CLO Markets Hit by Departure of Major Japanese Investor
- CVC Credit's CLO Loses Key Investor Norinchukin Bank Mid-Deal
- Barclays Hires Securitized Products Trader From Credit Suisse
- IMN Conference Tone Bearish Amid Historic Spread Levels: Nomura
- Mizuho Poaches CLO Trader Oher in New York From Barclays
- Moody's Warns Subprime Auto ABS at Risk in Downturn Scenario
- CLO Credit Quality Not Yet Affected by ESG Factors, Moody's Says
- CLO Equity Returns at -15% Year-to-Date, BofA Strategists Say
- Credit Suisse RMBS Pact Won't Be Its Last One: Legal Outlook

DISTRESSED DAILY: Recession Poises Threat to Vantage's Recovery (Bloomberg) -- The market for elevator parts may look nearly recession-proof, but high inflation and ongoing supply chain woes are hurting manufacturer Victory Buyer LLC's chances of strengthening its balance sheet. The company, which does business as Vantage, has high leverage it hasn't been able to address amid sustained higher prices. The company has raised prices twice in the last year-and-a-half, but those increases haven't fully offset its higher material and labor costs, according to S&P Global Ratings. Given safety requirements and the critical nature of elevators, demand for Vantage's parts should stay strong, S&P analysts Josh Katz and Trevor Martin wrote in a note. But some clients may put off modernization products as a recession nears, the analysts said. As of June 30, the New York-based company had \$11.8 million cash on hand and \$70 million available under a revolving credit facility. S&P said Vantage's debt load of roughly 10 times its earnings, along with other credit metrics, look "unsustainable" in the long-term if business doesn't improve. The company has no near-term maturities, and a term loan due in 2028.

- DATA POINTS

Read more: China Builder Yango's Unit Gets Wind-Up Order in First in HK

- QUOTABLE
 - "It is a case of the damage being done and too late to reverse."
 - Richard Segal, a London-based research analyst at Ambrosia Capital, on a Nigerian bond rout sparked after the country's finance minister unintentionally implied the government may ask for a haircut on its debt
- DEADLINES AND DOCKETS
 - All times are U.S. Eastern unless specified and are subject to late revision or cancellation.
- Monday, Oct. 24
 - Compute North Holdings, bankruptcy hearing, 2:30 p.m.
- READING LIST
 - News, research and insight relevant to distressed investing
- Brady Bond Veteran Says Coupon Opt-Outs Vital to Ease EM Pain
- Ares Raises \$7.1 Billion for Second Special Opportunities Fund
- Global Junk- Bond Sales Drop Most Ever With No Signs of Recovery
- Infowars' Parent Moves to Push Bankruptcy Plan Deadline to 2023

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(O) (b)(6) (M) (b)(6)

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Subject: RE: ICYMI: Europe's MiCA Crypto Rules Are Coming Soon. Here's Why They Matter — CoinDesk

Received: 2021-11-03T12:36:49Z
WEF_DeFi_Policy_Maker_Toolkit_2021.pdf

(b)(6)

(b)(5)

Re DeFi – just in case you missed it – attached the Wharton piece on toolkits from this summer.

From: (b)(6) dec.europa.eu>

Sent: Wednesday, November 3, 2021 3:37 AM

To: Jacobs, Elizabeth (b)(6) SEC.GOV>

Subject: Re: ICYMI: Europe's MiCA Crypto Rules Are Coming Soon. Here's Why They Matter — CoinDesk

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Thanks. Just flying back from (b)(6)

(b)(5)

(b)(6)

Sent from iPhone

On 2 Nov 2021, at 13:07, Jacobs, Elizabeth (b)(6) @sec.gov> wrote:

This was a nice little survey piece.
Hope all is well.

Europe's MiCA Crypto Rules Are Coming Soon. Here's Why They Matter
Leader in cryptocurrency, Bitcoin, Ethereum, XRP, blockchain, DeFi, digital finance and Web 3.0 news with analysis, video and live price updates.

Read the full article on CoinDesk:

<https://www.coindesk.com/policy/2021/11/02/unpacking-europes-looming-mica-crypto-regulation/>

In collaboration with
the Wharton Blockchain and Digital Asset Project



Decentralized Finance (DeFi) Policy-Maker Toolkit

WHITE PAPER

JUNE 2021

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Contents

3	Foreword
4	Executive summary
5	1 What is DeFi?
6	1.1 Distinguishing characteristics
7	1.2 The DeFi architecture
10	1.3 DeFi service categories
12	2 Risks
14	2.1 Financial
15	2.2 Technical
16	2.3 Operational
18	2.4 Legal compliance
18	2.5 Emergent risks
20	3 Policy approaches
21	3.1 DeFi and financial regulation
22	3.2 Available policy tools
24	3.3 Decision tree
25	Conclusion
26	Appendix 1: Background assessment
28	Appendix 2: Stakeholder mapping tool
30	Appendix 3: Decentralization spectrum
31	Appendix 4: DeFi policy-maker canvas
34	Contributors
35	Acknowledgements
36	Endnotes

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Foreword



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Decentralized finance (DeFi) is an emerging and rapidly evolving area in the blockchain environment. Although examples of DeFi have existed for several years, there was a sudden upsurge of activity in 2020. In one year, the value of digital assets¹ locked in DeFi smart contracts grew by a factor of 18, from \$670 million to \$13 billion; the number of associated user wallets grew by a factor of 11, from 100,000 to 1.2 million; and the number of DeFi-related applications grew from 8 to more than 200.² This growth in turn has stimulated interest from both the private and public sectors.

DeFi aims to reconstruct and reimagine financial services on the foundations of distributed ledger technology, digital assets and smart contracts. As such, DeFi is a noteworthy sector of financial technology (fintech) activity.

However, serious questions remain:

- What, if any, are the distinctive aspects of DeFi? What distinguishes a DeFi service from a similar service based on traditional finance?
- What are the opportunities and potential benefits of DeFi? To whom will these benefits accrue – and who might be excluded or left behind?
- What are the risks – individual, organizational and systemic – of using DeFi? How do these risks apply to clients, markets, counterparties and beyond?

- Can DeFi become a significant alternative to traditional financial services? If so, will there be points of integration? If not, what if anything will DeFi represent in the market?
- What novel legal and policy questions does DeFi raise? How should policy-makers approach DeFi? What options exist for addressing these questions?

Notably, the DeFi space is relatively nascent and rapidly evolving, so the full scope of risks and potential for innovation remain to be seen – and there are unique challenges in regulating and creating policies for such a new and changing area. This report does not recommend any one single approach; instead, it is designed as a set of tools that can be applied in light of the legal contexts and policy positions of each jurisdiction, which may vary. In the appendices we offer a series of worksheets and other tools to assist with the evaluation of DeFi activities. A companion piece, [DeFi Beyond the Hype](#), provides additional detail about the major DeFi service categories.

Our hope is that this resource will enable regulators and policy-makers to develop thoughtful approaches to DeFi, while helping industry participants understand and appreciate public-sector concerns. It is the result of an international collaboration among academics, legal practitioners, DeFi entrepreneurs, technologists and regulatory experts. It provides a solid foundation for understanding the major factors that should drive policy-making decisions.

Executive summary

Decentralized finance (“DeFi”) is a broad term for financial services that build on top of the decentralized foundations of blockchain technology. The space has evolved since the 2015 launch of the Ethereum network, which laid the groundwork by implementing blockchain-based smart contracts.³ There has been increased interest recently, paralleling the 2013 spike in bitcoin price and the 2017 boom in initial coin offerings.⁴ As new DeFi services aspire to reinvent elements of financial services, and billions of dollars of digital assets are pledged to DeFi capital pools, policy-makers and regulators face significant challenges in balancing its risks and opportunities.

DeFi proponents say it can address challenges within the traditional financial system.^{5,6} Open-source technology, economic rewards, programmable smart contracts and decentralized governance might offer greater efficiencies, opportunities for inclusion, rapid innovation and entirely new financial service arrangements.⁷ On the other hand, DeFi raises considerations related to consumer protection, loss of funds, governance complexities, technical risk and systemic risk. Significant incidents involving technical failures and attacks on DeFi services have already occurred.⁸ Moreover, questions remain about the actual extent of decentralization of some protocols – and associated risks, e.g. for manipulation – and whether DeFi is more than a risky new vehicle for speculation that may open the door to fraud and illicit activity.⁹

The purpose of this document is to highlight DeFi’s distinguishing characteristics and opportunities while also calling attention to new and existing risks – including the scope, significance and challenges of the fast-growing DeFi ecosystem. Understanding DeFi business models and the full set of relationships underlying DeFi is crucial for an accurate risk assessment and nuanced policy-making.

This toolkit:

- Provides an overview of the DeFi space generally, and the major classes of DeFi protocols, with tools to help understand the implications of new services
- Explores the potential benefits of the DeFi approach, along with the challenges that DeFi businesses will face
- Offers a detailed breakdown of the risks that DeFi may pose. Many of these are familiar concerns (although sometimes manifested differently), while others are unique to the decentralized, programmable and composable structure of DeFi
- Maps out potential legal and regulatory responses to DeFi

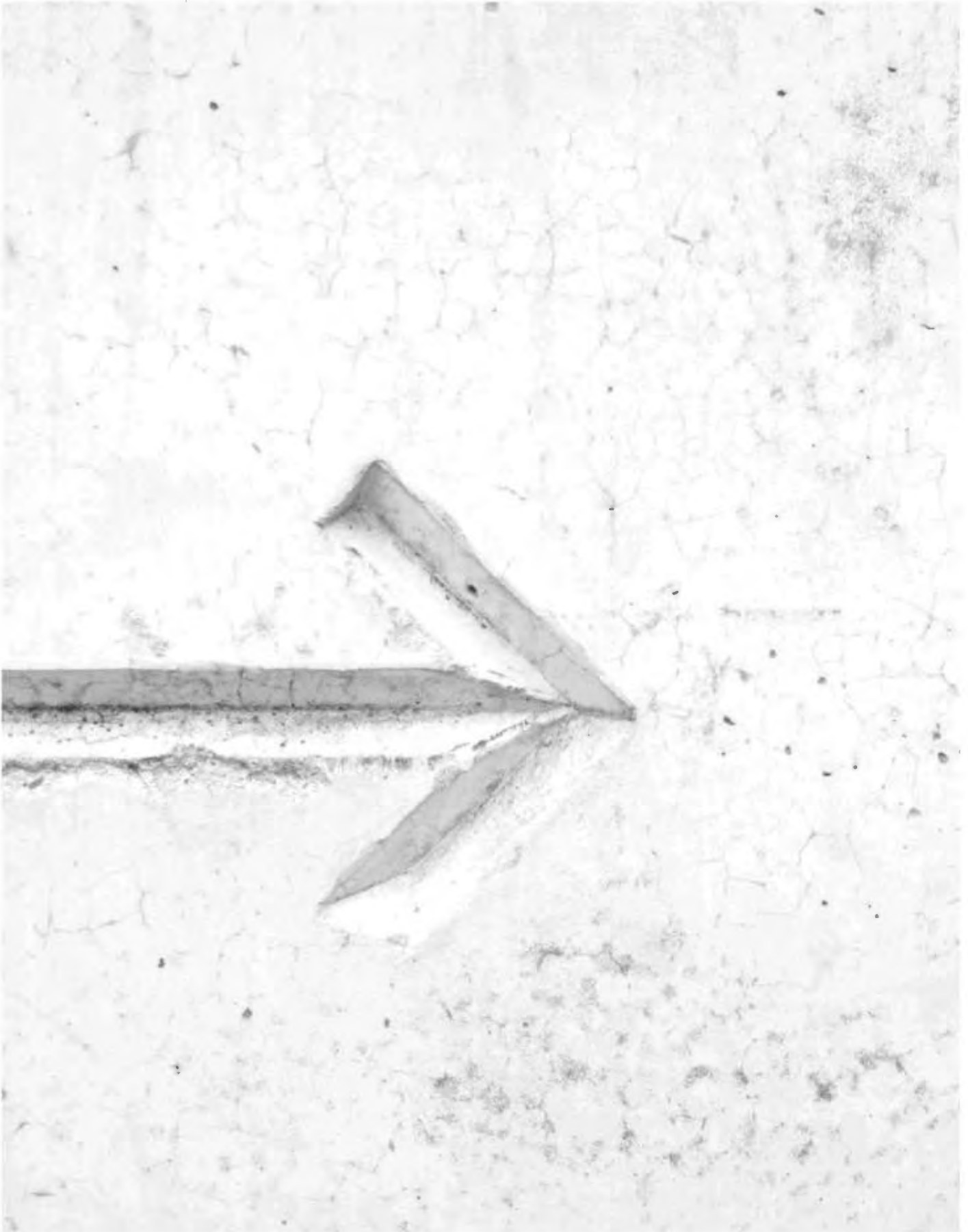
Our goal is not to recommend any specific actions universally, but to identify potential approaches and important considerations for the DeFi context. Financial regulatory regimes vary from jurisdiction to jurisdiction, as do policy-makers’ judgements about the relative risks and rewards. DeFi will raise further questions about whether regulators have the proper tools to address evolving market activity, and how they can assert jurisdiction over a set of technologies and stakeholders that is intrinsically borderless and global.

Appendix 1 offers a background assessment for policy-makers and regulators looking to understand whether DeFi may be relevant to their entity.

Appendix 2 provides a stakeholder mapping tool for DeFi services. **Appendix 3** outlines the decentralization spectrum, while **Appendix 4** provides a DeFi policy-maker canvas.

1

What is DeFi?



“DeFi” is a general term for an evolving trend. Broadly, it is a category of blockchain-based decentralized applications (DApps) for financial services. DeFi encompasses a variety of technologies, business models and organizational structures,¹⁰ generally replacing traditional forms of intermediation. DeFi transactions involve digital assets and generally operate on top of base-layer settlement platforms.

- **DeFi protocols** define software specifications and interfaces to create, manage and convert digital assets, building on a blockchain settlement layer.

- **DeFi services** implement DeFi protocols to create financial services, and associated functions such as specification of risk parameters and interest rates.¹¹

- **DeFi users** access DeFi services to transact.

DeFi services may be made available to users through centralized web applications or permissionless interfaces such as programmable wallets or smart contracts. They may be provided by a traditional controlling entity, a community around a non-profit entity or a *decentralized autonomous organization (DAO)*, in which rights and obligations are specified in smart contracts.

1.1 Distinguishing characteristics

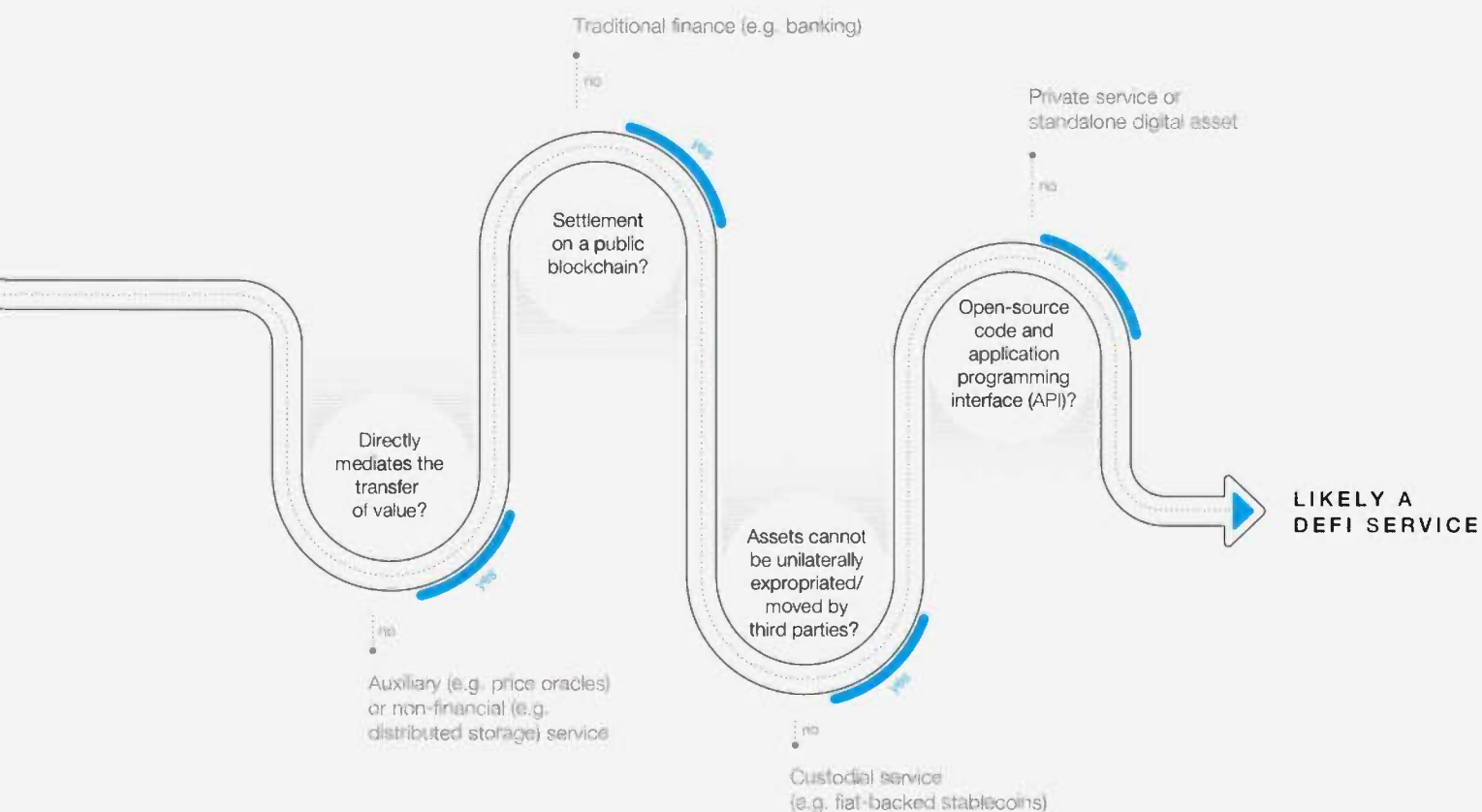
While the space is evolving quickly, we offer a functional description to distinguish DeFi from traditional financial services and auxiliary services. A DeFi protocol, service or business model has the following four characteristics:



1. **Financial services or products**
2. **Trust-minimized operation and settlement**
3. **Non-custodial design**
4. **Programmable, open and composable architecture**



Importantly, these characteristics represent the aspirations for DeFi. Businesses will exhibit each of these characteristics to varying degrees, and this may be fluid over projects' lifetimes.¹² Broadly speaking, the goal of DeFi solutions is to provide functions analogous to, and potentially beyond, those offered by traditional financial service providers, without reliance on central intermediaries or institutions.

Figure 1 provides a flow chart for evaluating whether an offering should be classified as DeFi.

FIGURE 1 DeFi classification flow chart



1.  **Financial services or products** means processing or directly enabling the transfer of value among parties. They are distinguished from information services, such as price feeds or storage, that only indirectly support value transfer.
2.  **Trust-minimized operation and settlement** means that transactions are executed and recorded according to the explicit logic of a DeFi protocol's predetermined rules, on a permissionless basis. That is, due to their availability through a decentralized settlement layer, transactions do not require trust in the counterparty or a third-party intermediary. While the platforms vary, DeFi projects generally build on public, permissionless blockchains.¹³ To date, most activity has been on the Ethereum blockchain, but activity is growing on other networks such as Algorand, Avalanche, Binance Smart Chain, Cosmos, EOS, NEAR, Polkadot, Solana and Tezos.¹⁴

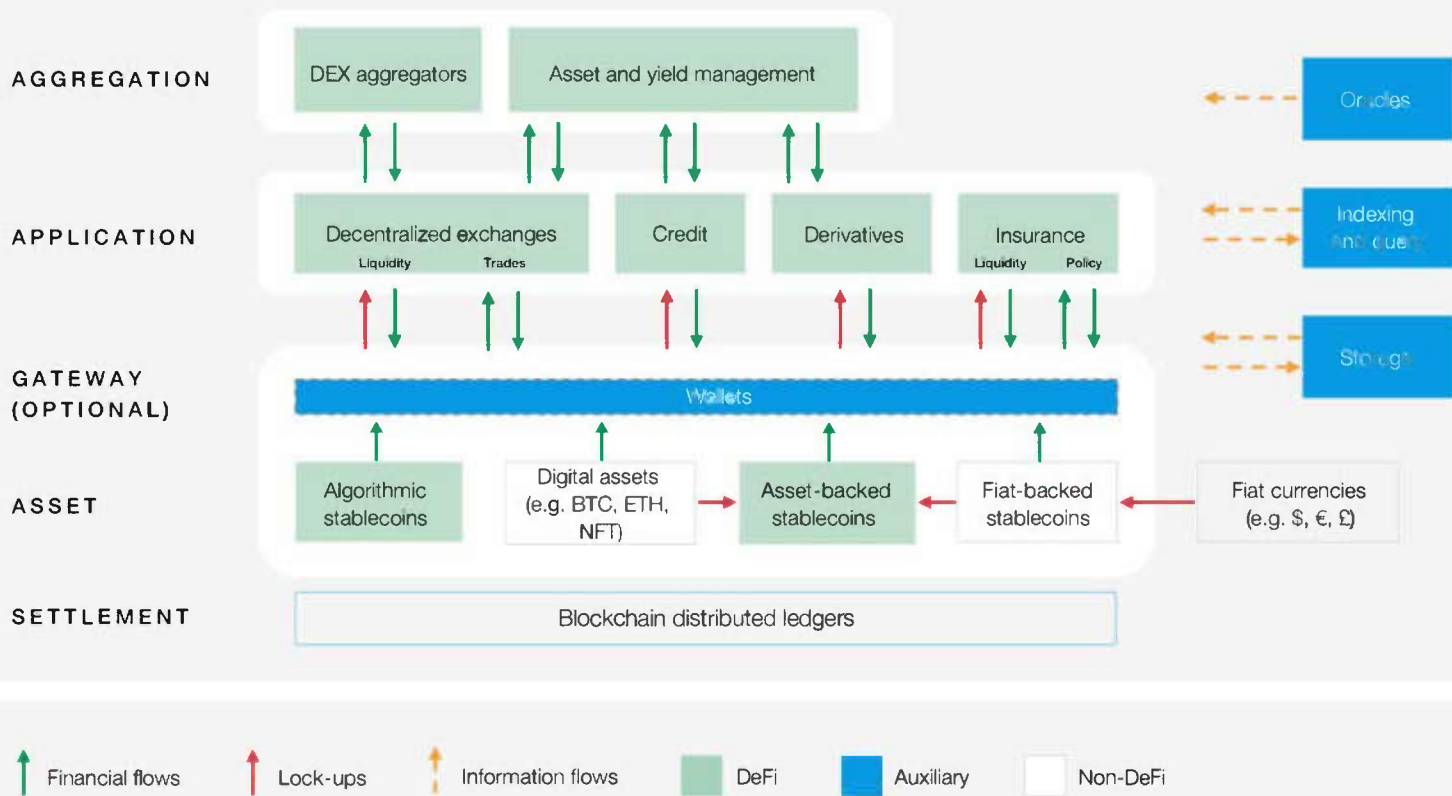
Service functionality is defined by a set of smart contracts. Both the settlement layer and the DeFi services have distinct governance structures – managed by one or more projects, communities or firms – that establish conditions for protocol changes. For example, a service may allow a volume of one token to be swapped for a corresponding volume of another token. This encompasses the price discovery, matching, execution and settlement functions of an exchange.
3.  **Non-custodial design** means that the assets issued or managed by DeFi services cannot be unilaterally expropriated or altered by parties other than the account owner, even those providing intermediation and other services.¹⁵ These tokens are subject only to the explicit logic of their smart contracts and the relevant DeFi protocols. Changes in those protocols, executed through the relevant governance structures, may affect the economic rights of digital asset holders.
4.  **Open, programmable and composable architecture** means that there is broad availability of the underlying source code for DeFi protocols and a public application programming interface (API) enabling service composability, similar to open banking¹⁶ for centralized financial services. The widespread use of *open-source code* allows participants to view and verify protocols directly, and to fork code – take source code and create an independent development – or to create derivative or competitive services. The use of *open interfaces* means that third parties can understand, extend and verify the integrity and security of the service. Together with the API, this enables access to functionality in an automated, permissionless way. It also allows for *programmability*: customizing and extending financial instruments dynamically. For example, the terms of a derivative may be specified at the time of its creation, and then enforced immutably through the decentralized settlement layer.

Composability means that these programmatic components can be combined to create financial instruments and services, including those incorporating multiple DeFi services and protocols. For example, a stablecoin may be used as the foundation for a derivative that is used as collateral on a loan and subject to an insurance contract. All of these services would be functionally interoperable, and the resulting instrument benefits from the common settlement layer of the underlying blockchain – but also faces common vulnerabilities.¹⁷ As the number of DeFi service providers and available protocols grows and competition increases, specialization, interoperability and composability can enable growth in the connection between these services, and the economic activity between them.

1.2 The DeFi architecture

Figure 2 is a conceptual overview of the DeFi “stack”.¹⁸ The base-layer blockchain system enables participants to securely store, exchange and modify asset ownership information, replacing the *execution and settlement* layer of conventional financial services. It also allows for the creation of digital assets in various forms, which are then incorporated into DeFi *applications*. Additional layers of applications may function as *aggregators*,

allowing users to shift among DeFi services, such as choosing an exchange based on real-time market factors. In this environment, digital assets may be transferred freely, based on contractual logic (financial flows) or they may be restricted from other uses to provide liquidity or collateral (lock-ups). There are also non-financial information flows that support the transaction activity.



Information and content external to the blockchain may also be incorporated into DeFi transaction flows through *oracle* services, which supply reliable data that is recorded outside the settlement layer. For example, a price feed may draw on external data and be delivered programmatically through a

smart contract. Such informational resources, as well as the wallet software and interfaces that help users store, transfer and manage assets interacting with DeFi services, are not themselves financial services and therefore we label them as *auxiliary* to DeFi.

Decentralized governance

Another dimension of the DeFi environment, not shown in Figure 2, is the implementation of decentralized governance mechanisms. Governance refers to the ways in which collective decisions are made, conflicts are resolved and changes to protocols are implemented. In DeFi, governance mediates activity between the applications and underlying settlement layer, including decisions such as altering interest rates or collateral requirements.

This new model raises several new questions for policy-makers and regulators, including:

- How are decisions made?
- How does accountability work?
- How does performance management work?

Many DeFi projects include a *governance token* that provides voting rights on certain governance decisions. Often these tokens are tradeable on exchanges, their value tied to scarcity and the activity level of the issuing DeFi service. Regulators will need to determine the appropriate classification of such tokens. It will be important to evaluate whether tokens are actually employed for governance or simply as a proxy for investment in the service.

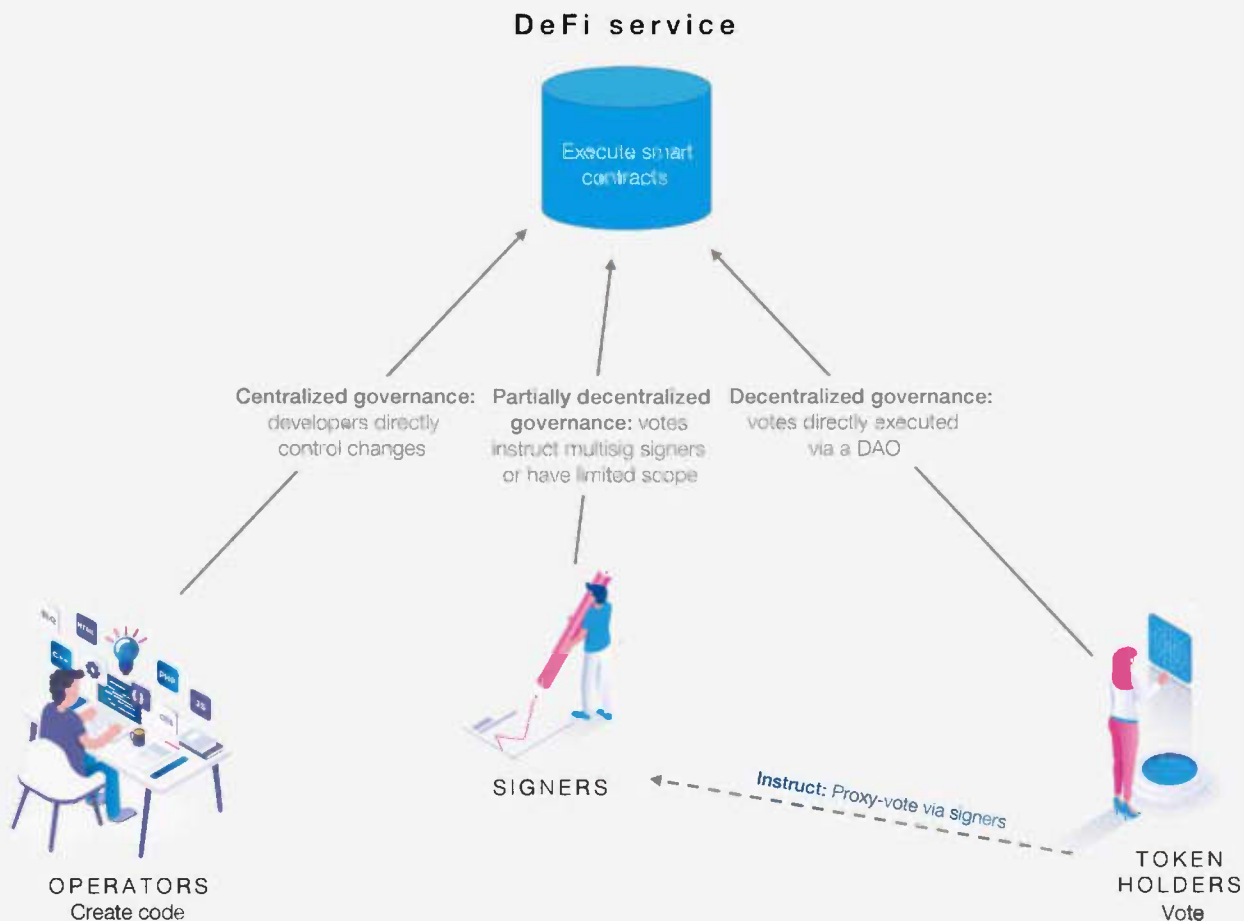


Figure 3 illustrates three forms of DeFi governance. The initial implementation is typically *centralized governance*, where the operator controls and implements changes directly.

Governance can be *partially decentralized* by giving token holders limited voting rights. They may have power over only a few parameters; developers may retain effective veto power through large token holdings or developers may have no formal obligation to implement proposed changes. In some instances of partial decentralization, individuals are designated to implement changes based on the instruction of token holder votes. They do so through *multisig keys*, wherein multiple signatures of delegates are needed to implement a change.

In *decentralized* governance, decisions move fully to a community of token holders through the establishment of a decentralized autonomous organization (DAO). DAO participants vote on

changes to the protocol and are aligned through token incentives and rules written into smart contracts. Governance decisions are executed as blockchain transactions, enforced through the consensus mechanisms of the settlement layer.

DeFi developers often describe a trajectory from centralized governance at the outset to partially and then fully decentralized governance as the service reaches maturity. At this early stage of the market, however, there are few if any examples of this process unfolding from start to finish. The token-based voting systems that have been implemented are immature, and governance votes of major services have failed due to insufficient turnout.¹⁹

Token-based mechanisms for liquidity and governance expand the scope of interested parties beyond those in traditional financial services. Policy-makers should consider the implications of decisions on all of these stakeholder groups, and

the incentives they create – especially considering: (1) who has control of the assets; and (2) who stands to benefit financially. **Appendix 2** provides a stakeholder mapping tool for DeFi services.

BOX 1 DeFi incentive systems

Many DeFi services incorporate explicit financial incentives to promote market development, including the creation of liquidity (for trading) and collateral (for credit):

- **Lock-up yields** pay interest or a share of trading fees for immobilizing digital assets to serve as liquidity or collateral for a service.
- **Liquidity mining** pays interest in the form of tokens issued by the service itself, typically governance tokens.
- **Airdrops** reward wallet addresses with tokens to promote awareness of new digital assets.

- **Yield farming** optimizes returns from liquidity mining and lock-up yields by automatically moving funds among services.

- **Liquidation fees** pay market-makers a percentage of the value of under-collateralized loans that they successfully liquidate (though not necessarily automatically).

These mechanisms are not necessary components of DeFi but have become widely identified with it. However, they may also distort investor expectations, generating unsustainably high returns as new capital is flowing in and token values are appreciating.

1.3 DeFi service categories

Due to their programmability and composability, the possible configurations of DeFi services are nearly endless. However, certain core functions, analogous to those in centralized finance, can be identified. These labels are generic and not intended as regulatory classifications for jurisdictions in which the terms used have legal import. A companion report, [DeFi Beyond the Hype](#), provides greater detail on each of these categories.

Stablecoins seek to maintain a constant value for tokens relative to some stable asset – most commonly the US dollar. The ability to avoid the volatility of non-stabilized cryptocurrency such as bitcoin and ether is one reason for the growth in DeFi.

Custodial stablecoins use holdings of fiat currency or high-quality liquid assets as a reserve. Though they may be used in DeFi, these stablecoins are not DeFi services themselves because they involve centralized trust and custody.

There are two forms of stablecoin that meet the DeFi requirements listed in **Figure 1**:

- *Asset-backed* stablecoins use smart contracts to aggregate and liquidate collateral in the form of digital assets.
- *Algorithmic* stablecoins attempt to maintain the peg through dynamic expansion and contraction of token supply.²⁰

Exchanges allow customers to trade one digital asset for another. The assets involved may be stablecoins or floating-value tokens. Unlike centralized exchanges such as Coinbase or Binance, *decentralized exchange* (DEX) protocols are DeFi services because they do not take custody of user funds and may not control other aspects of the process such as order book management and matching. An important category of DEX protocols for DeFi are *automated market-makers* (AMM), where an algorithm continuously prices transactions based on orders and available liquidity, rather than matching through an order book.

Credit²¹ involves the creation of interest-bearing instruments that must be repaid at maturity. It is based on a mutual relationship of borrowers and lenders, which can be either bilateral (peer-to-peer) or based on pooled capital. Credit terms can be quite complex, and these instruments can themselves be securitized and traded. DeFi borrowing and lending replaces the intermediating function of financial service providers with automated, decentralized, non-custodial protocols. While the lack of credit ratings and legal recourse means that digital asset loans are nearly always over-collateralized, DeFi also allows for uncollateralized *flash loans* in which assets are borrowed and repaid (with interest) within the span of a single block's time.

Derivatives create synthetic financial assets whose value is reliant upon or derived from an underlying asset or group of assets. Common financial derivatives include futures and options, which pay out based on the value of an asset at some time in the future or deliver the underlying asset. DeFi derivatives can be programmed and composed into virtually any configuration. For example, a derivative could create a synthetic asset that behaves as a stock, commodity, swap or another digital asset. It could involve a non-fungible token (NFT) uniquely associated with an art or real estate asset. It might be tied to the activity of a business, creating a *crowdfunding* service. Or the value could be tied to a future real-world event, such as the outcome of a sporting event or political campaign, turning the derivatives exchange into a *prediction market*. Prediction markets may also incentivize decentralized information generation or dispute resolution through the wisdom of crowds.

Insurance pools risk by trading the payment of a guaranteed small premium for the possibility of collecting a large payout in the event of a covered scenario. In DeFi insurance, decentralized

transactional and governance systems are used to manage and structure the insurance life cycle for certain types of risks such as smart contract hacks. Though technically insurance contracts are derivatives – they pay out based on some external event – insurance plays a distinctive risk-hedging function in markets by spreading risks across a common capital pool.²²

Asset management involves the oversight of financial assets for others and seeks to maximize the value of the whole portfolio based on risk preferences, time horizons or other conditions. DeFi asset management promises greater transparency and efficiency in constructing and executing investment strategies, by incorporating the asset management life cycle into a DApp.

In addition, there are **auxiliary services** that support DeFi activity but are not themselves financial services. The most prominent are *oracles* (outlined above). Other auxiliary services include wallets, data storage, data queries, identity verification and arbitration.



2

Risks



This section provides a risk-mapping framework as a basis for policy considerations. It contains two stages: (1) identification of relevant risks; and (2) assessment of how DeFi market participants and others are addressing such risks.

We categorize DeFi risks into five categories (explored in more detail below):

Category	Associated risks
Financial Depletion of funds due to the transactional behaviour of fellow users concerning the digital assets in the DeFi service	Market risk
	Counterparty risk
	Liquidity risk
Technical Failures of the software systems supporting transaction execution, pricing and integrity	Transaction risk
	Smart contract risk
	Miner risk
	Oracle risk
Operational Failures of the human systems for key management, protocol development or governance	Routine maintenance and upgrades
	Forks
	Key management
	Governance mechanisms
	Redress of disputes
Legal compliance Use of DeFi to engage in illicit activity or to evade regulatory obligations	Financial crime
	Fraud and market manipulation
	Regulatory arbitrage
Emergent Macro-scale crashes or undermining of the financial system due to the interaction, scaling and integration of DeFi components	Dynamic interactions
	Flash crashes or price cascades

These categories are not mutually exclusive; some failures may result from multiple risks. There are also concerns inherent in the use of blockchains for settlement. For example, proof-of-work blockchains such as Bitcoin and Ethereum version 1.0 require computationally intensive mining, which raises concerns about energy usage that contributes to climate change. Because these issues are not unique to DeFi, they are beyond the scope of this report.²³

Funds may be lost either unintentionally or due to deliberate attacks. Smart contracts do not distinguish intent and even undesired transactions may be effectively impossible to reverse. This problem was already evident in the 2016 draining of funds from the DAO,²⁴ the first DeFi service to accrue significant capital.²⁵ Finally, in some cases, the line between a legitimate trading strategy that takes advantage of an arbitrage opportunity and an improper exploit might be unclear.

2.1 Financial

Market risk is the possibility that asset value will decline over some time horizon due to market conditions, new information or traders' idiosyncratic behaviour. Though it may not be the role of governments to protect against market risk for well-informed and well-capitalized investors in a well-functioning market, it is appropriate for them to be concerned that those conditions are met. For DeFi, regulatory classifications will define whether requirements designed to prevent undue market risk – such as disclosure obligations and accredited investor standards – are applicable.

DeFi's novelty, as well as the ease of transferring funds and creating complex instruments, may increase the possibility of abuses, whether by the creators of DeFi protocols, the operators of exchanges or third-party manipulators. At the same time, policy-makers may want to consider the implications of potential increases in transparency as well as the retention of asset custody. There may also be a lack of observability and standardized price-discovery mechanisms found in digital asset markets. The inability to compare many of the current tokens to any fundamentals is a driver of big swings in valuation and overall volatility.

Counterparty risk is the possibility that a counterparty will default on its obligations to a financial instrument. This might involve failing to repay a loan (*credit risk*) or failing to settle a transaction by providing the specified asset (*settlement risk*). Though some credit risk is mitigated through interest rates for loans, it might be a particular problem in DeFi, where the volatility of underlying digital assets produces under-collateralization, the ease of credit creation leads to excessive leverage, or the algorithmic determination of interest produces inaccuracies. The lack of fixed identities in a pseudonymous network presents additional challenges in terms of determining creditworthiness. DeFi attempts to account for this through over-collateralization requirements.

Some traditional settlement risks are not present in DeFi because there is no separate settlement step; transactions are executed through transfer of the underlying value on the blockchain – but only if both sides of the transaction are operating on the same chain. Moreover, given the rapid inflow of capital, there are strong incentives and many opportunities for scams. Users may not receive the assets they anticipate due to fraud, especially when information asymmetries limit their understanding of investment decisions or the code that governs transaction execution.

Liquidity risk is the possibility that there will be insufficient funds or assets available to realize the value of a financial asset. Failure of liquidity for a borrower or trader (such as a short seller) means the position is involuntarily liquidated and the available assets allocated to owners or creditors. Insufficient liquidity also magnifies market inefficiencies, such as price movements resulting from trades.

DeFi liquidation processes differ from traditional instruments, where a centralized counterparty (a bank, the International Swaps and Derivates Association, a clearing house, etc.) executes the process. DeFi services often incentivize market-makers to liquidate under-collateralized loans, performing a function analogous to a foreclosure auction for real estate. If the liquidation incentive structures fail, however, original counterparties and liquidity providers hold unanticipated default risk. In DeFi markets where most transactions are automated and available continuously, the speed of liquidations may preclude rational decision-making. On centralized exchanges, cascades of automated liquidations have on several occasions produced "flash crashes", where prices dropped precipitously and trading was taken offline until the market settled. Such last-resort remedies may not be available for decentralized services.

DeFi liquidity risks may be mitigated through governance logic and the careful design of incentive structures. Game-theoretic analysis must anticipate not only expected behaviours, but other profitable strategies. For example, a market participant could deliberately skew liquidity in certain DeFi services and bet against the arbitrary results. Systems designed to incentivize stable liquidity could limit this risk. Because financial risks arise from profit-seeking, constant vigilance is needed to address new strategies.

Flash loans create a unique set of risks. They may effectively create artificial liquidity for a short period of time, seemingly addressing both counterparty and liquidity risk. If the loan cannot be paid back in time, the original transaction is never incorporated into the block and the loan is essentially rolled back before issuance. While flash loans may be used as near risk-free and low-cost capital for legitimate arbitrage transactions, they can also be employed in attacks. The temporary surge of funds can be used to manipulate prices and force artificial liquidation, often through the interaction of multiple DeFi services. Several million dollars have been stolen through several such high-profile, near-instantaneous attacks.²⁶

2.2 Technical

According to Ciphertrace, half of digital asset hacks in 2020 targeted DeFi services, up from a negligible number in 2019 – a trend likely to continue as the value of assets involved grows.²⁷ While the largest public blockchain networks, such as Bitcoin and Ethereum, have avoided significant breaches, blockchain-based DApps and the centralized exchanges or wallets handling funds have proven far less secure. The technical complexity and immaturity of the DeFi market increases the likelihood of significant vulnerabilities, with the vast majority created in the past few years. The degree of interconnection among DeFi protocols may also expand the attack surface available to malicious actors.

Services aim to police market abuses through radical transparency and trust minimization rather than centralized oversight. Some include sophisticated, multilayered incentive structures to discourage attacks, in addition to technical measures for security and market integrity. Some have used their decentralized governance mechanisms to implement changes in response to failures or potential scenarios identified by the community. These measures are not foolproof. If DeFi continues to grow and attract less sophisticated market participants, investor protection concerns may grow.

Transaction risks are limitations or failures of the underlying blockchain network. If the base-layer settlement network is successfully attacked, allows for double-spending, becomes too expensive for

transactions or lacks the necessary throughput, those failures will affect the application layer. The long-planned upgrade to Eth2 (Ethereum version 2.0), which aims for significant performance improvements, thus represents an important development for DeFi.²⁸ This upgrade will also shift Ethereum to proof-of-stake consensus, which does not require the intensive energy usage of proof-of-work mining.

Smart contract risks deal with code that does not execute as intended. All software has the potential for bugs. A programming flaw can cause a smart contract to fail to perform as desired, or attackers can exploit vulnerabilities to drain funds or engage in malicious activities. For example, where code has not been written properly, it can allow for exploits such as re-entrancy attacks. Complex software performing novel functions in a relatively untested environment, and often written by teams lacking the expertise or inclination to employ the most robust development practices, will tend to have more bugs than the norm.²⁹ Even without attacks, the smart contract might not accurately reflect the understanding of all parties. Because DeFi software is automated financial services, rather than a record-keeping mechanism subject to human override, coding errors can lead directly to financial losses, often without easy redress. Moreover, transparency of code has two sides – the visibility may make smart contracts more vulnerable to exploits or may offer opportunities for white hat hackers and bounty hunters to increase the robustness of the code.

CASE STUDY

The DAO exploit

The DAO, a decentralized crowdfunding platform, was arguably the first viable DeFi service. In 2016, ether then worth approximately \$150 million was locked up in its smart contracts, with the goal of funding decentralized application development.³⁰ Before it launched, however, an attacker exploited a re-entrancy bug to drain approximately 40%

of the funds into a “child DAO”. To prevent permanent loss, and the collapse of confidence in Ethereum, miners agreed to implement a hard fork that reversed the theft on the main Ethereum chain. A minority faction continued mining the deprecated chain, which became known as Ethereum Classic.

Mechanisms such as security audits and bug bounties can be employed to mitigate smart contract risks. Over time, common errors in smart contracts written in popular languages such as Ethereum’s Solidity become more familiar, and high-quality teams know to look for common attack vectors.

Miner risk deals with the possibility that transaction processing entities behave maliciously towards certain transactions. This depends on the correct ordering and execution of transactions sent to a DeFi smart contract. It operates at an analogous level to settlement risk in centralized finance, involving the finalization of transactions, although the nature of the threat is different. In blockchain systems, users typically send a transaction to the network along with a fee to the miner that successfully processes it into a block.

Miners take proposed transactions and decide the order in which to execute them. However, a miner need not execute transactions in fee order. A miner can choose to execute a lower-fee transaction ahead of a higher-fee transaction, if that transaction is particularly valuable to them, or in return for a side payment from the originator of the lower-fee transaction.

Such behaviour allows for a form of market manipulation like front-running in high-frequency trading. By manipulating the order of execution, a miner can effectively allow certain parties to compound returns faster than others. Some view “miner extractable value” as inevitable in any system based on public blockchains, which is legitimate if structured transparently and fairly. This is a topic of active debate in the DeFi community.³¹

CASE STUDY

DEX arbitrage bots

Researchers have documented and quantified the rising deployment of arbitrage bots in decentralized exchanges.³² Like high-frequency traders on Wall Street, these bots exploit inefficiencies, paying high transaction fees and optimizing network latency to front-run (anticipate and exploit) ordinary users' DEX trades. They

study the breadth of DEX arbitrage bots in a subset of transactions that yield quantifiable revenue to these bots by engaging in priority gas auctions (PGAs), competitively bidding up transaction fees in order to obtain priority ordering, i.e. early block position and execution, for their transactions.

Oracle risk involves the potential that data external to the blockchain on which a DeFi contract relies is inaccurate or has been manipulated. Oracle-dependent DeFi protocols are susceptible to attacks in which oracle providers can manipulate the price observed on-chain. If on-chain asset holders can do this, they can increase the value of their on-chain asset or decrease the value of other participants' assets. Re-marking below a liquidation threshold could lead to assets being sold to the highest or first bidder.

If an oracle uses a centralized data source, such as a feed from CoinMarketCap for prices, this represents a source of centralized trust and vulnerability. An oracle can be decentralized by using multiple data sources or by incentivizing providers to submit data. Decentralization makes it difficult for a small number of participants to manipulate prices. On the other hand, payments to data providers must be designed effectively for fairness and incentive compatibility to ensure accurate information. Poor mechanism design may make it profitable to manipulate oracle data feeds. There have already been several successful DeFi oracle attacks.

CASE STUDY

The Compound oracle exploit

In November 2020, the price of the DAI stablecoin was temporarily driven up 30% over its \$1 peg on the Coinbase exchange, which was used as the pricing oracle by the Compound DeFi credit platform.³³ When the DAI price spiked, it caused Compound's smart contracts to determine that many loans were under-collateralized. This triggered \$89 million of assets locked in Compound to be liquidated automatically. It is

unclear what caused the anomalous increase in the Coinbase price, but it could have been an intentional form of manipulation directed at Compound. This event illustrated the risks inherent in the interconnection among DeFi and other blockchain-based financial systems – and that some elements of the ecosystem may not be as decentralized, and therefore more vulnerable, than it initially appears.

2.3 Operational

Even though DeFi activity is highly automated, human operators still play a crucial role. The more decentralized a service, the less risk there is associated with any single point of failure. Auxiliary services may be centralized even when the DeFi service is highly decentralized. At the same time, greater decentralization can make it harder to respond effectively when something goes wrong. The fewer people who have unique power to break a service, the fewer who have the power to fix it.

Routine maintenance and upgrades may be more difficult to implement for decentralized services, or may create vulnerabilities, especially

given the composability of DeFi. This would also include ongoing network and node connectivity and considerations related to security and cyber risks.

Code **forks** are options for groups seeking to alter elements of DeFi services, providing an "exit" option for minorities that prefer a different set of parameters.³⁴ In some cases, a fork may become more popular than the original service. When there is already significant activity on a platform, however, forks can be costly and confusing for participants. They can also be employed for malicious purposes, including to mislead users.

CASE STUDY

SushiSwap vampire attack on Uniswap

In September 2020, a pseudonymous developer, Chef Nomi, forked Uniswap, an open-source decentralized exchange, to make SushiSwap, a nearly identical exchange with an added token (SUSHI) and token rewards for liquidity providers and token holders.³⁵ The incident, which became known as the first “vampire mining” event, was unique in that SushiSwap indirectly competed with Uniswap by providing the same service using identical code but with an additional incentive,

draining Uniswap's liquidity. Initial participants in SushiSwap earned SUSHI by depositing Uniswap's LP tokens, which represented user deposits in the Uniswap DEX. These Uniswap LP tokens were then swapped for the SUSHI, so that Uniswap liquidity would become SushiSwap liquidity. Ten days later, the pseudonymous developer sold all of his SUSHI tokens for \$13 million in Ether and handed over control of the protocol to the Chief Executive Officer of FTX, a centralized exchange.

Key management is a potential problem for all blockchain-based systems. Platforms identify users and their assets through cryptographic key pairs. Because DeFi services are non-custodial, they place the key management burden on their users in return for removing dependencies on centralized service providers. A variety of techniques including requiring multiple signatures (multisig), social recovery and custody arrangements have been developed to address key management risks for digital assets.

Governance mechanisms for DeFi and other blockchain-based services raise complex potential risks. “One-token, one-vote” may be exploited when participation rates are low, token control is concentrated or participants can bribe each other

to vote in their favour. Centralized exchanges may take advantage of the voting power of tokens in their custody to exert undue influence in governance. Specialized DeFi market participants may engage in activities analogous to activist investing, deliberately acquiring significant shares of governance tokens for a service. With enough voting power, these investors could change the parameters, allowing them to drain liquidity pools. Even though many of the mechanisms incorporated into DeFi governance systems have a history in academic literature, their behaviour with large numbers of participants and millions or billions of dollars at stake remains unproven. Moreover, a recent research paper presents evidence that DeFi token holdings are heavily concentrated, in ways that are not entirely transparent.³⁶

CASE STUDY

Flash loans and MakerDAO governance

Flash loans also pose challenges for governance systems. In late October 2020, an attacker used a flash loan to acquire \$7 million of the MKR governance token associated with the MakerDAO protocol and exercised its rights to

vote on a governance proposal. Concerned about the potential for abuse, MakerDAO adopted restrictions shortly thereafter to prevent this scenario from being repeated, but other DeFi services remain vulnerable to such attacks.

Redress of disputes is a final category of governance risks. Once a smart contract has executed, the output cannot be modified or reversed just because an individual actor, or a governmental authority, orders it to be. When participants believe they are entitled to redress for some failure of the system or malicious act, arbitration may be incorporated into the DeFi service through multisig arrangements or be decentralized through a prediction market or

crowdsourcing mechanism. However, these novel mechanisms have their own limitations, for instance, compared to judicial or administrative orders.

With a well-designed DeFi service, operational risks may be measured in real time and actively mitigated. DeFi transaction ledgers are public, so malicious activities may be tracked more easily than in analogous cases for centralized finance.



2.4 Legal compliance

DeFi may be used to bypass legal or regulatory obligations. The activities involved could occur with any service involving digital assets. Money laundering, for example, is a problem for established centralized cryptocurrency exchanges as well as DeFi DEXs. Because the focus of this report is on the distinctive challenges and opportunities of DeFi, we provide only a brief summary of risks in this category.

While a DeFi structure may not increase the likelihood of such violations *per se*, it could complicate enforcement. The decentralized, non-custodial, composable nature of DeFi services may make it difficult to identify a responsible party, for example. Regulatory regimes built around intermediaries as regulated processors of transaction information may fit poorly with a disintermediated market structure. We consider how regulators and policy-makers might address such challenges in Section 3, below.

Financial crime involves breach of anti-money laundering/countering the financing of terrorism (AML/CFT) restrictions, financial sanctions and similar legal regimes. DeFi transactions involving natively digital assets may be difficult to regulate through traditional AML/CFT controls because users are pseudonymous by default, transactions are resistant to blockage, assets are resistant to seizure and many transactions involve non-custodial wallets not directly tied to individuals. Although DeFi transactions are generally transparent and traceable, new privacy-enhancing protocols and/or tools may create additional regulatory challenges. Several approaches have been developed to comply with the 2019 anti-money

laundering guidance for digital asset service providers from the Financial Action Task Force (FATF), but further work remains and could be further affected by new guidance proposed in March 2021 that could require know-your-customer (KYC) compliance from DeFi services.³⁷ In particular, the use of non-custodial arrangements and self-hosted wallets in DeFi poses a challenge for requirements that identifying metadata be collected and passed for every transaction link.

Fraud and market manipulation involve deliberate scams, misappropriation and other efforts to take advantage of investors. Here we refer to activities conducted or enabled by DeFi developers themselves, rather than third-party attacks. For example, “rug pulls” or exit scams involve convincing users to place funds into a seemingly legitimate DeFi service, from which they are drained by the developers, who then disappear.

Regulatory evasion means failing to meet regulatory obligations by carrying out similar functions in a different technical manner. It may involve deliberately obfuscating activity or masking the jurisdictional attributes of transactions. On the other hand, the fact that a novel activity bears similarities to an established one does not automatically imply regulatory arbitrage. Poorly designed regulatory obligations could themselves be viewed as a risk factor for DeFi. All major categories of DeFi activity can be viewed as alternatives to regulated financial services. Whether they are subject to similar classifications goes beyond the scope of this report, and the answers will vary by jurisdiction.

2.5 Emergent risks

Emergent risks involve the interaction effects of multiple events, creating failure cases that are not reflected in a risk assessment of each service independently. Classic recent examples are banks that are “too big to fail” and scenarios in which ostensibly unrelated events, such as individual mortgage defaults, become highly correlated and produce cascading effects through chains of securitization. Other examples include system-wide liquidity failure due to bank runs or markets “freezing up” when parties are unwilling to transact due to perceived risk.

Dynamic interactions among a potentially endless number of interconnected DeFi components may produce risks that are not present in any individual service. Also, because DeFi operates in a global market, activities are not necessarily limited to countries or business segments as they are when transactions are based on a national sovereign currency. Unless regulators can effectively limit

cross-border DeFi activity, firebreaks to contagion of systemic defaults may be more limited than for traditional finance. Interaction risks will also grow as DeFi services begin to interoperate with traditional financial platforms.³⁸

Flash crashes or price cascades, exacerbated by leverage in the DeFi system, may occur in extremely volatile or rough market conditions. Unlike traditional markets, where primary dealers and brokers can manually intervene when defaults occur concurrently, the permissionless, algorithmic nature of DeFi means that it may not be possible to stop cascades. DeFi services that automatically liquidate collateral allow liquidators to compete to buy that collateral, sometimes offering a fixed discount as an incentive. However, when a flash crash occurs or market volatility is high, there may be so many liquidations and the drop in the price of the collateral may be so precipitous that liquidators or others will face significant losses.

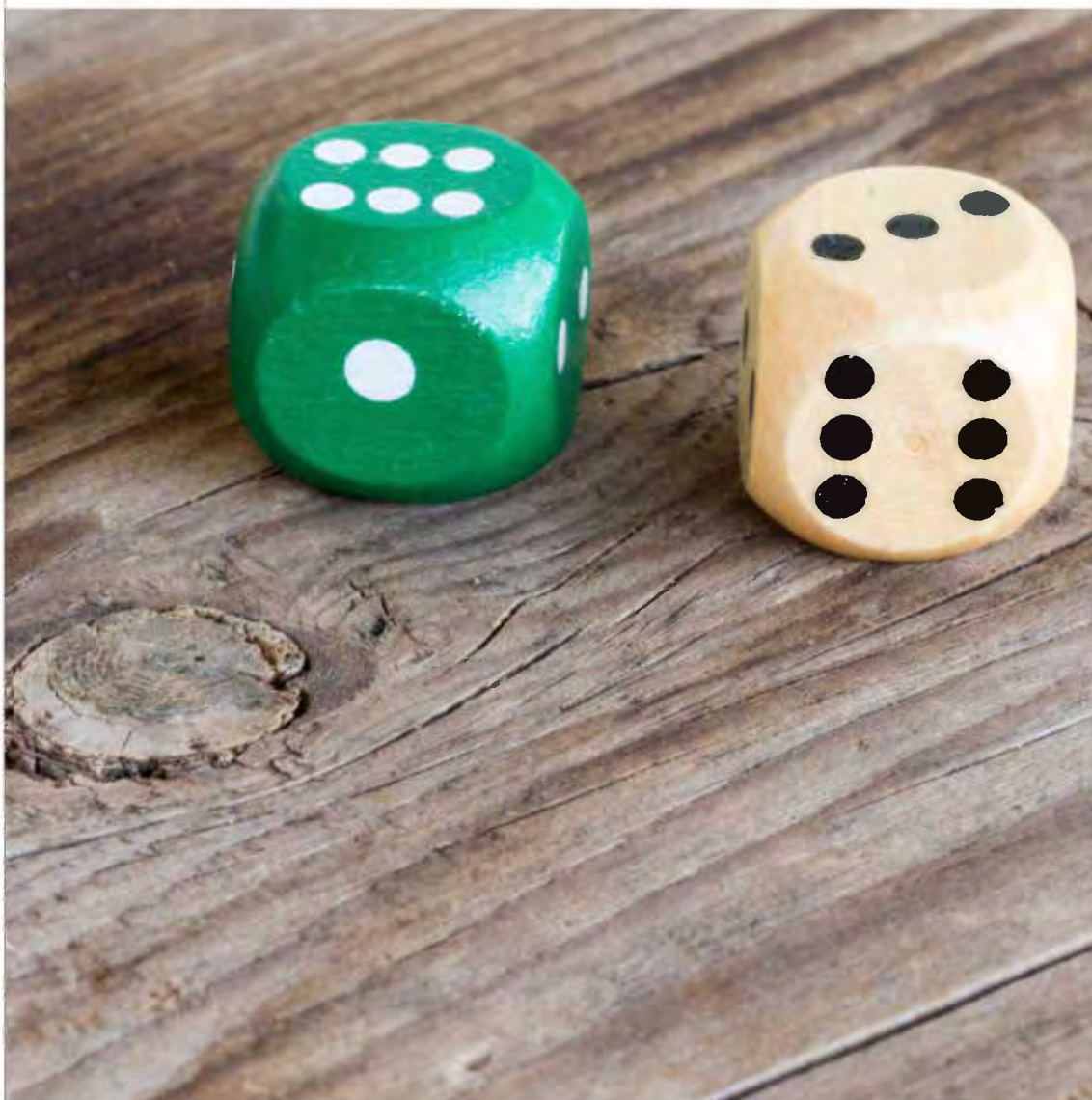
One of the largest systemic failures of a DeFi service took place on Thursday 12 March 2020, when Maker Protocol's liquidation system failed and more than \$8 million in user assets was lost.³⁹ This was exacerbated by network congestion on the Ethereum blockchain, which increased "gas" prices for validating transactions and slowed the flow of data updates to MakerDAO's oracle service.

A class-action lawsuit over the event, claiming that the Maker Foundation deceived collateral providers by failing to appropriately disclose such risks, was sent to arbitration in September 2020. The event exposed emergent risks faced by the DeFi protocols, including the availability and reliability of the underlying blockchain infrastructure.

Assessing such risk is difficult. Most traditional financial models assume that liquidations always occur successfully, as the trusted third party (exchange, broker, dealer) will close a position when unprofitable. In DeFi, this is true only when liquidators can achieve a profitable liquidation. If cascades persist for too long, liquidators stop liquidating and traditional value-at-risk (VaR) models break down. This failure is akin to what happened during the 2008 financial crisis, when centralized third parties that enforced liquidations, such as AIG, failed.

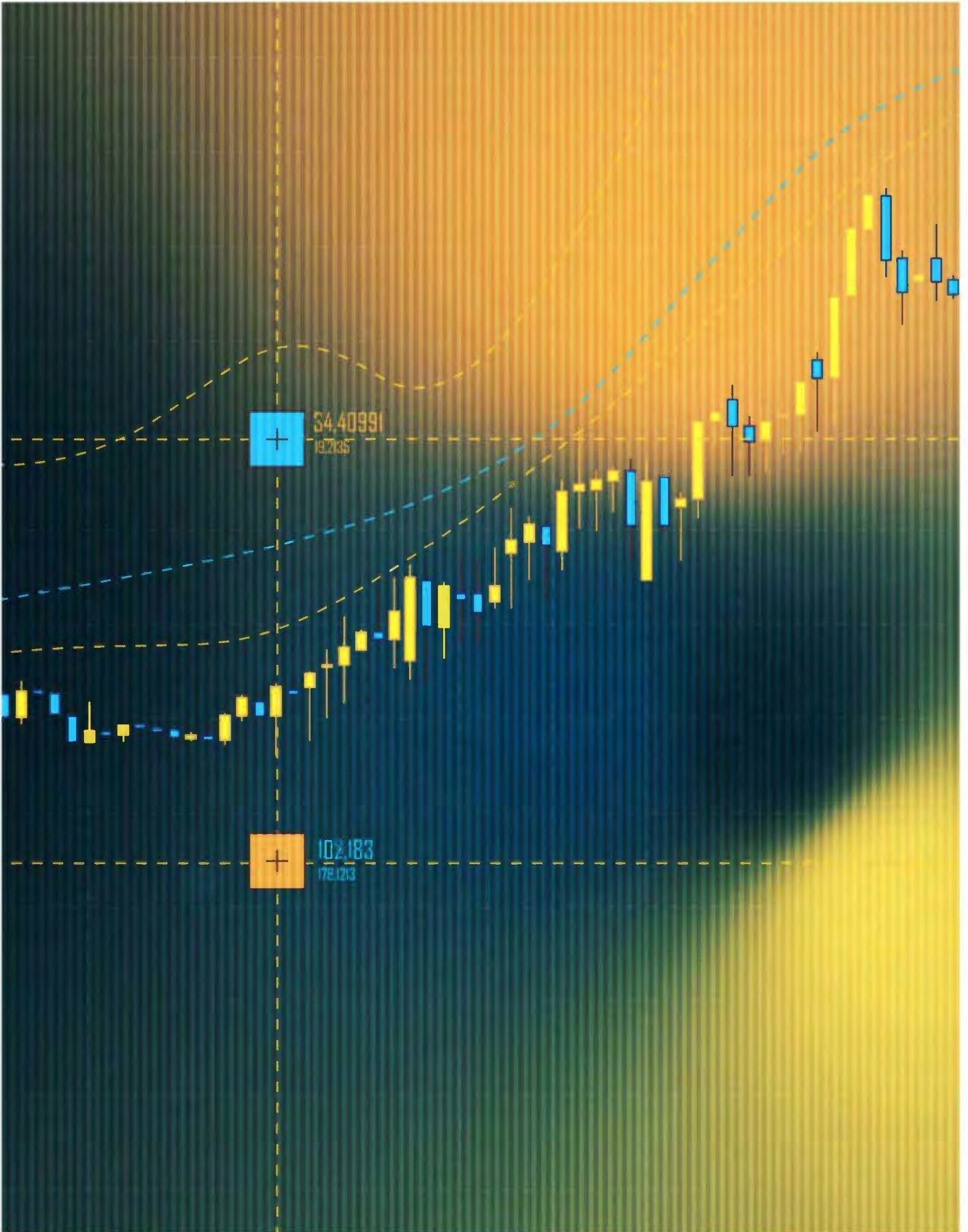
Risks of this form can be estimated using tools such as agent-based simulation, which model

rational behaviour for all principal parties (borrowers, lenders, traders and liquidators) and then run millions of event-based Monte Carlo simulations – models for predicting outcomes for situations subject to random variables – to estimate worst-case loss. Unlike traditional financial Monte Carlo simulations, these simulations explore conditions in which financial assumptions such as no-arbitrage and instant liquidation are invalid. Using such models, corrections to traditional value-at-risk (VAR) models can be estimated, leading to estimates of default probability as a function of parameters such as volatility.



3

Policy approaches



This section outlines the main areas in which DeFi may interact with policy and regulation. Importantly, it lays out key issues and options but does not offer prescriptive solutions, as jurisdictions vary in their objectives, regulatory regimes and market composition. The approaches described here are intended to be sufficiently generic to apply in the full range of contexts. The remainder of this section provides tools and resources.

Trust-minimized execution, non-custodial services and composable architectures may challenge the existing regulation. As described in Section 2, DeFi can both introduce new risks and may help mitigate known risks in financial services. Many of the key challenges for policy-makers – the way in which decentralization makes it difficult to identify regulatory subjects, new risks due to automation, and the way in which borderless software code

complicates the application of territorial rules – are extensions of issues for all digital assets. Others, such as the creation of building blocks with multiple potential use cases and integrations, or the incentive structures of tokenized governance, are less familiar. Given the cross-cutting nature of DeFi, an integrated strategy and vision is needed.

Generally, it may be wise to consider a **technologically neutral** approach to balance meeting the objectives of regulatory regimes with promoting innovation and market development. As with any regulatory initiatives, policy-makers should strive for DeFi rules that are fair, efficient, effective and enforceable.

A policy-maker canvas, included as **Appendix 4**, is designed to apply key components of this section in a structured manner.

3.1 DeFi and financial regulation

The first step is to identify the relevant objectives and associated categories of policy and regulation. Common goals for financial regulation include: protection of investors and other consumers; market efficiency and integrity; capital formation; financial inclusion; prevention of illicit activity; safety and soundness; and financial stability. Each provides a distinctive logic for certain kinds of rules. For example, regulators focused on investor protection are typically concerned that custodians are not able to abscond with funds. The non-custodial nature of DeFi may alleviate some of these worries, while creating new ones (as outlined in Section 2).

DeFi activity spans many domains of financial regulation, including securities, derivatives, exchanges, investment management, bank supervision, financial crime, consumer finance, insurance, risk management and macroprudential oversight. A coherent overarching strategy is important and could be delegated to a cross-entity taskforce or similar body. Some DeFi activity patterns will clearly match established legal categories; others will not.

A range of policy actions may be adopted for DeFi, including:

- **Forbearance:** decision that no new regulations are needed
- **Warnings:** issuance of warning to users/consumers
- **Enforcement:** determinations that existing rules already cover the relevant actors and activities and have not been complied with

- **Opt-in:** provide the option to become subject to regulations in return for certain protections, even though there is no legal requirement
- **Pruning regulations:** eliminate regulatory requirements that are no longer essential in a DeFi context
- **Limited licence frameworks:** the possibility of obtaining licences of limited scope or under size thresholds, with light-touch requirements
- **Prohibitive measures:** prohibit certain activities in the DeFi sector
- **New licence types:** address risks with new categories designed for DeFi
- **Issuing guidance or expectations:** craft new frameworks, often with a public comment or consultation included before its official release

An effective regulatory response to DeFi is likely to involve a combination of existing regulation, retrofitted regulation and new, bespoke regulation.⁴⁰ An emerging body of digital asset-specific law is growing, including the European Union's comprehensive Markets in Crypto Assets (MiCA) proposal.⁴¹ However, most jurisdictions are yet to adopt bespoke frameworks.

Most financial regulatory regimes focus on those "carrying on business" in a certain regulated activity, "dealing", "arranging" or "operating" some scheme or exchange or "issuing" an offer (or similar). Historically, the relevant government entity was relatively clear and focused on who is ultimately in control of an operation. Similarly, there are often

exemptions for service providers that merely provide infrastructure, data or other tools to enable others to layer on their financial services. Frameworks contemplate definable and centralized operators that are engaged in providing particular financial end products and services, but are not necessarily the underlying builders.

In the DeFi context, however, there may be no central entity performing the relevant activities. The software developers and token holders may be easily identifiable, but not those occupying roles that are the traditional regulatory touchpoints. And even when operators can be identified, they may lack the ability to modify DeFi services or stop transactions because of the decentralized nature of the protocols. Smart contracts can interact with assets held by other smart contracts that are not directly associated with a particular user. Regulators will need to assess who is *responsible* and when a locus of responsibility must be identified. It may

be possible to do so through careful analysis of services, even when they are nominally decentralized.⁴²

Legal regimes often include mechanisms for vicarious secondary “controlling person”, “responsible officer” or aiding-and-abetting liability based on requirements such as knowledge or foresight of harmful consequences.⁴³ If developers of a DeFi service or others associated with the DeFi business *could have* identified and mitigated legal compliance risks, policy-makers will need to consider whether it is appropriate to mandate that they should have. On the other hand, regulating the creation of software raises important concerns of freedom of speech and administrability, which should be considered carefully. The borderless nature of blockchain networks and digital assets also poses challenges for DeFi regulation at the national or subnational level.

3.2 Available policy tools

There are many ways for a policy-maker to approach new financial services or products. Below, we first identify some helpful steps that regulators

have taken in responding to the rise of digital assets and token offerings.

1. Transitional mechanisms

While not entirely analogous, policy approaches may be informed by how digital assets were initially addressed. In the 2017 initial coin offerings (ICOs) boom, few regulators had structures or expertise fit for purpose as – seemingly out of nowhere – significant capital was flowing into new platforms that claimed to be outside the regulatory perimeter. Some of the initial responses may prove useful in the context of DeFi.

Specialized regulatory units: A targeted desk with qualified staffing can serve as an initial gateway to gain experience in new technology, interact with the industry and provide guidance. This knowledge can be shared with policy-makers and actions may include issuing non-action letters under existing regulatory regimes. These groups may provide legal clarity to DeFi projects and encourage early-stage discussions with regulators. Regulators should also invest in technology and technical expertise to understand these markets more effectively. Many jurisdictions have used this approach. For example, the US Securities and Exchange Commission (SEC) created its FinHub unit (upgraded to a formal stand-alone office in late 2020), while Switzerland’s financial regulator, FINMA, created the FinTech Desk. Though initially small and limited in authority, they quickly became an important point of contact for both internal and external communities.

Incentivizing information flow: Disclosure is one of the most common tools of financial regulation. Even when the applicability of existing disclosure requirements on DeFi platforms is uncertain, efforts to encourage broad and consistent information disclosure may prove fruitful for regulatory analysis. The Monetary Authority of Singapore focused a significant portion of its regulation of ICOs on reviews of white papers.

Regulatory sandboxes: Policy-makers may decide to establish regulatory forbearance programmes such as sandboxes, where companies may test and operate their technology in a limited scope and therefore with limited regulatory risks. The scope of such regulatory “carve-outs” can be defined by activities, financial thresholds, territorial or customer limits and combined with reporting duties to ensure that the regulatory authority gains experience in new technology, interacts with the industry and reacts if new risks arise. However, a lack of transparency from the regulatory authority about the trajectory may inadvertently stifle innovation and there may be business risks involved for start-ups building in sandboxes without explicit safe harbours. The sandbox gives start-ups a chance to address regulatory compliance concerns and gives regulators a better understanding of the risks and benefits of a new space. A DeFi sandbox might go

beyond the prior models by establishing a means of monitoring the trajectory for projects looking to decentralize control over time in order to address some concerns without creating new ones. The UK Financial Conduct Authority (FCA) established a sandbox regime for fintech that included a substantial number of blockchain and digital asset services. However, it has had limited applicability for DeFi because stablecoins are considered to be outside the FCA's scope. Others, such as Colombia's "la Arenera" sandbox, have followed this approach as well. DeFi sandboxes will need to be designed carefully to avoid prematurely signalling approval from the regulator.

A variation of this approach is a *regulation-free zone*, as implemented in Busan, South Korea. Under this model, specific jurisdictions within a country may allow companies to operate under a limited set of regulations (often not fully "regulation-free") in order to allow for innovation and testing of services.

Clarifying easy cases. There will always be some new activities that clearly raise regulatory red flags, some that do not and others that are in grey areas. Sometimes by taking on the easier cases first, especially those where intervention is not warranted, policy-makers and regulators can narrow the zone of uncertainty and incentivize compliance activities. A more formal approach for

distinguishing easy cases is a safe harbour policy that explicitly excludes from regulation services that meet defined criteria. In the ICO case, the US SEC's first official statement was the 2017 investigative report on the DAO.⁴⁴ It clarified that bitcoin was not considered a security, but that a token created for investment purposes would be. Further, because the DAO had already shut down, there was no need for an enforcement action. Though it left many questions unanswered, the report clarified the SEC's approach and its concerns, facilitating further dialogue.

Coordinating government action. In some cases, it may be useful to bring together different government entities for a harmonized response. An example is the modification of the "Volcker Rule" in the US by five federal regulatory agencies (the SEC, the Commodity Futures Trading Commission [CFTC], the Federal Deposit Insurance Corporation [FDIC], the Office of the Comptroller of the Currency [OCC] and the Federal Reserve Board).

This list is not intended to be comprehensive. Nor does it presuppose the direction in which the policy-makers will eventually go. These techniques are equally relevant if DeFi services are ultimately found to be covered by existing requirements, outside the regulatory perimeter or subject to new, bespoke rules.

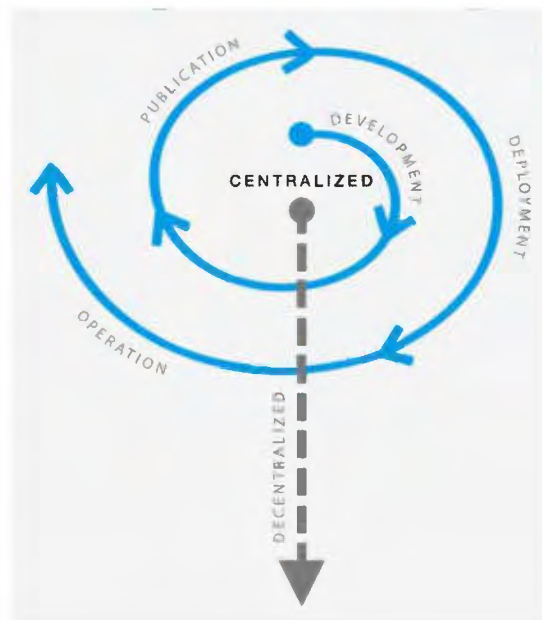
2. Regulation throughout the life cycle

Where there is no inherent distinctive risk, regulation typically occurs later in the life cycle of a product or service, when the harms that trigger liability or regulatory enforcement are more likely to occur. Early on, regulators are more likely to adopt a "do no harm" approach, given the relatively small scale and innovative potential of nascent technologies. For products with clearly known dangers or misuses, such as poppy flowers and weapons, the industry is strictly regulated and all stages are carefully supervised and controlled. Technological systems tend to fall somewhere in the middle.

In addition to maturing, DeFi services have the potential to become more decentralized across their life cycle, as detailed in **Appendix 3**. The degree of decentralization is also an important consideration for policy-makers and regulators. Rules to address the potential dangers of DeFi services can be adopted at four stages of the life cycle: (1) development; (2) publication; (3) deployment; and (4) operation, as shown in **Figure 4**.

There will typically be an identifiable group of protocol developers (although it might operate under the umbrella of an open-source development community, non-profit foundation or association or the DAO). Once the protocol is published, multiple teams might develop it into services and market

FIGURE 4 | DeFi service life cycle



it to users, representing a combined deployment stage. Those services might later be forked by different teams. The operation of the service will largely be automated by the protocol and smart contracts, perhaps moderated by decentralized governance processes.

Imposing regulatory obligations may be easier earlier in the life cycle, where there may be clearly identifiable access points and more room to influence the long-term trajectory. However, the earlier in the life cycle, the weaker the nexus to actual demonstrable harm and the greater the potential

implications for innovation – so it is important to determine at what point regulatory involvement is proportionate to the risks. Tools that incentivize rather than mandate action at early stages, including sandboxes, safe harbours and no-action letters, can be a valuable means of mediating this conflict.

3.3 Decision tree

This tool integrates frameworks presented in this toolkit to support internal policy and regulatory analysis of DeFi services. It is not intended to provide specific recommendations on when and how to act.

This may be used in conjunction with the other resources cited in this toolkit:

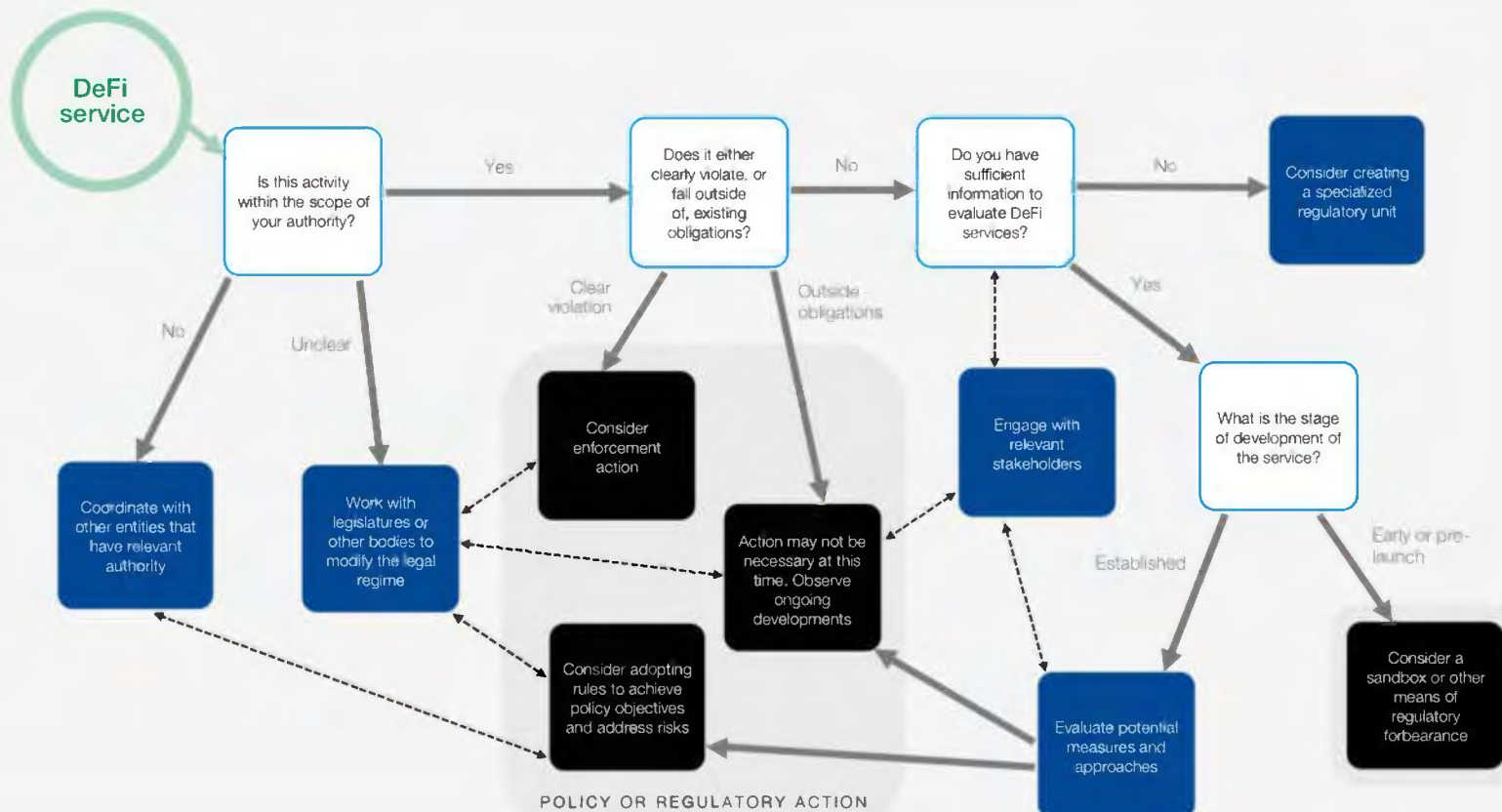
- **Appendix 1** offers a series of questions to identify relevant policy considerations and capabilities for DeFi generally.
- When considering a policy or protocol, the initial step, following **Figure 1**, is to determine whether the activity represents DeFi.
- **Figure 2** and the companion paper *DeFi Beyond the Hype* can be used to understand the relevant service categories and features.

If a service is considered DeFi:

- The questions shown below in **Figure 5** are designed to clarify the suggested courses of action.
- **Appendix 2** is a stakeholder mapping tool that can be used to identify relevant stakeholders for engagement.
- The decentralization spectrum in **Appendix 3** allows for a more precise picture of whether there are significant points of control in the service that might be relevant for decision-making.

Finally, when a determination to consider policy or regulatory action has been made, the policy-maker canvas in **Appendix 4** walks through a series of questions to assist in developing specific responses.

FIGURE 5 Decision tree for evaluating DeFi services



Conclusion

This toolkit is designed as a starting point for policy-makers seeking to understand the risks and opportunities posed by DeFi businesses and services, and to devise the best policy responses. The particular manifestations of DeFi, and the policy questions they pose, will change over time, as will activity levels and other aspects of the larger blockchain and digital asset world.

Policy-makers and regulators will take different approaches based on the unique context of their jurisdictions. Larger shifts in financial regulatory obligations, or implementation of cross-national standards, may alter the context for consideration of DeFi issues. There were no decentralized digital currency assets before 2009, and no general-purpose smart contract platforms before 2015, so

any recommendations about the proper treatment of an offshoot such as DeFi must consider potential and unpredictable developments in a space that is evolving rapidly.

What is clear is that DeFi represents a distinct and potentially significant development, both within the landscape of blockchain and of financial services more generally. As this report has documented, DeFi presents a host of opportunities and many challenges. Even when there are no clear answers, policy-makers are best served by considering the right questions to ask, appreciating the points of interaction and tension with their regulatory regimes, and estimating the costs and benefits of various courses of action.



Appendix 1:

Background assessment

The following questions are designed to help evaluate fundamental background questions before proceeding with policy or regulatory decisions.

Editable versions are available in [Word](#) and [Excel](#) form.

- Is DeFi, or a subset of DeFi services, within your entity's mandate? If so, what are the relevant policy or regulatory areas of focus? What are the top three risks you are focused on?

Top three risks:

1.

2.

3.

- Are there other entities that have relevant mandates? What are they? How do their jurisdictional scope and risk priorities compare to yours? What are your procedures, if any, for coordinating with those entities?

- Has DeFi been explored by your entity or others? What were the outcomes of those explorations?

- What is the in-house knowledge, experience and expertise related to DeFi? What about fundamentals such as digital assets, blockchain technology and decentralized governance?

- What is the process for getting up to speed on quickly evolving spaces and technologies? Are these relevant to DeFi or will they need to be adapted?

- Which parties in the public or private sector are required to provide input or consultation regarding potential changes in policies/regulations related to the financial system and financial technology?

- From which institutions or parties would it be beneficial to solicit input? Which additional stakeholders should be represented and involved in decision-making?

Appendix 2:

Stakeholder mapping tool

This tool is designed to help policy-makers map out the relevant environment of a given DeFi service. We group stakeholders into four categories, though in some cases stakeholders may span multiple categories:

- **Builders:** create, implement and support DeFi protocol
 - **Suppliers:** provide capital or a core service to the functioning of the protocol
 - **Users:** use protocol functionality for intended use case
 - **Governance:** make decisions on the development of the protocol
1. For each service, use the stakeholder mapping table to identify who or what the relevant actors are for each category. The more specific, the better. Every category may not be represented, or there may be multiple entries in a category.
 2. Review relevant materials, such as white papers, source code, etc. to identify:
 - a. The specific obligations on each actor
 - b. The specific rewards each actor hopes to receive (in the form of fees, value accrual, categories or other metrics as specified by the protocol).

Complete one stakeholder map per DeFi protocol or service. Blank rows are spaces to add additional stakeholders, where relevant.

Editable versions are available in [Word](#) and [Excel](#) form.

Protocol or
service name:Service category
(See Part IC)

Category	Stakeholders	Responsibility/impact	Economic incentives	Obligations	Rewards
Builders	Interface providers	Provide access to DeFi protocols, either directly or through aggregation	Receive transaction fees		
	Auxiliary service providers	Support external data feeds, or offer development tools for DeFi services	Receive transaction fees		
	Connected protocols	Other composable protocols integrated with the target service	Drive utility for their protocol, generate fees		
	Wallet providers	Protect user funds	Fees based on assets		
Builders and governance	Development teams	Drive development of a protocol and ecosystem	Receive inflationary rewards and transaction fees		
Governance	Multisig signatories	Shape governance to ensure long-term sustainability	Earn proportion of fees generated by the protocol		
	Governance token holders	Propose and vote on governance decisions	Earn proportion of fees generated by the protocol		
	Miners or stakers	Verify transactions on the underlying blockchain	Receive inflationary rewards and transaction fees		
Suppliers	Liquidity providers	Contribute collateral or other assets to facilitate DeFi activity	Receive inflationary rewards and transaction fees		
	Liquidators	Liquidate under-collateralized positions	Obtain collateral at discount		
Users	Protocol users	Use protocol functionality for intended use case	Low-cost, peer-to-peer, trust-minimized financial services		
	Protocol token holders	Use protocol functionality or purchase tokens on secondary markets	Profit from appreciation of token value, or receive inflationary rewards and transaction fees		

Appendix 3:

Decentralization spectrum

Several aspects of DeFi protocols or services may be more or less decentralized. Furthermore, decentralization can occur at the asset level, at the smart contract level and at the protocol level, to varying degrees.⁴⁵ The following tool maps out the relevant questions to evaluate the spectrum of decentralization in each major area.

Key questions		Potential spectrum		
Governance	Who decides which aspects of the system can be altered by governance token holders?	Completely centralized	Partially decentralized	Completely decentralized
	What is the threshold to propose governance change?	Only operators can change any aspects of the system	Only some aspects can be altered by governance token holders; threshold for proposing governance change is low	All aspects can be altered, any token holder can propose change
	What percentage of token holders needs to vote on proposal for vote to be valid?			
	Who can vote (all users, all token holders, only governance token holders)?			
	Are all governance tokens freely traded?			
Custody	Who is in charge of safely guarding the assets?	Fully custodial	Partially non-custodial	Completely non-custodial
	Does the user retain control over funds at all times?	Service retains full control of assets	Admin key, time-lock and/or multisig for updating parameters	Customer has full control of assets
	Who controls the multisignature wallet of the protocol?			
	Are admin keys controlled by a DAO?			
	Are admin keys held in cold storage?			
Protocol modification	Once a smart contract is deployed, can the code be changed by a party unilaterally?	Completely centralized	Partially decentralized	Completely decentralized
	Which parties can make changes to the protocol?	Operators alone can modify all parameters	Operators can change some parameters; users can change other parameters	User alone can modify all parameters
Verifiable security	Does the development team offer a public bug bounty programme?	No verifiable security	Some verifiable security	Fully verifiable security
	Has there been at least one audit of the code deployed on-chain?			
	Has the audit report been made public?			
	Have all of the serious issues listed in the report been fixed?			
	Have any vulnerabilities been exploited?			
Insurance coverage	Is there insurance coverage? For which risks? Up to what amount?	No coverage	Some coverage	Full coverage
	Is the insurer able to withstand a "black swan event" in DeFi (e.g., substantial coverage claims from different DeFi users simultaneously)?	Assets are uninsured	Limited or non-standardized coverage	Assets fully insured

Appendix 4:

DeFi policy-maker canvas

The following tool has been developed to help policy-makers frame their consideration of potential approaches to DeFi businesses.⁴⁶ It is designed to apply key components of this toolkit in a structured manner. Editable versions are available in [Word](#) and [Excel](#) form.



The canvas is intended to be used working out from the middle counterclockwise, and puts risk identification at its core. The canvas consists of nine questions divided into three stages:

(1) Identifying the necessity and conditions for policy-making

1. What specific risk are you aiming to address?
2. What policy objectives will be achieved by addressing such risk?
3. What is the context in which the policy measure will be implemented?

(2) Defining the approach

4. What policy measures or approaches are you considering?
5. Who are the stakeholders likely to be affected by these measures or approaches?
6. Who would be required to take action to implement the measures or approaches?

(3) Refining the approach

7. Is there already risk mitigation in place (either tech-based or of a self-regulatory nature) and is it sufficient?
8. What would be the implication of this measure, especially regarding innovation, the core business model and Sustainable Development Goals (SDGs)?
9. How effective are these measures, i.e. regarding enforcement?

**1. Risk identification**

The canvas puts the identified risks at the centre of the policy-making process. As outlined, DeFi may introduce a risk profile different from that presented by conventional financial activities.

As a basis for assessing harms, risks and responses in a structured way, the following questions may be relevant:

- What is the risk and who might suffer harm?
- How significant is the risk to a desired policy outcome?
- Who has a role in reducing/mitigating the risk? What can be done by that entity to mitigate potential harm?
- What legal mechanisms can address that harm?
- How might cross-border activity be addressed?

Example: Operational risks regarding custody (loss of funds)

**2. Policy objectives**

Before developing a specific approach, policy-makers should identify priorities for policy outcomes. These should serve as a basis for weighing the implications based on proportionality at a later stage (see Refining the approach, above).

Example: Investor protection and financial stability

**3. Context**

It will be important to understand where DeFi policies and regulations fit within broader regulatory schemes. There may also be existing market structure issues or areas of particular concern in the relevant jurisdiction that bear on decisions concerning DeFi.

Example: National initiatives to promote local development of innovative financial service platforms

**4. Measures and approaches**

Depending on the layer of the “DeFi stack” addressed, legal mechanisms to address the identified risk of harm will vary. Approaches should be crafted accordingly.

Example: [Gateway] – licensing regime for custodians

**5. Stakeholders**

This step identifies the groups or categories of individuals who might be affected, positively and negatively, by the proposed measures or approaches.

Example: Investors seeking to leverage their digital assets to increase potential returns; liquidity providers seeking predictable yields for digital assets they hold



6. Targets

This step analyses which actors need to implement the policy or would be encumbered by the measures involved. Activities could be grouped to identify roles, which would then inform specific obligations and controls.

Example: Someone who has control over private keys for others (custodian)



7. Risk mitigation

Policies and regulations should take into consideration existing risk mitigation, which may be tech-based or self-regulatory. It is likely that these will require supplementary measures, but this will give a more informed and nuanced picture of risk.

Example: Self-custody with multisignature wallet and smart contract-enabled governance features (threshold, white-listed addresses, etc.) and auditing of smart contracts



8. Implication/consequence

Desired policy outcomes will need to balance investor protection, innovation and many other considerations. Some measures and approaches will impose significant limitations on DeFi business models. Different levels of impact could be distinguished, for example:

- A low impact if the activity can be conducted without prior approval
- A medium impact if the operation cannot be performed without prior approval
- A high impact if such approval cannot be obtained at all due to the underlying decentralized business model

Example: Licensing regime for custodians = medium impact



9. Effectiveness of measures

As with all policies, the effectiveness of a measure – whether the measure can be enforced and how well it achieves the objective pursued – is an important consideration. Policy-makers and regulators should be clear about how they intend to measure the impact of the policy, weighing both the upsides and downsides, as defined by policy goals and objectives. Key metrics could explore the balance of areas such as consumer protection, privacy, innovation, etc. This also depends heavily on which layer of the tech stack a measure addresses. For instance, policies addressing the network infrastructure layer (blockchain protocol layer) will have more significant and far-reaching implications, and the effects should be measured and considered accordingly.

Example: High effectiveness where regulatory access point can be identified

Contributors

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Endnotes

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13. Products and services offered through permissioned networks and/or blockchains provide additional layers of control and centralization with a distinct risk profile not covered in this report.
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several meetings.” Waller added “I am not taking 50 basis-point hikes off the table until I see inflation coming down closer to our 2% target.” For context, Waller was James Bullard’s director of research at the St. Louis Fed – so to characterize the two as hawks of a feather would be apt. Nonetheless, the case for a continuation of the 50 bp hiking cadence certainly resonates in the current environment – if for no other reason than Powell has already committed to half-point hikes at the June and July meetings. The focus of the monetary policy debate at present is the September decision and whether the most prudent decision will be 25 bp, 50 bp, or as Bostic recently hinted, a pause. We remain in the 25 bp camp for the September move; if for no other reason than the shaky footing in risk assets is unlikely to be maintained without issue throughout the summer.

The overnight weakness was also something of a ‘catch up’ move insofar as Bunds sold off sharply on Monday as the regional German inflation data illustrated higher consumer prices in core Europe. Adding further to forward inflation concerns was the announcement that the US has committed to a partial ban on Russian oil. Unsurprisingly, crude oil rallied with the front-month WTI contract reaching \$119.43/bbl and serving as a reminder that the war in Ukraine continues to influence global commodity prices toward the upside.

While the bulk of the overnight weakness was established early in Asian trading, yields remain higher as the US comes online. The 2s/10s curve is at 27.8 bp – consistent with the mid-range skew that has been in place throughout May. There is a decided reluctance to breakout either steeper or flatter as the macro narrative continues to develop. The correlation between higher consumer prices and forward inflation expectations has broken down when faced with the reality that the Fed is willing to risk materially undermining demand to preserve its credibility as a competent inflation fighter. This isn’t to suggest there isn’t still upside potential for consumer prices; rather, investors have a better understanding of policymakers’ reaction function to suborning high inflation. At the same time, overtightening remains top of mind; although it’s notable the curve has been unable to challenge the local flats – a fact that we will attribute to the rebound in US equities.

In outright terms, 10s have established an opening gap this morning at 2.738% to 2.795% -- a meaningful void that we expect will ultimately be backfilled as the week progresses. 10s initially challenged the 40-day moving-average at 2.832%; however, the level appears to be holding. Another breach certainly isn’t out of the question; even if its relevance is contingent on a close north of the 40-day. In the runup to Friday’s employment report there will be a variety of data on offer to further the market’s attempt to establish a fresh dynamic equilibrium for US rates. Let us not forget month-end buying needs as May comes to a close.

Along with this morning’s lineup of housing data, we’ll attribute more market moving potential to May’s Conference Board Consumer Confidence index. Especially following Friday’s final revision of the University of Michigan measure which confirmed the lowest read in headline confidence for that gauge since August 2011. Historically, the state of the labor market has been more impactful on the Conference Board figures than gas prices, which typically have greater influence on U Mich, and in this context we’ll be particularly intrigued to see any divergence that is revealed this morning. After all, despite slowdown worries, for the time being jobs remain nothing if not robust even as inflation has emerged as concern number one for both monetary policymakers and households. As for what the release may mean for Friday’s jobs numbers, the durability of the labor differential that is holding just off its highest level ever as jobs plentiful continue to dramatically outnumber those that are hard to get will be another anecdote to aid the market in its setup for NFP.

HIGHLIGHTS FROM THE LYNGEN US RATES WEEKLY: In the holiday-shortened week ahead, the market will be focused on Friday’s employment report as the latest barometer for the US economy’s ability to maintain forward momentum even as the Fed continues with the process of removing policy accommodation. It’s too early in the cycle to point toward the FOMC’s actions as having any impact on the jobs landscape; at least not yet. Instead, any potential headwinds that are revealed will be a function of the profit compression resulting from higher input prices that firms are unable to pass along to consumers. To be fair, the consensus forecast indicates investors are expecting an additional 325k payrolls were added in May, on top of the solid showing of +428k in March. The unemployment rate is seen declining to 3.5% as labor force participation upticks to 62.3%. Focus on the participation rate has been increasing as the cycle extends; primarily because this measure of engagement in the employment market has been lagging expectations – so much so that we’re left to ponder the lasting impact of behavioral changes that took place during the pandemic.

In breaking down the age cohorts that have been most heavily impacted during the last two years; it’s clear many workers 55-years and older have left the labor force with no intention of reengaging – that much is obvious. The 16 to 19-year-olds which were quickly stopped out of the jobs market in the beginning of the pandemic have regained ground and returned to pre-pandemic levels. **The most relevant unknown is whether those in the 45-54 age range who have opted out of the labor market will return during this cycle; to a large extent, elevated asset prices and shifting priorities can account for a portion of the shift.** It follows intuitively that inflation, flagging risk asset performance, and the risk of skills atrophying will, eventually, lead this subset to return to the fold; although there has yet to be any evidence of urgency in this regard.

During the runup to the BLS data, investors will be offered a variety of employment proxies, including ADP and the jobs component in ISM to further refine expectations for Friday’s print. The personal income and spending figures for April showed steady gains in the wage/salary category; a trend that is expected to follow-through to the May update of average-hourly earnings. We’re reminded that real wages remain deeply negative on a year-over-year basis – a dynamic that will continue to erode the purchasing power of the US consumer. While core-PCE gained +0.3% in April, the downshift in the yearly pace to 4.9% from 5.2% has offered a degree of solace to those embracing the peak-inflation narrative. For context, core inflation as represented by the Fed’s preferred metric reached 5.3% in February and has managed to retrace since then; a trend we see extending as the summer unfolds.

It's with this backdrop that **we continue to favor duration and are increasingly of the mind that 3.20% will represent the yield peak in 10s**. While we're certainly sympathetic to investors developing a bias to price in the risk of rate cuts once Powell reaches terminal; the rally in 2s has extended to the point that the sector is increasingly vulnerable for a correction higher in rates – at least from a short-term, tactical perspective. Such a move would reinforce our core curve flattening call in the 2s/10s spread, which remains near 25 bp and solidly in the middle of the prevailing range. As risk assets appear to have stabilized, the case for the Fed to move 50 bp in June and July remains strong; reinforcing the potential for a cheapening of the front-end of the curve as the payrolls report approaches.

Tactical Bias: The bullish theme of the week just passed will be put to the test in the week ahead as investors prepare for May's NFP data, and the market continues to evaluate how high the Fed will ultimately be able to push policy rates. Along with the outright decline in 10-year yields that reached as low as 2.706%, the steepening of the curve speaks to the moderation of the assumptions surrounding terminal, and just how far beyond neutral will be appropriate in the current cycle. On a longer-term time horizon, we remain constructive on duration with a flattening bias, but coming out of month-end and ahead of payrolls, we suspect a period of consolidation in US rates will serve as the near term path of least resistance.

It's a short trading week and the unofficial outset to summer, but given the current macro backdrop summer liquidity conditions will likely be put on hold as investors prepare for NFP. While headline payrolls growth will always be 'the' number within the print, we'll ascribe more macro weight to average hourly earnings, the participation rate, and unemployment rate. Firstly on earnings is what the realities of the labor market have translated to in terms of workers' ability to demand higher wages and nominal AHE that climbed rose 5.2% YoY last month. This is a deceleration from March's 5.5% YoY gain, but to quote Powell, "There is more demand for workers than there are people available to work by a substantial margin. That means wages are moving up, which is a great thing, but they are moving up at a pace that is not consistent with 2% inflation." The risk of a wage price spiral remains very much top of mind for monetary policymakers and higher wages begetting higher prices is precisely the feedback loop the Committee is endeavoring to interrupt.

Implicit in this line of thinking is some softening in jobs, and especially if the participation rate is going to remain subdued in a historical context, this almost by definition means that the Fed would be comfortable with some increase in the unemployment rate. Again to touch on one of the Chair's recent comments, while NAIRU may move lower to more closely align with the current sub-4% unemployment rate, at present the labor market is too tight. In keeping with our expectation that the bar for the Fed to deviate from its normalization conviction is very high, this means that even some softness in terms of jobs would be characterized as acceptable by the Fed.

Turning from the fundamentals to the more flow-driven factors currently driving the market, the past week revealed two important details on the issue of Japanese investor behavior. Firstly, the Ministry of Finance data showed that investors bought a net of \$4.9 bn in overseas notes and bonds during the week ended May 20 versus purchases in the prior week of \$2.9 bn. The prior two weeks combined \$7.8 bn in net buying that ended a selling streak which lasted fifteen weeks and totaled net outflows of \$73.9 bn. Within this period of heavy selling, there were two weeks that were effectively flat; although the broader trend of the last several months is clear. Secondly, while still speculative until we receive the auction allocation for Thursday's 7-year auction on June 7, the highest indirect allocation at a 7s auction since January 2018 and lowest dealer award on record suggests that Japanese investors are beginning to increase exposure to Treasuries. Following what had been consistent selling for most of 2022 thus far, **it is still too soon to call this the inflection moment in terms of Japanese demand, but should we start to see consistent inflows and additional primary market evidence, this would add to the bull case for bonds over the coming months and quarters**. -Ian Lyngen and Ben Jeffery

[Biden Pledges to Back Fed in Effort to Combat High Inflation \(WSJ\)](#) President outlines inflation-fighting strategy ahead of meeting with Fed Chairman Jerome Powell

[European Union Pledges to Curb Oil Purchases From Russia \(WSJ\)](#) Agreed-to embargo would exempt imports via pipeline and mark a sixth sanctions package

[CNBC - Oil prices jump after EU leaders agree to ban most Russian crude imports](#) (Ling Yu)

[FT - Eurozone inflation hits record 8.1% - Higher than expected price rises pile pressure on ECB to speed up rate increases](#) (attached, Ling Yu)

[What Stock Investors Are Watching for: Signs of Stability \(WSJ\)](#) Wall Street's 'fear gauge,' investors' sentiment and bond spreads are tracked for clues on where the market might go next

[This Risk-On Rally Rests on Risky Foundations: John Authers \(Bloomberg, attached\)](#) If the reason we needn't worry about inflation is slowing growth, that's not great.

[...and yet: FT - Executives 'buy the dip' at rate not seen since start of pandemic](#) (attached, Ling Yu) Stock purchases by company insiders are encouraging sign for markets, say some analysts

[Supply-Chain Relief Sparks Feud Over Degree of Softer US Economy \(Bloomberg, attached\)](#)

- Some observers see corrugated boxes as a canary in a coal mine
- But if shipping pallets are a guide, demand still looks solid

[Zombie Firms Face Slow Death in the US as Easy-Credit Era Ends \(Bloomberg, attached\)](#)

- Rising rates are reshaping the corporate borrowing landscape
- Companies kept alive by cheap, plentiful debt face reckoning

Warning Sirens Blaring From US Credit Deterioration: Macro View (Bloomberg, attached) The coming shakeout in US credit will look and feel a lot like 2008, even if the fundamental underpinnings of the market are different: Leverage is lower, debt maturity schedules are longer and ratings are higher, but bad things are happening at the junkiest end of US debt markets, made worse by liquidity draining away as markets slow for the summer

Adjustable-Rate Mortgages Are Back, but Aren't Like You Remember (WSJ) Rise in interest rates fuels demand for ARMs; but gone are the ultralow teaser rates and lax lending requirements

Dreaded Commute to the City Is Keeping Offices Mostly Empty (WSJ) Urban areas where people live closer to work have a higher return-to-office rate, WSJ analysis shows

Battered DeFi Investors Put Their Hopes in Ethereum Revamp (Bloomberg, attached)

- The Merge remains the sole bright spot in gloomy crypto winter
- Upgrade could reduce new issuance of Ether by as much as 90%

Suspended HSBC Banker Draws Ire From Academics Over Climate Rant (Bloomberg, attached) After drawing both cheers and rebukes from within the finance industry, HSBC Asset Management's suspended head of responsible investing has now caught the attention of academia. A presentation delivered by Stuart Kirk earlier this month offered "spurious correlations," as well as "weak methods" and an "even weaker" grasp of financial theory...

Highlights From the 5-27-22 Issues of Asset & Commercial Backed Alerts (Ling Yu, attached)

CREDIT DAYBOOK AMERICAS: Risk Gauge Rises; Sales Ready to Resume (Bloomberg) -- Investment-grade issuance may ramp up to as much as \$30 billion this week, while the big freeze in junk could finally begin to thaw with four potential deals in talks. The possible rebound follows the slowest May for the space since 2008 and comes as investors are questioning how much longer last week's relief rally will last as markets start Tuesday on a risk-off tone.

- The Markit CDX North American Investment Grade Index, which rises with increased credit risk, opened around 0.23 basis points wider at about 79.6 at 7:27 a.m. in New York
 - Treasuries slumped Tuesday morning and US sovereign yields climbed across the curve as oil advanced to a two-month high and European inflation data for May exceeded economists' forecasts
- Jerome Powell and Janet Yellen will join Joe Biden in the White House today for a rare Oval Office gathering to discuss the state of the American and global economy
 - The Fed is set to start unwinding its \$8.9 trillion balance sheet, beginning with as much as \$30 billion a month of reductions in Treasuries and \$17.5 billion of mortgage backed securities
 - FOMC hawk Christopher Waller wants 50-bp hikes "for several meetings" until inflation nears 2%. The comments added to this month's bond selloff
- Semiconductor-maker Qualcomm wants to buy a stake in SoftBank's Arm Ltd. in the pending IPO, CEO Cristiano Amon told the FT
- GSK has agreed to buy Affinivax, a clinical-stage biopharmaceutical company based in Cambridge, Boston, Massachusetts, for \$2.1 billion upfront and up to \$1.2 billion in potential milestones
- Leveraged loans are still at a standstill with no lender meetings or due dates on Tuesday's calendar
- Salesforce and HP are set to report earnings Tuesday after the closing bell

US HY OPEN: Junk Bonds Are Erasing Losses on a Fed-Spurred Rally (Bloomberg) -- **US junk bonds are on track to post modest gains in May, the first monthly gain since December, as easing fears that rising interest rates will set off a recession boosted risk assets.** This follows the biggest gains in more than two years for week ended Friday, snapping a seven-week decline. The sharp rally came after the release of the minutes last Wednesday of Federal Reserve's policy meeting held on May 4 that signaled that the central bank may reassess the pace of its monetary policy tightening after the anticipated half-percentage-point rate increases at the next two meetings.

- BBs, the highest quality in the high yield market, are poised to post gains for May, with month-to-date returns of 1.6%. This will be the first monthly gain since December. This comes even as CCCs, the riskiest of junk bonds, are likely to post losses for the month. This suggests that high yield is more concerned about an imminent recession and default risk rather than inflation
- Rising yields, macro uncertainty over the pace of economic growth arising from supply-chain issues, and the continuing war in Ukraine have kept junk bond borrowers on the sidelines. Yields jumped by 286bps this year after rising for almost five months. May is likely to see the slowest increase in yields
 - **The year-to-date junk bond sales were a mere \$56b, a 77% drop from comparable period last year. It is also the lowest since 2009**
 - **The month of May priced \$2b, the slowest May for issuance volume since Bloomberg started keeping record of new bond sales in 2002 and a 95% plunge from 2021**
 - Revising new issuance forecast for 2022, JPMorgan analyst Nelson Jantzen wrote on Friday rising yields have changed the financial landscape for junk bond borrowers. New projections for issuance this year revised to \$210b
 - Issuers will be patient with a mere \$114b in bonds maturing in 2022 and 2023

- However, junk bonds gained across ratings in the last week as yields tumbled since the release of minutes of the last FOMC meeting
 - **Yields plummeted by 73bps last week, the biggest weekly decline since November 2020 after rising for seven straight weeks, the longest rising streak since July 2013**
 - CCCs rallied to end the week with 3.11% returns, the most in almost two years and reverse the seven-week losing streak. Yields fell 82bps for week ended Friday to 7.54%, the biggest weekly drop in two years as after rising for seven straight weeks
- US junk bonds may stall and pause the rally as US equity futures slide as euro-zone inflation accelerated to a fresh all-time high, intensifying the debate at the European Central Bank about how rapidly to raise interest rates

[Eight Issuers Eye US High-Grade Bond Sales on Tuesday in Rebound](#) (Bloomberg) -- Around eight companies are looking to sell new US investment-grade bonds on Tuesday, according to an informal survey of debt underwriters who declined to name the firms, following the slowest week for sales this year prior to Memorial Day. The issuance backdrop is uncertain with equity futures lower and Treasury yields elevated with the 10-year offering around 2.82%. The high-grade CDX, a key measure of credit risk, is wider by over 1/2 of a basis point. The final trading session of May is expected to be fairly active if market conditions don't deteriorate further with a majority of syndicate desks expected to advise their clients to move forward. **Treasury yields have fallen over the past few sessions, with the 10-year tightening around 30 basis points from its recent high of 3.13% earlier this month.** Moreover, the average high-grade corporate bond spread has also narrowed 15 basis points over the past five days, making funding levels more attractive for potential borrowers. Syndicate desks are anticipating \$25 billion to \$30 billion in new supply this week, with National Australia Bank targeting \$2 billion in aggregate in the lone overnight trade. The monthly tally of \$73.85 billion is well below estimates of around \$135 billion and May is expected to finish with the largest monthly miss in at least the last three years, according to Bloomberg data.

- No deals priced on Friday and one company sold new bonds last Monday
- There was one overnight deal for National Australia Bank Ltd/NY, selling a benchmark 3-part bond offering. The structure will consist of a 3-year floater, 3-year fixed and a 5-year fixed, with initial price talk of T+100bp area, SOFR+equivalent and T+125bp area, respectively

[STRUCTURED PIPELINE: ABS and CMBS Supply Higher; CLOs Down 12%](#) (Bloomberg) -- New issue sales of US ABS and private-label CMBS are up 10.2% and 36.5%, respectively, year-over-year, according to data compiled by Bloomberg. ABS issuance is approximately \$131 billion while private-label CMBS supply is roughly \$67.2 billion.

- The active ABS calendar is currently thin, but there has been a flurry of recent filing activity including Encina Equipment Funding, Credit Acceptance Corp., Global Lending Services and Westlake Funding
- Monthly ABS sales in May were the highest of the year at \$30.9 billion
- Last week's pricing of the \$3B+ Cosmopolitan single asset, single borrower CMBS was the largest of the year
- New issue US CLO supply is down 12% year-over-year at \$57.5 billion

[DISTRESSED DAILY: Aerospace Parts Maker Struggles With Cash Flow](#) (Bloomberg) -- Consolidated Precision Products Corp., which makes parts for the aerospace industry, is struggling to generate cash and faces "significant" interest payments in the coming years, according to Moody's Investors Service. The company, based in Cleveland, Ohio, may have challenges returning to positive free cash flow, Moody's analyst Eoin Roche wrote in a note last week. The credit grader said CPP is likely to have negative operating cash flow and higher capital expenditures through 2023. It also has interest expenses in excess of \$100 million annually in the coming years. Lower commercial aerospace build rates in the past two years have hurt the company, though the industry's recovery should benefit CPP's sales and earnings going forward, according to the note, though the company's recovery is likely to be "gradual," with weak metrics persisting into next year. CPP has a \$125 million first-lien revolving credit line due in 2023 and a more than \$1 billion first-lien term loan maturing in 2025 that trades around 90.125 cents on the dollar, according to data compiled by Bloomberg. The longer-dated maturities help reduce the company's liquidity risk, Roche wrote. The company is backed by Warburg Pincus and Berkshire Partners. Moody's downgraded the company to Caa2 last week.

- DATA POINTS

Read more: [Warning Sirens Blaring From US Credit Deterioration: Macro View](#)

- QUOTABLE
- **"If rates had not been so low, many of them would have gone under."**
 - Viral Acharya, a professor at New York University's Stern School of Business, on companies that don't earn enough to make their debt interest payments
- DEADLINES AND DOCKETS
 - All times are U.S. Eastern unless specified and are subject to late revision or cancellation.
- Tuesday, May 31
 - Exela Technologies, closing date for new financing

- o Rockall Energy, confirmation hearing, 2:30 p.m.
- o Sungard, bankruptcy hearing, 3 p.m.

- READING LIST

- o News, research and insight relevant to distressed investing
- Bombardier's White Knight Bond Investor Is Canso Investment
- InfoWars Case Spotlights Limits of Small Business Bankruptcy Law
- SAS Has Less Than 3 Months for Debt Conversion Process, CEO Says
- Embattled Noble Group Can't Repay Remaining Bond on Time

Daniel J. Nigro

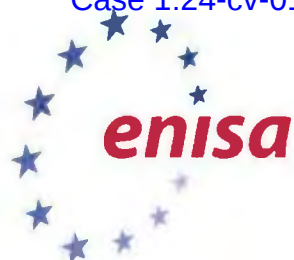
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Distributed Ledger Technology & Cybersecurity

Improving information security in the financial
sector

DECEMBER 2016





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Table of Contents

1. Executive summary	5
2. Drivers of adoption for Financial Institutions (FI)	7
3. Distributed Ledger Technologies	9
3.1 Miner	10
3.2 Consensus protocol	10
3.3 Cryptography	11
3.4 Sidechains	11
3.5 Smart Contracts	11
3.6 Permissionless Ledgers	12
3.7 Permissioned Ledgers	12
4. Cybersecurity Challenges	14
4.1 The Traditional Challenges	14
4.1.1 Key Management	14
4.1.2 Cryptography	14
4.1.3 Privacy	15
4.1.4 Code review	15
4.2 The Distributed Ledger Specific Challenges	15
4.2.1 Consensus hijack	15
4.2.2 Sidechains	16
4.2.3 Exploiting Permissioned Blockchains	16
4.2.4 Distributed Denial of Service	17
4.2.5 Wallet Management	17
4.2.6 Scalability	17
4.2.7 Smart Contract Management	18
4.2.8 Interoperability	19
4.2.9 Governance controls	19
4.2.10 Anti-fraud and Anti-Money Laundering Tools	19
5. Good Practices	21
5.1 Key Management	21
5.2 Cryptography	21
5.3 Privacy	21
5.4 Code review	21
5.5 Consensus Hijack	22

5.6 Sidechains	22
5.7 Permissioned chain management	22
5.8 Denial of Service	22
5.9 Wallet Management	22
5.10 Scalability	23
5.11 Governance Controls	23
5.12 Smart Contracts	23
5.13 Interoperability	23
6. Open Challenges	24
Annex A: Blockchain Use Cases	25
A.1 Executing and settling contractual agreements	25
A.2 Reconciling and auditing information	25
A.3 Signing messages on behalf of a counterparty	25
A.4 Connecting systems to IoT enabled devices	25
A.5 Facilitating the transfer of assets	26
A.6 Automating regulatory compliance	27
A.7 Portable Identity	27
A.8 Automated companies and investment vehicles	27
Annex B: A study of the Ethereum DAO hack	29
Annex C: Distributed Ledgers	30
Glossary	34
Decentralised Autonomous Organisation (DAO)	34
Proof of Elapsed Time	34
Ripple Protocol	34
Proof of Work	34
Proof of Stake	34
Quantum Computing	34
Reconciliation	35
Double Spend	35
Unspent Transaction Output Set (UTxO)	35

1. Executive summary

Distributed ledger technology – commonly referred as Blockchain – has emerged as candidate for financial institutions to reform their businesses. The speed and cost of doing business using distributed ledger technology is expected to improve by simplifying back-office operations and lowering the need for human intervention. However, a number of security concerns around this new technology remains.

Instead of depending on a central entity such as a single financial institution to track the validity of ownership of funds, a distributed ledger maintains all transactions and holdings and is updated by a number of counterparties.

The distributed ledger allows counterparties to use smart contracts¹ and enhanced transaction privacy. Updates to the Blockchain or “distributed ledger” leave an audit trail and allow auditing to verify how an agreement was executed. Blockchain protocols are believed to provide a transaction and application environment, by using a mix of consensus and transaction protocols to determine valid transactions, as well as reach agreement on the current state of items such as a contract or account balance.

This paper aims to provide financial professionals in both business and technology roles with an assessment of the various benefits and challenges that their institutions may encounter when implementing a distributed ledger. Some of the key challenges of Blockchain identified in the document are:

- **Traditional challenges** such as:
 - Key Management
 - Privacy
 - Code Review
- **Technology specific challenges** such as:
 - Key Generation
 - Smart Contract Management
 - Scalability

ENISA has also identified good practices to overcome the issues identified as well as introduce the key concepts that decision-makers should be aware of when approaching this technology. After reviewing the existing challenges attached to distributed ledgers, some good practices are:

- Using recovery keys
- Using multiple signatures for authorizing and processing transactions
- Using library of standardized smart contracts

¹ Szabo, Nick. "The idea of smart contracts, 1 997." (1997).



In this paper, we have also identified that there are challenges that may require further development, such as:

- Anti-money and anti-fraud tools
- Interoperability of Blockchain protocols
- Legal provisions and tools for implementing privacy and the right to be forgotten

Throughout this paper, we refer to the words Blockchain and distributed ledger interchangeably. Although they do not always share the exact same underlying technical mechanisms, these technologies often follow the same principles of allowing counterparties to exchange data and automate contractual obligations.

2. Drivers of adoption for Financial Institutions (FI)

As financial services move towards digitisation, financial institutions will need to operate lower cost, high volume payment lines to service their retail business, whilst catering to the increasing demand for security and mobility. There are also increasing demands for efficiency and transparency from institutional counterparties and financial services regulators, on business and technology processes.

The main drivers behind the adoption of distributed ledger technology are:

- **Cost reductions** - The opportunity for financial institutions to unplug legacy systems and reduce the amount of layers required for data sharing. By ensuring data is natively in digital format and shared at the point of transaction, reconciliation time can also be drastically reduced.
- **Risk-management** - The ability to predict and avoid overextending an institution's liabilities. By providing a standardised framework for recording even complex transactions such as derivatives, financial institutions can make it much easier to manage their risks and positions in real time.
- **Regulatory compliance** - compliance with the requirements of various sets of legislation, as well as conducting only authorised transactions can be automated to a great degree.

Financial institutions currently operate their own database silos, which are then reconciled against each other to ensure data is valid. Blockchain technology can provide a single distributed ledger of transactions and messages.

To operate effectively, the financial system requires its actors to fulfil their engagements and comply with existing legal statutes as well as operate in a structured fashion. This is achieved by a combination of means, which we refer to as a “governance toolkit”:

- **Regulation** - An authorisation body is appointed, which can designate individuals and firms as authorised to transact within specific markets. In the wake of the global financial crisis of 2008 and the resulting increase in regulatory requirements, the additional costs of meeting regulatory compliance and auditing requirements is evaluated at up to \$48n yearly² for some banks.
- **Audit** - The financial institution must make certain business information available to the regulator on a regular basis, to prove their compliance with specific rules.
- **Internal Controls** - A financial institution will monitor its' various business lines using a range of risk-management metrics to keep business activity in line with capital and risk requirements. Additionally, managerial and organisational processes are used to maintain human agent behaviour within acceptable parameters.
- **Technology** - At any one time, large financial institutions have a number of technology related projects under development which allow them to transact, report on data or interface with counterparties. Current technological implementations suffer from having to integrate with previous systems, resulting in a patchwork of legacy technologies that require ongoing maintenance.

The above tools, applied collectively, allow financial institutions to comply with regulatory requirements, send transaction messages to counterparties and reconcile data. However, recent years have shown the extent to which these tools can be insufficient. The “governance toolkit” is vulnerable to either dishonest human activity, data entry mistakes, or technological shortcomings.

² *Accenture, Investment Banking Technology: Jettisoning legacy architectures, 2015* (link – last accessed August 2016)

Distributed ledger technologies might allow institutions to embed their operating rules within code. From a governance perspective, this means that the business functions of regulation, audit and internal controls can be embedded into the transaction system. For example:

- **Regulation changes**

Distributed ledger technology could assist the financial institutions and regulators in a way that once a new regulation is coded into the distributed ledger it is spread to all, without any need of technical change required from the counterparties.

- **Audits**

Audits mainly show a status of a given system or organization in a given point in time- distributed ledger technology could potentially allow for **continuous monitoring**.

- **Business logic**

At the scale of an individual financial institution, **business logic can be programmed into smart contracts, drastically simplifying back-office operations**, especially with regards to data reconciliation and asset or funds settlement. By establishing a common protocol for transaction and settlements, financial institutions can move towards near real-time settlement.

- If all financial transactions are recorded on regulated ledgers, it might be possible to implement prudential regulations. For example, this could automatically restrict new transactions that cause an institution's balance sheet to exceed risk-management parameters issued by the regulators to whose jurisdiction the financial institutions are subject.

- **Reduce the need for internal monitoring**

With the support of Blockchain transactions that will now be conducted and settled by software rather than staff. The requirement for regular data audits will remain, to ensure that the smart contract has been executed as intended.

- **Achieve consensus in an uncertain environment**

The nature of the distributed ledger allows for reaching consensus over a certain transaction even when you may not trust the counterparties in the network.

Blockchain technology must not be seen as a replacement to financial institutions for the operation of the financial system. It is a technological tool, which can be used by parties such as major financial institutions and regulators to share information and transact more easily whilst maintaining control over their information.

3. Distributed Ledger Technologies

Here we show key components and properties which we think are important and valuable for the financial institutions.

Usually, the distributed ledger has the following model (see Figure 1):

- All participants share a consistent copy of the database, there is no central server
 - Some participants might not have a full copy
- Network connections are peer-to-peer
- Participants must comply with ledger rules
 - **permissionless ledger** – anyone could join
 - **permissioned ledger** – participation is subject to rules of the members
- Using a type of **consensus protocol**, to agree on validity of a given transaction
- **Transactions** – could be financial and/or exchanging of assets and/or services
 - Rules for a transaction could be coded into what is called **smart contracts**
- **Uses digital signatures (private/public key)** to sign and/or encrypt transactions on the ledger
 - Signatures could be linked to identity
- Represents a temporal order of how assets evolve over time

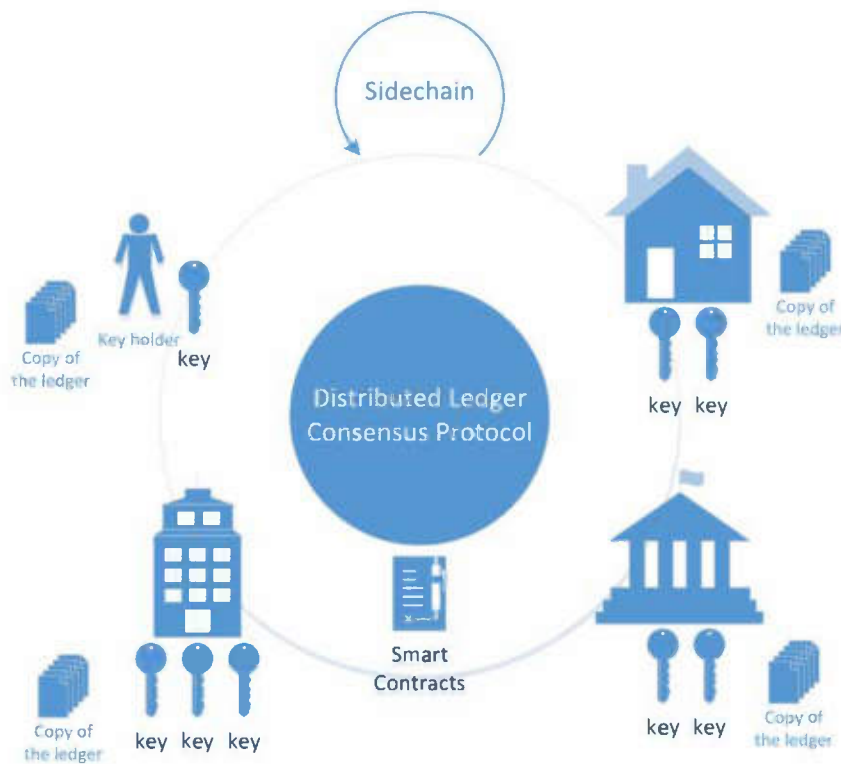


Figure 1: Distributed Ledger Ecosystem

3.1 Miner

A miner is a participant in a Blockchain that participates in securing the network and validating new transactions. The mining and validation process happens via either competitive, voting or luck-based methods dependant on the consensus protocol chosen. Miners are incentivised to participate in a Blockchain either because they receive mining rewards in the form of cryptocurrency (eg. Bitcoin) or because they have a vested interest in accessing and exchanging data on that network (such as a business that chooses to participate in an industry or market-specific Blockchain).

3.2 Consensus protocol

The core difference between a distributed ledger and a traditional database is the way in which datasets evolve over time. The system allows multiple participants to submit new inputs to a distributed ledger. Consensus is then used to determine over time which state of the database is considered as valid. This is in contrast to a traditional database, where multiple participants submit new inputs and one counterparty is relied on to provide the valid state of the database.

Consensus protocols are the mechanisms by which all users within a distributed ledger agree on the validity of the underlying data.

One of the key aspects of a distributed ledger is that the data held within it, is considered valid because all parties agree to a single “true” version. In the event that existing participants in a Blockchain decide to include data in a non-compliant manner with established protocols, an event named a fork occurs.

Forks result in a split of the ledger and the consequent creation of two groups, each validating their own version of the ledger. In order for participants to be able to continue to interact with each other, they are required to follow the same fork of the ledger.³

The following table gives a brief overview of main consensus protocols in use:

CONSENSUS PROTOCOL	OVERVIEW
Proof of Work	Uses computational power to validate new blocks of data. To participate in this scheme, participants are required to collate transactions within a single block and then apply a hash function with the use of some additional metadata.
Proof of Stake	Validators (special nodes) voting on valid blocks whilst posting collateral in order to be able to participate in the validation process. Unlike Proof of Work, Proof of Stake relies on proving the user is invested in the underlying token of value of the network being mined rather than being the owner of a large amount of computing power
Ripple Protocol	In order to validate new transactions, servers amalgamate outstanding transactions into a “candidate list.” All participants then vote on valid transactions to be included in the ledger.

³ A case study of a fork can be found in Annex B of this document

	Transactions that meet the 80% threshold of “yes” votes are included within the following last closed ledger state.
Proof of Elapsed Time	<p>As part of its Intelledger proposal, Intel has devised a means of establishing a validation lottery that takes advantage of the capability of its CPUs to produce a timestamp cryptographically signed by the hardware.</p> <p>Whoever in the chain has the next soonest timestamp will be the one to decide which transactions will be a part of the next block in the chain.</p> <p>This consensus method is extremely energy efficient compared to Proof of Work and therefore more adapted to IoT devices.</p>

Table 1: Consensus protocols

3.3 Cryptography

Distributed ledger technology relies on the use of asymmetric cryptography to sign messages and encrypt data through the use of a private/public key pair. Key sizes depend on the implementation of the ledger and could vary.

Cryptography is also involved in some of the consensus protocols (e.g. Proof of Work) and is the primary vehicle in achieving consensus.

The private keys, which allow a given entity to transact with the assets or virtual currency allocated to it in the Blockchain are typically stored in what is called a wallet. In a given wallet, there could be multiple keys stored.

3.4 Sidechains

The standard operation of a distributed ledger might allow thousands of transactions which in some cases, might result in slow processing. In an attempt to resolve this problem, one technology that has been developed is the concept of side chains.

- These are the concept of running a separate distributed ledger off of the main chain but with transactions able to take place in the same currency as the core system
- By performing transactions on a such specialized ledger, transactions should be processed faster
- Users who are able to see the content of a transaction, may also be restricted depending on that sidechain’s implementation

Another sidechain⁴ proposal establishes the idea of pegged sidechains. Pegged sidechains would enable digital virtual currencies and/or other ledger assets to be transferred between multiple Blockchains.

3.5 Smart Contracts

Business activities require counterparties to trust each other, and ensure they share the same understanding of transaction details. Contractual obligations carry three key characteristics, as outlined by researcher Nick Szabo⁵.

- **Observability**
 The ability of the principals (parties to the contract) to observe each other’s performance of the contract, or to prove their performance to other principals.

⁴ A. Back, M. Corallo, L. Dashjr, M. Friedenbach, G. Maxwell, A. Miller, A. Poelstra, J. Timon, P. Wuille, *Enabling Blockchain Innovations with Pegged Sidechains*, 22nd October 2014

⁵ Nick Szabo, *Formalizing and securing relationships on public networks*, First Monday Vol. 2 Number 9 September 1997

- **Verifiability**
The ability of a participant in a contractual agreement to prove to an arbitrator that a contract has been performed or breached, or the ability of the adjudicator to find this out by other means.
- **Privity**
The principle that knowledge and control over the contents and performance of a contract should be distributed among parties only as much as is necessary for the performance of that contract. A generalization of the common law principle of contract privity, which states that third parties – other than the designated adjudicators and designated intermediaries – should have no say in the enforcement of a contract.

Blockchain-based applications involve the use of smart contracts, a direct application of Szabo’s principles.

Smart Contracts

“Contracts whose terms are recorded in a computer language instead of legal language. Smart contracts can be automatically executed by a computing system, such as a suitable distributed ledger system.”⁶
Smart contracts allow participants to verify that counterparties have fulfilled their obligations and provide for an accelerated, automated, settlement once the required conditions have been met (such as a payment or asset transfer).

3.6 Permissionless Ledgers

A permissionless ledger is defined as a Blockchain protocol where a client may operate a full node without prior approval (i.e. download a copy of the database and act as a validator for future transactions). The advantage of a permissionless ledger is that, as it gains adoption, it becomes highly decentralised and redundant, becoming very difficult to shut down.

Furthermore, applications deployed within a permissionless ledger will be able to natively interact with other applications on the same ledger. If two applications are on separate ledgers, then a communication channel becomes required.

3.7 Permissioned Ledgers

Permissioned ledgers are a form of distributed ledger that operate as a “members’ club”. In this environment, the underlying consensus protocol is freely chosen by the group that initiates the protocol.

In the example of a group of financial institutions:

- they would agree on a common distributed ledger protocol
- Consensus protocols changes could potentially happen if adopted by all the counterparties
- Its’ members will be able to vet and add new counterparties, as well as remove existing ones.

Though financial institutions may use permissionless chains to hash some private data as well as trade on specific public, open, markets, the largest likelihood is that most applications and financial systems will be implemented as permissioned ledgers, managed by a quorum of counterparties. A permissioned ledger could allow financial institutions to leverage their real-world reputation. In this case, the FI will not want to perform malicious actions on the network, as this will damage their brand.

⁶ UK Government Office for Science, p.18, *Distributed Ledger Technology: beyond blockchain, 2016*



As outlined, distributed ledger technology offers a novel set of solutions to enable entities to transact with others in a safer environment. However, the extent to which this is a security improvement will now be the focus of our next section.



4. Cybersecurity Challenges

In this section we aim to identify the challenges associated with the distributed ledger technology. As this technology is in its development stage the challenges recognized should not be considered as complete list of challenges.

4.1 The Traditional Challenges

The use of a distributed ledger implies that data is shared between all counterparties on the network. On one side this could potentially have a negative impact on the confidentiality; while on the other, it has a positive impact on availability with many nodes participating in the Blockchain, making it more robust and resilient.

4.1.1 Key Management

Private keys are the direct means of authorizing activities from an account, which in the event they get accessed by an adversary, will compromise any wallets or assets secured by these keys.

The methodology of the attacks seeking to gain unauthorised access to a system via stolen credentials remains fundamentally the same- try to capture information, plant malware and/or use social engineering to steal the private keys from the user's machine.

Potentially different private keys could be used for signing and encrypting messages across the distributed ledger. An attacker who obtained encryption keys to a dataset would be able to read the underlying data. However, if the signing key is secured, they will not be able to modify the data or interact with that smart contract (providing it has been appropriately designed).

The significance of protecting the private key is due to the fact that actions taking place on a hacker's machine, such as file decryption attempts or private key reproduction, are not subject to server imposed query limits and are run without anyone else being able to notice.

Unlike with traditional systems, where before a server administrator was capable of tracking attempts to break into a customer or user account, the malicious users can keep trying limitlessly to decrypt or try to reproduce a private key out of encrypted data from a given ledger. With Blockchain, there is no way of knowing this is happening until after the hacker has succeeded.

4.1.2 Cryptography

Most Blockchain implementations rely on the cryptographically generated public and private keys to operate.

Main challenge associated with cryptography is that stringent policies and procedures must be followed when managing keys, including people, processes and technology.

Usually, the user generates the private and public keys using software, such as the Blockchain client software, or another available software. It has already been shown, that some programs are generating keys that have been identified to be weak⁷. There are also documented⁸ attempts to spread intentionally

⁷ Coindesk, *Open-Source Tool Identifies Weak Bitcoin Wallet Signatures*, October 16th 2014

⁸ N. Heninger, *How not to generate random numbers*, May 13th 2015, University of Pennsylvania

weakened random number generators, from which a limited range of possible values can be produced. Keys generated through these limited random number generators could be more easily brute forced.

Quantum computing may also threaten the premise of asymmetric cryptography. Though it does not represent an immediate threat, it should be certainly taken into consideration for a future-proof solution. Popular security algorithms that are used for securing information through a complicated challenge (e.g. RSA, ElGamal), may now be resolved in a shorter amounts of time through the use of quantum computing.

4.1.3 Privacy

Privacy is an additional issue that emerges from the use of Blockchain technology.

In a permissionless ledger, all counterparties are able to download the ledger, which implies that they might be able to explore the entire history of transactions, including those to which they were not members of. The “right to be forgotten” where information needs to be removed from a ledger is challenging to implement. Usually, many counterparties have the data from the ledger, and it would be difficult to prove that all data has been deleted.

The solution of Hyperledger for example, offers to solve this by offering a range of commercial privacy services.

Additionally, there is a challenge with smart contracts being able to access the data in order to process transactions. Since this is possible, there is possibility that a smart contract might be able to leak information on what is being processed. In this way, privacy might be breached.

4.1.4 Code review

Whilst many skilled eyes may have reviewed the protocols, methods, and codebase of popular implementations of distributed ledgers, it remains possible that unknown vulnerabilities exist.

4.2 The Distributed Ledger Specific Challenges

In addition to the traditional security concerns, Blockchain brings additional security challenges and attack vectors. Some of these are unique to specific implementations, and others exist across all designs.

4.2.1 Consensus hijack

In decentralized, permissionless networks, where consensus is formed through majority, taking control of a large enough portion of participating clients could allow an attacker to tamper the validation process.

In the case of Bitcoin, this is referred to as a “51% attack⁹” where the majority (defined as the proportion of all hashing power in the network) is compromised or controlled by the same entity or a coalition of dishonest counterparties. An attacker would be able to produce new blocks faster than the rest of the network (in proportion to their computing power) leading participants to consider that chain as valid.

The extent of a 51% attack will allow an attacker to refuse to process certain transactions as well as to re-use an asset which has already been spent.

There is possibility, that in a permissionless distributed ledger, the computational power required to hijack the consensus might be cheap enough for a malicious attacker to buy (from a cloud provider for example). This depends on the number of participants and the computational power required for such case. In

⁹ I. Eyal, E. Sirer, *Majority is not Enough: Bitcoin Mining is not Vulnerable*, November 1st 2013

situations like this, even one participant might hold the possibility to validate transactions and direct the flow of transactions in the ledger. This is contrary to the notion that, usually, in distributed ledgers one participant doesn't have enough resources to influence the consensus process.¹⁰

Another consequence of such an attack is in the perspective of adoption. Any chain coming under attack might see an outflow of participants, leading to the question of which chain should be considered as the "main" one to follow as well as potentially crippling the value of that chain.

Another challenge comes from consensus protocols that do not involve some way of penalty to the participants. In this way for a malicious user would be easier to attack.

4.2.2 Sidechains

Whereas major Blockchains like Bitcoin and Ethereum have sufficient adoption to be protected by their mining process against all but the most resourceful attackers, sidechains are more at risk due to their more specialised focus. Where a user has no interest in tracking the data and maintaining the operation of a sidechain, they will not contribute the relevant mining power to secure that chain.

Another vulnerability of sidechains consists in the gateway used to transfer assets and messages between chains. In the case of a Bitcoin sidechain, a user will "lock" Bitcoins in an address on the main Bitcoin Blockchain and then issue proxy tokens for these on the sidechain. If users can also later exchange sidechain tokens for the original token, this mechanism is called a 2-way peg. They can then transact with others on that sidechain. If the initial "locking" transaction is later considered invalid, then subsequent proxy-token transactions would also be affected. Additionally, owners of proxy tokens that had been affected would not be able to convert these back to the original asset via the pegging mechanism.

Fraudulent transactions or attacks on a sidechain do not affect the validity of data held on the parent chain. However, in the event that a sidechain was to be put out of service, the parent chain might be subjected to high stress levels as the sidechain users migrate their transaction volumes to the parent chain.

4.2.3 Exploiting Permissioned Blockchains

In a regulated, permissioned network, where consensus might be implemented under the regulator's direction, any exploitation of the regulator's capabilities would be even more and immediately severe. The extent of the impact depends on the range of capabilities ascribed to the regulator within that specific system.

All problems that had required hijacking of the majority consensus, a task that was a potentially significant in undertaking, are now replaced by the hijacking of a single entity.

The challenges created by the above could be mitigated by implementing a fixed-time notice period prior to regulator-issued major protocol updates being made effective. However, until the intrusion is detected, malicious activity would still be possible within the scope of the regulator's ongoing activities, such as whitelisting individuals or institutions to participate in the system.

¹⁰ Eyal, Ittay, and Emin Gün Sirer. "Majority is not enough: Bitcoin mining is vulnerable." International Conference on Financial Cryptography and Data Security. Springer Berlin Heidelberg, 2014.

4.2.4 Distributed Denial of Service

Distributed Denial of Service attacks coming out of the nature of the distributed ledger remain a concern. For example, if rogue wallets decide to push large numbers of spam transactions to the network it could create potentially a denial of service and increase the processing time, as the nodes will be checking the validity of the fraudulent transactions.

In March 2016, the Bitcoin network was slowed to a near halt. The cause was a Bitcoin wallet pushing large volumes of spam transactions with a higher than average transaction fee. This caused miners to prioritise these transactions when computing new blocks.

Within a permissioned ledger, it would be possible for nodes to agree to ignore or even block the issuer of such spam transactions. However, if an attacker is able to control a large number of clients, they might be able to severely disrupt the network by pushing large volumes of irrelevant transactions.¹¹

The distributed nature of Blockchain architecture introduces the prospect that it would be difficult to shut down a malicious program.

With the capabilities of newer protocols offering data storage and computation, it would be possible to store malicious data within the Blockchain network. Additionally, an attacker could reassign control of the related smart contract at will, leveraging the trustless nature of the Blockchain to buy and sell malware between anonymous cryptographic keys¹².

4.2.5 Wallet Management

Wallet management represents the process and technology used with which a wallet software operates with the keys assigned to it. The wallet software would need to protect the keys from being accessed without authorization, in both cases while stored, but also while in operation with the software.

Losing access to a given wallet might preclude a financial institution from authorising transactions or moving assets. It might be difficult for an entity to be aware that a malicious user has access to the wallet, because copying or stealing the keys might not leave any trace on a computer. By the time an entity understands that the keys are compromised, because of a fraudulent transaction for example, it might be too late for reversal.

4.2.6 Scalability

Removing the need to reconcile counterparty data introduces a scalability problem. On one hand the growth of the ledger size and on the other the speed at which transactions are processed.

The need to store all data pertaining to a specific distributed ledger, may grow to be unmanageable in size for individual end-users.

In the case of a financial market implementation, we assume that major financial institutions act as full nodes. Where the Bitcoin Blockchain has exceeded 90Gb, the Ethereum Blockchain exceeds 10Gb (depending on client used). In terms of keeping a full copy of the database, this doesn't look like a big

¹¹ Lamport, Leslie, Robert Shostak, and Marshall Pease. "The Byzantine generals problem." *ACM Transactions on Programming Languages and Systems (TOPLAS)* 4.3 (1982): 382-401

¹² D. Roffel, C. Garrett, *A novel approach for computer worm control using decentralised data structures*, December 13th 2014

number, but its growth is exponential and has grown for four years around 450% (Bitcoin from July 2012 to July 2016).

The speed at which a given transaction is processed, in some implementations of the ledger, may not be sufficient or acceptable¹³.

Exposed to the high transaction volumes of financial institutions, a completely distributed ledger might subject users to performance issues as their machines struggle to maintain an ever growing chain. The transaction speed also depends on the consensus protocol. In the case of Proof of Work consensus protocol the validation of transactions needs to be verified by a number of other nodes which requires processing time. The more participants need to verify a transaction, the more time it will take to be accepted as valid in the ledger. On one hand, participants might not have sufficiently powerful hardware to validate a transaction. On the other, the ledger protocol itself would be designed to accommodate more general requirements, thus bringing more delay. In a consensus protocol that would just use time stamping, the process of validation will be faster compared to the Proof of Work.

The possibility that only specific transactions are to be verified by specific nodes (validators) is called Sharding.¹⁴ Sharding could also introduce a significant fault (ie. reversion of subsequent transactions) if a specific subset of validators were to wrongly validate transactions to which other members of that same Blockchain refer to. This is due to the fact that communication between shards will require the use of transaction receipts from one shard to communicate with the next.

The process of downloading block headers (which are a hashed version of past data) as well as the underlying data for most recent blocks and then cross-reference this with other nodes (rather than downloading the entire database) is called Blockchain pruning. Here, a challenge exists if an attacker were to convince a user that the fraudulent block headers they verify, are genuine.

4.2.7 Smart Contract Management

Smart contract management refers to the people, processes and technology used when creating a smart contract.

Smart contracts are essentially programs that run on the distributed ledger. They are prone to any faults associated with code. As with any software, the more complex a smart contract is, the more prone to software errors it will be.

Generally, the function, and the security of smart contracts code depends on the author's capabilities.

A review by Peter Vessenes¹⁵ found that large numbers of template contracts available on the web for the Ethereum scripting system contained significant vulnerabilities to their operation.

¹³ Note: For reference, at the time of writing the Bitcoin transactions are limited to 7(seven) per second, Visa handles at an average of 2000 (two thousand) per second

¹⁴ V. Buterin, *DEVCON1: Scalable Blockchains & Asynchronous Programming*, Nov. 9th 2015

¹⁵ P. Vessenes, *Ethereum Contracts are Going to be Candy for Hackers*, May 18th 2016

On June 2016 an attack on the DAO¹⁶ took place, which was an investment vehicle created on the Ethereum network and operated as a smart contract. Over \$59m in Ether¹⁷ were stolen by an unknown source from the wallet controlled by the program on behalf of all investors.

4.2.8 Interoperability

Using different distributed ledgers will very likely bring the need of data sharing between them.

Exchanging data will require translation of formats and protocols, which currently are in very early stages.

Also having to reconcile transactions between different distributed ledger brings another challenge to consider, as different consensus protocols might not be easy to transpose from one to another. Key challenges related to interoperability are:

- Who can transfer assets between distributed ledgers?
- Who can oppose to transferring assets?
- Should transfers allow for whole asset or just part of it?
- Should changes of ownership or asset (theft, loss) be also proliferated to the other chains?

Another interoperability challenge arises from the use of wallet software with different distributed ledgers. Currently, most distributed ledgers come with their own wallet software, and it is difficult to have a common wallet for different distributed ledgers.

4.2.9 Governance controls

Institutions still need their staff to sign off on requests and transactions, though a distributed ledger may transparently indicate which financial institution was involved in a transaction. A challenge becomes how exactly the governance structure could be coded into the distributed ledger.

Another aspect of governance lies at the systemic level, where some institutions may have rules concerning which business activities they can engage in. For example, in the distributed ledger there might be rules for some financial institutions to be allowed to transact with only specific entities, or provide only specific services.

4.2.10 Anti-fraud and Anti-Money Laundering Tools

Another key problem is a lack of tools to combat illegal activity. Though it might be possible to identify who owns an address used for money laundering despite attempts at obfuscating the transaction¹⁸, it is not possible to block these types of transactions in advance. Also, the consensus-based nature of adoption combined with the cross-application and industry aspirations of Blockchain technology means protocols may not evolve sufficiently fast or in correlation with more complex business needs.

The European Commission has already begun researching the foundations of a Public Key Infrastructure, that will impose Anti-Money Laundering (AML) compliance on all entities acting as gateways towards the

¹⁶ See annex B

¹⁷ Zerohedge, *Bitcoin's Largest Competitor Hacked: Over \$59 Million "Ethers" Stolen In Ongoing Attack*, June 17th 2016

¹⁸ M. Möser, *Anonymity of Bitcoin Transactions – An Analysis of Mixing Services*, 2013

cryptocurrency ecosystem. Within the financial sector, this could give way to a whitelist of approved public keys whose owners are institutions and professionals who have been allowed to transact.¹⁹

Another issue that arises with users is that the Blockchain network could be more trustworthy than the machine used to access it. Hence, though the record of the transactions would be verifiable, the intent to perform that transaction might not be. An example of this would consist in the transfer of a large sum of money. Because it happens on a distributed ledger, the transaction is visible and verifiable by all other entities on that ledger. However, the owner of the wallet may not have had the intent of making such a transfer and been subject to a hack. The decentralised chain design also means that it is not possible to simply revert previous actions.

A further potential vulnerability lies not just in the consensus protocol, which exists to provide an accurate historical presentation, but in the transaction protocol used to broadcast messages to the rest of the network. Fraudulent transactions exist in various types:

- **Double-spending:** This involves sending two transactions, one of which will cancel the other. In the example of Bitcoin, until the UTXO set of the Blockchain has been sufficiently confirmed after enough time, counterparties expose themselves to the possibility that the payment received will be invalid.
- **Hacked key:** This type of transaction is broadcast to the network but has not been conducted by the true owner. This happens when a third party obtains unauthorised access to a key.
- **Non-compliant transaction:** This type of transaction is mainly applicable to permissioned, regulated networks. It involves broadcasting a message either from an unauthorised address or against pre-defined business rules. Hyperledger solves this issue with a blend of enrolment (authorisation) certificates and single use transaction certificates to allow transactions.

¹⁹ European Commission, p.7 *Proposal for amending Directive (EU) 2015/849 on the prevention of the use of the financial system for the purposes of money laundering or terrorist financing*, 2016

5. Good Practices

Having identified key challenges related to Blockchain implementations, our recommendations focus on the good practices to adopt within each category. Some of the good practices are very well documented like the key management, others have been identified during our research. The good practices can be implemented by institutions which wish to participate in a distributed ledger network.

5.1 Key Management

CHALLENGES	GOOD PRACTICES
<p>key storage</p> <p>key loss</p> <p>key theft</p>	<ul style="list-style-type: none"> • Store keys according to good practices²⁰ • Use rules that require the use of multiple signatures to authorize and/or create transactions • Allow the use of recovery agents - one way of doing this is through a trusted third party which holds, the keying material required to recover keys • Use different keys to sign and encrypt • Enable internal identification of the individual signing off the request for a transaction • Issue individual keys to persons working on behalf of institution

5.2 Cryptography

CHALLENGES	GOOD PRACTICES
<p>Key generation</p>	<ul style="list-style-type: none"> • Make sure the keys are generated in a secure and valid way²⁰ • Make sure the key length is appropriate for the use²⁰ • Use different keys to sign and encrypt

5.3 Privacy

CHALLENGES	GOOD PRACTICES
<p>Keep information visible only to authorized entities</p> <p>Unauthorized access to transactions</p>	<ul style="list-style-type: none"> • Encrypt the transactions, so only the involved counterparties can access the whole information • Use sharding to allow specific transactions to be validated by specific entities • Use pruning to remove data from the ledger at certain period of time, as requested by the regulation • In case an entity must be linked to a key, an authority may keep information of which key belongs to which entity • Encrypt ledger with more than one key

5.4 Code review

CHALLENGES	GOOD PRACTICES
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²⁰ Smart, N., et al. "Algorithms, key size and parameters report.", ENISA (2014).

<p>Bugs/Errors</p> <p>Zero-day attacks</p>	<ul style="list-style-type: none"> The institutions offering Blockchain applications should <ul style="list-style-type: none"> do code review (or employ third party services) of Blockchain applications and associated libraries Apply Software Development Life Cycle principles Do penetration testing (or employ third party services) of the Blockchain application
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5.5 Consensus Hijack

CHALLENGES	GOOD PRACTICES
<p>Fraudulent transactions</p>	<ul style="list-style-type: none"> Monitor if one of the nodes increases processing power and is executing a significantly higher number of transactions Assign fees to new transactions or make it difficult for a node to process a large number of transactions

5.6 Sidechains

CHALLENGES	GOOD PRACTICES
<p>Fraudulent transactions</p>	<ul style="list-style-type: none"> Require the use of merged mining, where the proof of work applied to validate the parent chain may also be used to submit valid blocks for the sidechain

5.7 Permissioned chain management

CHALLENGES	GOOD PRACTICES
<p>Central authority key loss</p> <p>A node getting enough power to validate transactions of their choice – potentially fraud</p>	<ul style="list-style-type: none"> Monitor if one of the nodes increases processing power and is processing a significantly higher number of blocks Use a clear set of criteria to accept new members, as well as to remove existing ones Enable the use of recovery keys

5.8 Denial of Service

CHALLENGES	GOOD PRACTICES
<p>Spam/invalid transactions being introduced for validation</p> <p>Slow processing of transactions</p>	<ul style="list-style-type: none"> Restrict which nodes can offer new transactions for validation Assign fees to new transactions or make it difficult for a node to issue large numbers of transactions Accept transactions from only authorized IP addresses Have the possibility to block IP addresses as necessary

5.9 Wallet Management

CHALLENGES	GOOD PRACTICES
<p>Key theft</p> <p>Unauthorized access to data</p>	<ul style="list-style-type: none"> Make sure the software for the wallet does not leave the key accessible in plain text outside the application Require the implementation of recovery keys

Information disclosure
Block/Compromise of operations of entity

5.10 Scalability

CHALLENGES	GOOD PRACTICES
<p>Slow processing of transactions</p> <p>Unexpected growth of the distributed ledger database</p>	<ul style="list-style-type: none"> • Use sharding to allow specific transactions to be validated by specific entities • Use pruning to limit the growth of the ledger • Restricting the type of information allowed on the ledger and the entities allowed to act as full nodes

5.11 Governance Controls

CHALLENGES	GOOD PRACTICES
<p>Institutions engaging in a not permitted activity</p>	<ul style="list-style-type: none"> • Use smart contracts to allow for certain entities to engage in certain activities. • Internal governance procedure must enable internal identification of the individual signing off the request

5.12 Smart Contracts

CHALLENGES	GOOD PRACTICES
<p>Unwanted behaviour of smart contracts</p> <p>Malicious software spread</p>	<ul style="list-style-type: none"> • Use code review for smart contracts • Standardization of regular functions into libraries • Keep a library of approved smart contracts • Participants could use consensus protocol which considers a malicious program as an invalid state

5.13 Interoperability

CHALLENGES	GOOD PRACTICES
<p>Fraudulent transactions</p>	<ul style="list-style-type: none"> • Use pegged sidechains

6. Open Challenges

We have identified some issues that we believe could be improved or where the technology needs to evolve.

OPEN CHALLENGES	RECOMMENDATIONS
<p>Information security standards</p> <ul style="list-style-type: none"> to keep data confidential what and how data needs to be deleted from the ledger 	<ul style="list-style-type: none"> The Industry in cooperation with the regulators to define what to be kept confidential in order to remain compliant with regulatory requirements, such as General Data Protection Regulation, as well as sector or local regulations The Industry in cooperation with the regulators to identify or develop standard methods for removing data from a ledger
<p>Monitoring illegal activity</p>	<ul style="list-style-type: none"> The Industry to explore how current anti-fraud and anti-money laundering technologies need to be adapted or new ones created to work with the distributed ledger.
<p>Interoperability between different distributed ledger protocols</p>	<ul style="list-style-type: none"> The Industry should explore the possibility to standardize requirements and harmonization of interoperability of different distributed ledger protocols XML standards could potentially be good candidate for data operability
<p>Quantum computing</p>	<ul style="list-style-type: none"> The Standardization bodies in cooperation with the Industry to research the use of post-quantum algorithms for asymmetric cryptography
<p>Privacy preserving smart contracts</p>	<ul style="list-style-type: none"> The Industry to research availability of contracts preserving privacy, e.g. smart preserving contracts²¹
<p>Governance controls</p>	<ul style="list-style-type: none"> Financial regulators in cooperation with the industry to explore mechanisms to add assurance and governance controls (standard legal and compliance items)
<p>Wallet Management</p>	<ul style="list-style-type: none"> Industry to explore the possibility for creating standards for wallet software to store multiple keys from different distributed ledgers

²¹ Kosba, Ahmed, et al. "Hawk: The blockchain model of cryptography and privacy-preserving smart contracts." University of Maryland and Cornell University (2015).

Annex A: Blockchain Use Cases

Blockchain technology holds a significant promise for the financial sector. It simplifies many types of business transaction and has significant applications within the non-financial sector.

A.1 Executing and settling contractual agreements

The current process behind an investment in shares requires for counterparties to hold both a bank account and their shares with institutions that can assist with the settlement of their trade. In contrast, a share trade accomplished through a distributed ledger can be settled instantly. Furthermore, as soon as a user receives their share tokens, is able to receive dividends and vote on proposals from the originating company. A share token is a digital version of a share certificate. However, rather than owning a paper certificate specifying ownership of shares, a shareholder owns digital tokens, representing the equivalent of shares. Due to the fact that smart contracts are legal contracts embedded in code, it therefore becomes possible to assign the attached rights to various classes of shares to these tokens.

In the case of more complex financial instruments such as derivatives, it is possible to program the execution of settlements following external events. Additionally, what were previously complex paper contracts can now be encoded into software, allowing financial institutions to assign a data-based framework to keep track of liabilities.

A.2 Reconciling and auditing information

Current processes require a financial institution to reconcile data internally then across business lines. Using Blockchain technology, institutions can eliminate double-entry accounting by connecting Back-office transaction processing to the initiator of a transaction. Furthermore, instead of preparing cyclical reports and audits for regulators, it will be possible to communicate data in real-time, allowing for a more efficient implementation of regulatory requirements and risk monitoring.

A.3 Signing messages on behalf of a counterparty

A good example of this is undertaking a proof of funds action. Whereas a client involved in import/export financing would need to request a letter from their bank, they can now sign a message on the Blockchain to prove they have the funds available. One way to do this is to simply transfer the funds to another wallet which the user has access to. In advance of the transaction, and then inform the counterparty of the wallet addresses to monitor. Other users on the Blockchain will only be able to identify that a transaction between two anonymous public keys has happened. Furthermore, it is technically feasible to encrypt the amount of a transaction, thus obscuring amounts to third parties.

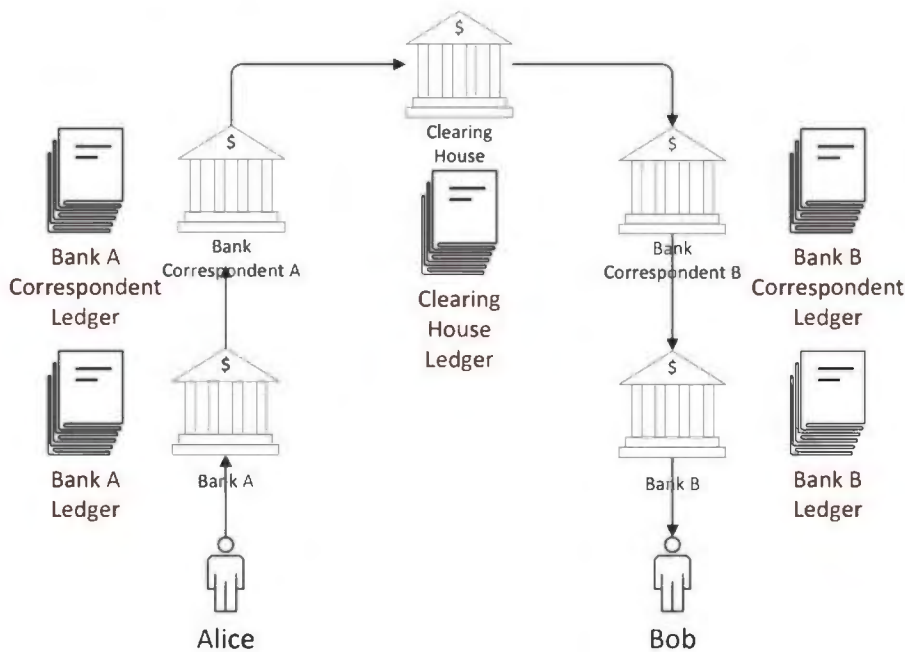
A.4 Connecting systems to IoT enabled devices

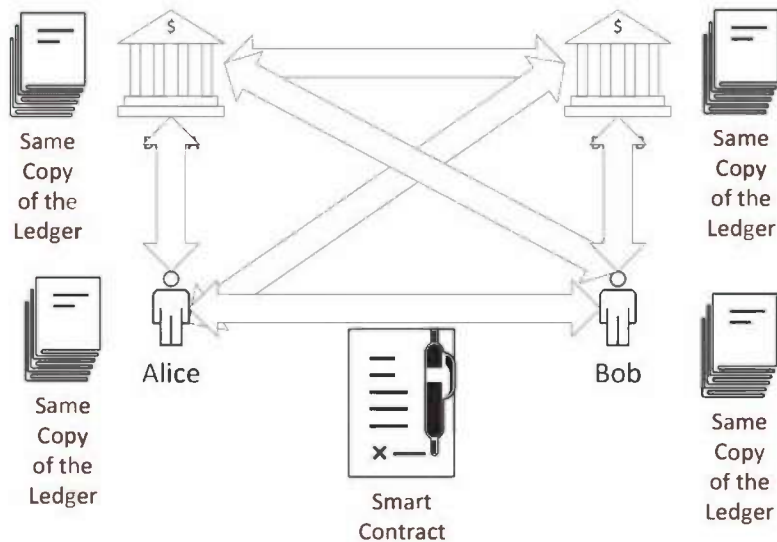
Blockchain technology will facilitate the development of large amounts of connected devices. By enabling their systems to interface with the data generated for these devices, financial institutions can obtain real-

time data for a range of matters such as destructive weather (for insurers), client location (fraud prevention), production facility status (valuation of a business).

A.5 Facilitating the transfer of assets

Registering and transferring the ownership of an asset can be a complex process involving multiple information silos. In the case of a residential property, relevant surveys must be carried out and intervention of a central counterparty, such as the Land Registry, is required in order to effectively record the transfer of ownership. A distributed ledger may enable property titles to be freely exchanged and linked to smart objects, such as an electronic lock that only opens for a specific key. Because the ledger is timestamped, it would also be possible for an arbitrator to verify who made the first claim in the case two counterparties were in dispute over a property. As soon as a property is transferred, this could also be made visible to the property buyer's bank, who would then be able to offer a variety of collateral-backed financial products.





A.6 Automating regulatory compliance

Prudential regulation defines the capital requirements needed by financial institution to function effectively. If all trades are happening on distributed ledgers with the information encrypted to transaction counterparties and the regulator, it becomes possible to calculate in near real-time an institutions' financial position and whether additional transactions will cause it to exceed the defined risk management parameters and capital requirements. Another application from a regulatory perspective lies in enforcing sanctions and closing access to specific markets if participants do not meet the criteria.

A.7 Portable Identity

Distributed ledgers have the advantage of using cryptography rather than user credentials. This means that participants in a ledger can produce their own identity by generating a private key only they have access to. The entity (individual or business) can then port its identity across different services as long as it uses the same address.

A.8 Automated companies and investment vehicles

Smart contracts make it much easier to conduct corporate governance. This includes automating the shareholder listing, recording board decisions and allocating assets. Financial institutions will be able to



take advantage of smart contracts by quickly instantiating investment vehicles on a distributed ledger whilst subjecting them to regulatory requirements. Because assets and funds can interact through a Blockchain, smart contract-based investment vehicles will be able to accurately manage the holdings of a business with full transparency.

Additionally, the issuance of new shares as well as trading of outstanding shares can be conducted through the ledger. Financial institutions can choose to trade within existing liquidity pools. However, their settlement can be linked to the Blockchain in order to improve the efficiency of trading activity.

Annex B: A study of the Ethereum DAO hack

Ether is the currency of the Ethereum Blockchain, with the second highest capitalisation in the digital currency market. Following its developer-focused Frontier release in July 2015, Ethereum released Homestead, the first production-grade version of the protocol, in March 2016. Since inception, Ethereum has been designed to allow for a range of applications rather than being limited to digital currency. A private version of the Ethereum network has even been used²² by the R3 Consortium, a group of banks conducting an evaluation of Blockchain technology.

A range²³ of independently developed Decentralised Applications (DApps) are already in existence on the Ethereum network. These range from identity record lookup and validation to Blockchain-chartered companies, prediction markets and notary services. However, the main issue as with any new technology is that of adoption. Within the world of decentralised ledgers, this can happen in two ways, either bottom-up grassroots adoption or through the integration of Blockchain technology to the technology stacks of existing commercial service providers. The first major demonstration of the potential of a decentralised computer (Ethereum Virtual Machine) was the launch of the Decentralised Autonomous Organisation (DAO)²⁴. This smart-contract based investment vehicle is aimed at providing a collective fund through which token holders can vote on investments and contractors to undertake specific ventures or tasks.

After a token sale (similar to IPO) in May 2016, the DAO raised over 11.5 Million Ether²⁵ (equivalent to over €140 million). This also represented over 13% of all Ether in existence at the time. On June 17th 2016, the DAO came under an attack known as a “recursive split.”²⁶ Investors in a DAO can choose to separate from the existing vehicle and take their funds with them. In this case, a split function occurred, initiating a withdrawal. However, the function was called recursively, blocking the invocation of the function which updates the user’s token balance, and therefore allowing them to withdraw more funds than they were otherwise entitled to.

In response, a protocol update²⁷ was proposed within the same month and adopted²⁸ on July 20th. This protocol reverted the previous transactions to an address accessible by the original DAO investors, enabling them to withdraw their funds. Within a day, nearly half the original investors had been able to recover their Ether.

The DAO hack is an example of how participants in a distributed ledger can, by consensus, overcome major security events. However, this also introduces the possibility of reverting past transactions, an issue which would mean that participants who transacted after the attack would have their transactions effectively nullified. This has resulted in a hard fork and the creation of a second Blockchain, “Ethereum Classic” which does not recognise the reversion of the attack as valid.

²² Coindesk, *Ethereum Blockchain Project Launches First Production Release*, March 14th 2016

²³ Ethereum DApps

²⁴ DAOHub

²⁵ New York Times, *A Hacking of More Than \$50 Million Dashes Hopes in the World of Virtual Currency*, June 17th 2016

²⁶ Hacking Distributed, *Analysis of the DAO exploit*, June 18th 2016

²⁷ Ethereum Blog, *CRITICAL UPDATE Re: DAO Vulnerability*, June 17th 2016

²⁸ Coindesk, *Ethereum Executes Blockchain Hard Fork to Return DAO Funds*, July 20th 2016

Annex C: Distributed Ledgers

Bitcoin

The main cryptocurrency by market capitalisation and the most widely known implementation of the Blockchain concept, Bitcoin has operated without any central authority since 2009. There are now over 15m bitcoins in existence, with a market capitalisation of close to 8Bn Euros.

Bitcoin contains a very basic scripting language, called Script, making simple smart contracts a possibility. Script does not support loops and acts mainly as a tool to place parameters on how Bitcoins can be spent once they arrive at their destination.

Bitcoin uses a distributed ledger of transactions from which it is possible to compute the Unspent Transaction Output set, or UTXO. From a more practical perspective, this means that wallets' publicly exposed addresses (ie. unique identifiers) are not simply links to a set amount or asset. Rather, they are the most recent link in a publicly verifiable historical trail of transactions which ends at that address.

Open networks such as Bitcoin need to allow for an unbounded number of participants. The challenge that therefore arises is for a large number of parties who do not know each other and may not trust each other to arrive at an agreement about the truth of a given transaction. Bitcoin solves this problem with the use of a proof of work algorithm. In order for messages to be considered valid, they must be compressed into a block of data, which is appended to the existing database. This concept of validating a set of messages is referred to as mining.

The economic connotation of the term of mining refers to the fact that in the Bitcoin implementation, peers are given an incentive to maintain the system. Each new block in the Blockchain is the result of a competition by miners to provide a valid set of transactions in a block. Miners that successfully submit the next block receive a reward, denominated in the crypto-token linked to that specific Blockchain. For example, every 10 minutes on average, one of the miners on the Bitcoin Blockchain currently receives 12.5 Bitcoin (approx. 6 700 Euros²⁹) for solving the current block.

For the system to function, peers must be able to ascertain that the information they have been presented with is truthful. Additionally, there should be a disincentive for dishonest actors to overtake the system. The proof of work function makes it unlikely for 2 parties to arrive at a valid conclusion to the challenge at the same time. However, it remains a possibility. When this happens, a fork may develop in the Blockchain with two separate chains proceeding. To stop these forks from continuing, and to ensure there is only ever one chain, clients accept the longest chain above all others. As a result, the two chains at the fork enter a race condition to see who can become the longest first, with the smaller one being discarded.

The issue that arises with a distributed ledger is guaranteeing that, as the dataset evolves over time, older data is not subject to modification. To avoid this, all previous blocks in the system are included in the hash for the most recent block. This is referred to as a Merkle proof^{30,31}. The Bitcoin implementation features a chain of blocks. Each block contains a block header with 6 elements:

²⁹ Based on an XBT/EUR rate of € 533.92 on Aug. 8th 2016

³⁰ US Patent No 4309569, Filed September 1979

³¹ Ethereum Blog, *Merklng in Ethereum*, November 15th 2015

- Block version - Specifies the version of the Blockchain the mining software is generating for.
- Hash of previous block header - A hashed version of the previous block header.
- Hash of Merkle Root (Transactions in Block) - A hash of all transactions/messages in the current block.
- Timestamp - The time of publication of the block.
- Bits - A 256 bit number that acts as a target for miners to produce a hash under the value of in order to generate a valid block.
- Nonce - A random number to allow for different hash outputs for a block on each attempt.

In order to produce a block, miners pick a set of transactions to validate and hash them using a SHA-256 algorithm. If the resulting hash is a lower number than the Bits, then it is considered a valid solution and is broadcast to the rest of the network. If it isn't, the nonce is changed for each hashing run until an output lower than the Bits is found.

The algorithm used for proof of work requires the entity running the computation to contribute computational power. The probability of submitting the valid solution to a block is proportional to the total amount of computing power contributed by that user during the time window necessary to find the most recent valid block. The proof of work algorithm has enabled Bitcoin to operate for over 7 years. However, one of its main flaws resides in the fact that it consumes a large amount of energy. The first unintended consequence is that this creates a drive towards centralisation of mining capacity due to economies of scale to be achieved on hardware and electricity. Additionally, based on current projections, Bitcoin may consume as much electricity as Denmark by 2020³². As such, research for other needed solutions has resulted in alternative proposals that can lower electricity consumption without impacting data security.

Ethereum

Ethereum was founded in 2013 and launched in 2015 after a successful crowdfunding campaign which raised over \$18m in Bitcoin. To date there are over 80m Ether in circulation, with a market capitalisation approaching 1Bn Euros.

Ethereum offers the same range of computational abilities as existing real-world systems, and in particular supporting loops and conditional statements. The inherent design of the system means that smart contract code and its' execution are open for review by all parties. Ether is a form of payment made by the clients of the platform to the machines executing the requested operations.

A variety of languages have been developed to support smart contracts. Ethereum's virtual machine runs on byte code, which can now be compiled out of many traditional languages including Javascript and C++. Solidity is a new High Level Language developed specifically for Ethereum contracts, similar to Javascript, designed to make complex smart contracts as easy to write as possible.

Whereas Bitcoin blocks contain transaction messages, Ethereum blocks contain messages representing computational steps of the execution of a smart contract. This computation is funded by subunits of Ether, more commonly referred to as "gas". All execution fees are paid by the entity issuing the instruction and are included within the mining rewards for that specific block. Blocks on the Ethereum chain are currently also validated using a proof of work algorithm; however, it is in the process of switching to Proof of Stake.

³² Breitbart, *Bitcoin may consume as much electricity as Denmark by 2020*, April 3rd 2016

Ripple

Already in use by a number of financial institutions, Ripple³³ provides a Peer to Peer system for banks in foreign exchange (FX) markets to transact with each other. The global ledger is replicated by thousands of participants. FX trades take place through a distributed order book, where all bids and asks are recorded and executed. Ripple relies on the concept of “gateways”. Hence, in order for a user to move their fiat (i.e. account balances denominated in government-issued currencies such as EUR, GBP etc) balance out of the Ripple network, they will need to request a settlement from the entity that initially issued that balance on the network. Therefore, Ripple still contains a degree of counterparty risk as users are required to trust that they will be able to receive an effective settlement of their funds.

Hyperledger

The wide variety of applications for distributed ledger technology also means there is a large amount of potential optimization to be done, as some protocols may be more appropriate in certain circumstances depending on who is building them and for what. Recognition of this has led to the development of Hyperledger, which is being developed by a consortium of finance and technology companies, led by the Linux Foundation. **Hyperledger³⁴ is focused on developing a standard for distributed ledgers that will allow separate ledgers to communicate with one another without needing bespoke APIs.** From a security perspective, Hyperledger uses two types of certificate:

- Enrolment certificates: Controls a participants’ access to the network
- Single use Transaction Certificates: Restricts the ability to push undesirable transactions

Hyperledger refers to this common standard as Fabric, and intends for smart contracts to be writeable on this platform in any common programming language. The aim is to produce a completely modular system that will allow everything – from the cryptography used to the underlying consensus protocol – to be easily customized and deployed with as little effort as possible. The key driver of Hyperledger’s modular approach is to allow business participants to determine the consensus protocol to use, following their business needs.

Sawtooth Lake/Intelldger

Sawtooth Lake³⁵ is an open source project developed by Intel, who are also participating in the Hyperledger initiative. Founded on the same principles as Hyperledger, but with a slightly different focus, its’ primary goal is to operate on IoT devices with limited human involvement.

Sawtooth Lake abstracts the core concept of consensus by isolating consensus from transaction semantics. It provides two consensus protocols with different performance trade-offs; Proof of Elapsed Time and Quorum voting, an adaptation of the Ripple protocol.

This project is currently in early development, with an alpha release simulating the token generation function of the segregated secure CPU unit without the actual underlying hardware. However, some key questions remain about this system, including Intel’s access and knowledge of the cryptographic keys on the hardware. Additionally, it is not clear whether or not it is possible for a hacker to extract the keys to

³³ Ripple, *Executive Summary for financial institutions*

³⁴ Hyperledger Foundation

³⁵ Intelldger developer documentation



create timestamps that will assure them victory in the consensus determining lottery by decapping the chips. Another question that remains is whether or not the range of hardware that will work in this system can be expanded without being vendor-locked.

Corda

Corda is a distributed ledger for contracts tailored for use by financial institutions. It rethinks a number of the assumed required components of their design. Transactions/agreements, are only visible to parties with a need to see them, including a definable regulator. In this setting, the regulator could be an authority such as the European Banking Authority or an industry body defining a set of standards market participants are required to adhere to. Corda³⁶ has no cryptocurrency, as these parties alone are also the validators of the agreement taking place, with multiple consensus mechanisms potentially being used.

Corda aims to provide a global distributed ledger, where transactions serve as authoritative and binding facts to ascribe contractual obligations to counterparties³⁷. To this effect the behaviour of the system is designed in code and backed by a legal framework which outlines the obligations of participants. Corda is designed to allow a number of financial transactions, including enabling financial institutions to issue digital fiat currency to counterparties. In turn, these Blockchain-based funds can be used for trading and settlement.

³⁶ R3 Blog, *Introducing R3 Corda a distributed ledger designed for financial services*, April 5th 2016

³⁷ R. G. Brown, J. Carlyle, I. Grigg, M. Hearn, *Corda: An Introduction*, August 2016

Glossary

Decentralised Autonomous Organisation (DAO)

A DAO is an autonomous entity with programmable rights deployed on a Blockchain as a smart contract. A DAO serves as a proxy to represent a real-world entity or grouping of entities.

Proof of Elapsed Time

As part of its Intelledger proposal, Intel has devised a means of establishing a validation lottery that takes advantage of the capability of its CPUs to produce a timestamp cryptographically signed by the hardware. Whoever in the ecosystem has the next soonest timestamp will be the one to decide which transactions will be a part of the next block in the chain. This consensus method is extremely energy efficient compared to Proof of Work and therefore more adapted to IoT devices. Proof of Elapsed time does not require a Public Key Infrastructure. Assets with compatible hardware can simply be added to the network and immediately participate in the validation process.

Ripple Protocol

The Ripple consensus protocol operates a ledger system. The last closed ledger is the most recent ledger validated by the consensus process and can be accepted as representing the current state of the database. In order to validate new transactions, servers amalgamate outstanding transactions into a “candidate list.” All participants then vote on valid transactions to be included in the ledger. Transactions that meet the 80% threshold of “yes” votes are included within the following last closed ledger state.

Proof of Work

Proof of Work uses computational power to validate new blocks of data. To participate in this scheme, participants are required to collate transactions within a single block and then apply a hash function with the use of some additional metadata. If the resulting hash falls within the acceptable range set by the current difficulty parameters of the proof of work scheme, then that block is considered valid and is broadcast to the rest of the network as a valid submission. The probability of creating a valid block for any individual miner is defined by the proportion of computing power held by that miner in comparison with the rest of the network.

Proof of Stake

This consensus protocol is based on the validators voting on valid blocks whilst posting collateral in order to be able to participate in the validation process. Unlike Proof of Work, Proof of Stake relies on proving the user is invested in the underlying token of value of the network being mined rather than being the owner of a large amount of computing power. Ethereum will use the Casper protocol variant. This implementation of Proof of Stake sees all validators on the network undergo an iterative voting process on the next valid block. Votes are made in the form of cryptocurrency, which is locked as a deposit until consensus has been reached. The next valid block is the one which has the majority of deposits (at least 51%) allocated to it. Due to the iterative voting process, a validator that suddenly switches their vote to a completely different block may forfeit their deposit. Proof of Stake additionally allows miners to focus computing resources on processing more transactions per second rather than producing a large number of hashes as in Proof of Work.

Quantum Computing

Quantum Computing is a new computing paradigm. It involves the use of quantum based phenomena. One of the main benefits is opening the way for even smaller computers. This is especially relevant due to

quantum tunnelling, an issue which arises for chips below 10nm as electrons begin to jump across closed transistor gates. Quantum computers use “qubits” instead of conventional bits of information. These qubits may take the form of an electron trapped inside a cage of atoms or the polarisation of laser light. Other forms of quantum computers involve using molecules and observing their spin in order to reconstruct information. Although quantum computers may potentially offer exponential computing capabilities for specific tasks (such as brute-forcing attacks), they are still highly experimental.

Reconciliation

Reconciliation is the process by which individuals, companies and institutions must ensure all records are valid and all instructions effectively executed. Reconciliation firstly involves ensuring all the internal data of an organisation has been correctly captured and is in line with existing policies and rules. The second element involves ensuring that, where data is shared with external counterparties, both parties hold the same copy of that information. Blockchain technology promises for a large simplification of the reconciliation process as data will be shared at the point of origin.

Double Spend

Double-spending is the result of successfully spending some money or an asset more than once. Double spend attacks can mainly occur when the network has not yet processed a previous transaction from an address.

Unspent Transaction Output Set (UTxO)

One of the key elements of a Blockchain is that data is considered valid in reference to previous data. Hence, in the example of Bitcoin, the UTxO is the list of all current Bitcoin addresses which have previously received funds and have not yet been spent. Each address can be linked to all the previous transactions that resulted in the funds being routed to that address.



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To: Brian.Peretti@treasury.gov [Brian.Peretti@treasury.gov]
From: Szczepanik, Valerie
Sent: 2018-06-15T14:33:20Z
Subject: RE: Crytpo Working Group 4
Received: 2018-06-15T14:33:20Z

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Hi – here are the docs. Most are on the list (TOC) created by the CFTC. The two not on that TOC are Grant Thornton and The Valuation of Cryptoassets, but I did not want to alter the CFTC’s TOC.

From: Brian.Peretti@treasury.gov [mailto:Brian.Peretti@treasury.gov]
Sent: Wednesday, June 13, 2018 10:10 PM
To: [Szczepanik, Valerie](#); [nida.davis@frb.gov](#)
Cc: [\(b\)\(6\)](#)@treasury.gov; [\(b\)\(6\)](#)@treasury.gov
Subject: RE: Crytpo Working Group 4

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Valerie - thanks. If you can send both the list and the copies, that would be great! Thanks. Brian

From: Szczepanik, Valerie
Date: June 13, 2018 at 9:41:08 PM EDT
To: Nida Davis , Peretti, Brian
Cc: [\(b\)\(6\)](#)
Subject: RE: Crytpo Working Group 4

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CFTC has provided best practices/standards docs. Altogether we have about 15 or so docs. I can get you a list, or copies by Friday, whichever you prefer.

From: Nida Davis [mailto:nida.davis@frb.gov]
Sent: Wednesday, June 13, 2018 2:52 PM
To: [Brian.Peretti@treasury.gov](#); [Szczepanik, Valerie](#)
Cc: [\(b\)\(6\)](#) (Treasury); [\(b\)\(6\)](#)@treasury.gov
Subject: RE: Crytpo Working Group 4

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Dear Brian,
Yes, we will be able to pull that together. FDIC and SEC provided us feedback on their efforts and we are folding these in the draft. I suppose there is not much to report at least for my workstream in the way of stocktaking. Much of the work is in the early stages of analysis and research.

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Cc: (b)(6) (Treasury); (b)(6)@treasury.gov
Subject: Crypto Working Group 4

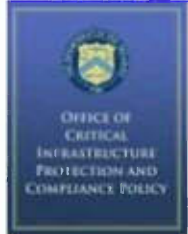
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Valerie and Nida

Next week is the meeting to the FSOC seniors group and I have been asked to present the work that we have done within the #4 Crypto workstream. Can you send me whom has submitted information for each of your stock takes and what has actually been submitted so that I can provide a summary? I don't want to call out anyone who hasn't submitted, but I think they would like to have awareness. Any chance I can get this by Friday?

Thanks!

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Whitepaper 2.0 on Distributed Ledger Technology

25 October 2017



HONG KONG MONETARY AUTHORITY
香港金融管理局

Whitepaper 2.0 on Distributed Ledger Technology

Table of Contents

1	Foreword	5
2	Executive Summary	7
3	Introduction	12
	3.1 Background and history	13
	3.2 Purpose and scope of the second Whitepaper	13
	3.3 Structure of the second Whitepaper	14
	3.4 Ways forward	14
4	Technology Update	15
	4.1 DLT platforms	16
	4.1.1 Hyperledger	16
	4.1.2 Corda	17
	4.1.3 Bitcoin	18
	4.1.4 Ethereum	20
	4.2 Unpermissioned DLT technology extension for enterprises	20
	4.2.1 Quorum	20
	4.2.2 Enterprise Ethereum Alliance	21
	4.2.3 Microsoft Enterprise DLT Framework	21
	4.3 Off-chain services technology for DLT	23
	4.3.1 Lightning Network on Bitcoin	23
	4.3.2 The Raiden Network on Ethereum	24
	4.3.3 Plasma on Ethereum	24
5	Compliance Issues	25
	5.1 Background	26
	5.2 Anti-money laundering (AML) and counter-financing of terrorism (CFT) issues	26
	5.3 Systemic risk	27
	5.4 Technology and operational risks	28
	5.5 Reporting and transparency	28
	5.6 Governance and controls, cybersecurity and legal risks	28
	5.7 Conclusion	28
6	Governance and Control	29
	6.1 Background	30
	6.2 Governance	30
	6.2.1 Governance structure	30
	6.2.2 Membership on-boarding and ongoing operation	31
	6.2.3 Technology audit	32
	6.3 Security management	32
	6.3.1 Information protection	32
	6.3.2 Data privacy from a governance point of view	33
	6.3.3 Authentication and access control (key management)	33
	6.3.4 Security administration and monitoring	34
	6.3.5 Physical security	34

6.4	System development and change management	35
6.4.1	System development	35
6.4.2	Portability and compatibility	36
6.4.3	Change management	36
6.5	Information processing	37
6.5.1	Disaster recovery and resilience	37
6.5.2	Minimum viable number of validating nodes	38
6.6	Communication networks	38
6.6.1	Security and network connectivity among nodes	38
6.7	Outsourcing	39
6.8	Other considerations	39
6.9	Conclusion	40
7	Legal Issues	41
7.1	Background	42
7.2	Legal basis	42
7.3	Data protection and privacy	42
7.4	Cross-border and localisation issues	44
7.5	Smart contracts	44
7.6	Liability	45
7.7	Competition/Anti-trust	45
7.8	Specific applications	45
7.9	Conclusion	48
8	Proof-of-Concept Work	49
8.1	Background	50
8.2	General observations and lessons learned	50
8.2.1	Trade finance	50
8.2.2	Digital identity management	52
8.2.3	Mortgage loan application	55
8.3	Conclusion	56

Chapter 1

Foreword

Many people have commented that, if 2016 was a year of proofs-of-concept (PoCs) for distributed ledger technology (DLT), then 2017 should be a year of prototypes and production. Although the deployment of DLT projects into production on a large scale is still uncommon, small-scale pilot runs putting DLT on trial are regularly reported from different corners of the world. From what we have observed in the market, the technology per se is probably not the greatest hurdle to large-scale roll-out of DLT projects. More often, it is the governance, control and legal issues associated with the technology, and the new risks that come with it, that are proving the toughest challenges for the industry to deal with. Differences in legal regimes across different jurisdictions certainly do not help, and indeed are often exacerbating the situation.

Last year, the Fintech Facilitation Office (FFO) of the Hong Kong Monetary Authority commissioned the Hong Kong Applied Science and Technology Research Institute to conduct a research project on DLT. In the first stage of the project, a whitepaper was published to outline the key features, benefits, risks and potential of this technology. Following PoC work carried out by banks and other industry players on three banking services (trade finance, digital identity management and mortgage loan applications), the whitepaper also shared the experience gained from these projects.

This year the FFO has continued to engage with the participating banks and other industry players to complete the PoC projects, while at the same time carrying out research into the governance, control, compliance and legal issues related to DLT implementation. These issues are addressed in this second whitepaper. I would like to express my gratitude to the many industry experts and professionals who have contributed thematic articles on various topics around the implementation of DLT.

This second whitepaper is unique because it has devoted substantial parts to offering practical advice. Based on the real-world experience gained from the PoC projects and the specialist knowledge of professional practitioners, it provides pragmatic suggestions and guidance on implementing DLT, especially in terms of governance controls and legal considerations. Accordingly it will, we hope, help facilitate the sound and safe implementation of DLT for financial applications.

Another fruitful result of the PoC projects has been the plan to progress the trade finance PoC into the Hong Kong Trade Finance Platform, where digitalised trade documents will help automate the trade finance process to reduce risks and increase the financing capability of the banking industry. The platform will also try out a “connectivity highway” to address the issue of interoperability with similar DLT-based trade platforms in other jurisdictions.

It is vital for Hong Kong to explore the potential of DLT and deploy the technology where it offers significant benefits, so as to maintain the city’s status as an important global financial centre. When applying DLT to financial applications, risks have to be minimised and the interests of the general public protected. Now that the value of DLT has been demonstrated and the technology is out of its infancy, I trust that this whitepaper will serve as a timely reference document for the implementation of DLT in the banking and payment industries.

Howard Lee
Senior Executive Director
 Hong Kong Monetary Authority

Chapter 2

Executive Summary

2.1 Introduction

In 2016, the Hong Kong Monetary Authority (HKMA) commissioned the Hong Kong Applied Science and Technology Research Institute (ASTRI) to conduct an in-depth and open-minded research project on the deployment of DLT. ASTRI delivered the first stage results of the project on 11 November 2016 with the publication of the *Whitepaper on Distributed Ledger Technology* (the first Whitepaper). The Whitepaper introduced the technology in detail and described three Proof-of-Concept (PoC) projects on which the HKMA had worked with ASTRI and five leading banks, namely Bank of China (Hong Kong) Limited, The Bank of East Asia Limited, Hang Seng Bank Limited, the Hongkong and Shanghai Banking Corporation Limited, and Standard Chartered Bank (Hong Kong) Limited¹, and their progress. It further reflected on a number of issues relating to governance, risk management, compliance, security and privacy, and legal matters that were identified during the PoC projects.

This second Whitepaper provides an update and overview of the development of DLT, and outlines lessons taken from the three PoC projects. It also suggests some key principles relating to issues of governance, control measures and security management for DLT, and describes common legal and compliance issues encountered when deploying DLT, along with some possible steps to address these issues.

Given the expertise required in many of these areas, the HKMA is pleased to have received professional input from Deloitte and PwC in relation to issues of governance, control measures and security management in the deployment of DLT. In addition, the HKMA has been honoured to receive professional contributions from The Law Society of Hong Kong along with academic input from law professors Dirk Zetsche, Ross Buckley and Douglas Arner dealing with the privacy and legal issues identified. Finally, ASTRI has continued to provide assistance by preparing a technology update on the latest developments in DLT since November 2016.

Given the still evolving nature of DLT, it has not been possible for this second Whitepaper to uncover and describe all the implementation issues and address them fully. Rather, its purpose is to contribute to the growing body of knowledge on DLT, and to provide a window into the workings of DLT and an understanding of how it can benefit the banking and payment industry by reference to real-life PoC projects. Furthermore, the HKMA hopes that the issues identified from the PoC projects and the expert advice received will give confidence to those considering DLT deployment for specific applications, by making them aware of common factors/issues that need to be considered and the types of experts that need to be engaged. This will in turn enable developers to anticipate in good time any new issues that may surface in their specific areas.

2.2 Distributed ledger technology

Development of a number of platforms such as Hyperledger, Corda, Bitcoin and Ethereum is continuing. Recent developments include the formal release of Hyperledger and a new version of Corda, different suggested approaches for tackling the block size limit of Bitcoin, and a proposed proof-of-stake consensus algorithm to improve the performance of Ethereum. A number of players have been active in bringing unpermissioned DLT networks into enterprise operation. This has been achieved by, for example, modifying a public DLT network such as Ethereum into the permissioned Quorum, defining additional standards (as the Enterprise Ethereum Alliance has done) to provide privacy and performance assurances, and suggesting frameworks for governing how DLT would operate so as to conform to the needs of enterprises, as in the case of Microsoft. Performance and scalability remain major limiting factors for DLT, and a number of off-chain service technologies have surfaced as a result which are enabling the DLT processing burden to be offloaded.

¹ In alphabetical order

2.3 Compliance issues

Compliance is about identifying and managing risks often related to finance, operation, technology, governance and law, and meeting supervisory and legal requirements. While the topics covered by the term ‘compliance’ are fluid and in some cases overlap, a total of seven items have been identified as baseline compliance issues in this Whitepaper. They should provide a good starting point for those engaged in DLT design and deployment, helping developers avoid the need for after-the-fact, bolt-on compliance measures that may be costly and ineffective.

2.4 Governance, control principles and cybersecurity

A common theme running throughout the three PoC projects as they tested the implementation of DLT technology has been the issue of governance. As all the PoC projects deployed permissioned DLTs, establishing a governance structure and framework has been crucial for ensuring the viability of the DLT solutions.

Three approaches — consortium, joint venture, and separate organisation — have been proposed for the possible governance structure. Their advantages and disadvantages have been compared in terms of cost, flexibility, time needed for establishment, legal certainty, market recognition and level of controls. In terms of governance frameworks and controls, lengthy deliberations have been made for the benefit of potential practitioners on the available options and on best practice with regard to membership on-boarding procedures, the drafting of end-user agreements, data privacy controls, authentication and access controls, security administration and monitoring, system development, change management, portability and compatibility, disaster recovery and resilience.

Smart contracts have been singled out as requiring additional attention due to their huge potential for automating transactions in DLT.

Discussion around cybersecurity has not only included consideration of a range of ‘traditional’ security management techniques for physical, logical and network security. In addition, a number of techniques relating to key management have been discussed at length.

2.5 Legal Considerations

Legal issues also connect all three PoC projects, and require expert input and advice.

DLT solutions often involve replacing and automating laborious paperwork, so the legal basis on which such digitisation is carried out must be sound. While the exchange of digitised documents between private parties may be underpinned by agreements, checks should be carried out to ensure that there is a valid legal basis for the digitisation of documents that are definable under the law, such as title deeds, negotiable instruments, etc.

DLT solutions often involve the storage of personal data. The three characteristics of DLT of data transparency, immutability and cross-border implementation could raise concerns over the data protection principles of ‘need-to-know’, the right of deletion/correction, and the right or otherwise of the data user or controller to store collected personal data in another jurisdiction. A simple way of addressing these concerns is to store personal data off-chain, thus allowing participants more control over how personal data is handled and protected. This arrangement is particularly appealing in more complex cases where DLT solutions are subject to the data protection laws of multiple jurisdictions.

Although DLT solutions often operate across borders and give rise to legal issues relating to contractual and jurisdictional arrangements, such issues are not new in the world of global trade and there are established ways of handling them.

Given that smart contracts remain at an early stage of development, many legal issues potentially arising from them are yet to be fully understood and addressed in the legal system. That said, one important piece of advice is that smart contracts should not be considered as a complete replacement for formal legal relationships between parties. In other words, a traditional contract or agreement is still considered to be the best way of protecting all parties.

The governance structure of DLT solutions, which determines the level of control and participation of each party, has a significant effect on each party's level of liability. Participants must therefore study the terms and conditions or contracts carefully, and ensure they understand their implications before participating.

Competition law is relatively new in Hong Kong. To avoid getting themselves into uncharted territory, participants should take care that their use of DLT does not create an artificial or technological barrier that enables or facilitates a monopoly.

Finally, the Law Society has provided detailed discussion on the use of DLT in specific areas, including physical asset management, e-Conveyancing, trade finance and digital identity management, as examples of the legal considerations connected with specific types of applications. This is available in the Annex.

2.6 Proofs-of-Concept

The three PoC projects on trade finance, digital identity management and mortgage loan applications were chosen because these processes are often unstructured, manual and paper-based. They are labour intensive and time-consuming, involve multiple parties, and are prone to error and potential fraud. The use of DLT aims to enhance process and data transparency, trust between parties, data security, the traceability of transactions, and the efficiency and level of process standardisation.

For each PoC project, prototypes of DLT solutions were constructed and tested by participating banks. The processes and results were then reviewed and discussed in order to identify the associated benefits and challenges.

The diversity of the three PoC projects allowed participants to learn from real-world experience and identify common issues surrounding the deployment of DLT applications. For example, using a modular architecture to separate the DLT ledger from the workflow application and the interfaces used by participants, together with Application Programming Interfaces (API) to link them together, was soon found to be a necessity. Such modular design allows both new and existing participants to easily join the application, connect their disparate internal systems to the ledger, and make changes without affecting others. It was also agreed that the amount of information or documentation to be stored in the DLT ledger should be kept to a minimum for reasons of performance, flexibility and privacy protection.

Other common challenges facing the PoC groups included the difficult decision of which DLT platform to choose to build the prototype or production systems on. Given the development of a range of DLT platforms and the lack of standards, PoC participants struggled with this decision since they did not know the impact that future market developments, standardisation and interoperability might have. Another common challenge was the choice of a governance structure, as each PoC project had its own characteristics and business constraints that participants had to take into account.

Finally, all three project teams shared the view that many of the challenges and discussions they faced did not arise from the DLT technology itself, but rather from the associated issues of governance, controls, operation, maintenance and administration of the DLT platforms.

2.7 Ways Forward

The HKMA engaged in the three PoC projects in order to obtain first-hand experience of DLT, with the aim of understanding its advantages and disadvantages, particularly in those areas of its application that require solid data integrity.

More specifically, the trade finance PoC project is planned to progress into the Hong Kong Trade Finance Platform, using digitalised trade documents to automate the trade finance process, reduce the risk of duplicated trade finance and increase the financing capacity of the banking industry. The design will incorporate a “connectivity highway” for cross-border data exchange with other jurisdictions using similar trade platforms.

Apart from the PoC projects, the HKMA has also commenced research on Central Bank Digital Currency (CBDC) with the aim of assessing the potential benefits, challenges and future implications of issuing CBDC. This is another example of the growing potential for the application of DLT.

In conclusion, the HKMA has always adopted a risk-based, technology-neutral approach to regulation. Its goal is for the two Whitepapers to help the industry better understand the specific potential of DLT as well as related issues surrounding its implementation. Individual organisations deploying DLT must remember that they have a responsibility to strike the right balance between innovation, customer protection and risk management.

Chapter 3

Introduction

3.1 Background and history

In 2008 blockchain technology, a specific type of Distributed Ledger Technology (DLT), was conceptualised in a paper titled “Bitcoin: A Peer-to-Peer Electronic Cash System”¹. The paper suggested how certain technologies existing at the time, such as decentralised peer-to-peer networks, asymmetric-key cryptography, hashing functions and Byzantine Fault Tolerance design, could be put together to form a blockchain. In January 2009, the first Bitcoin built on blockchain technology made its debut in “a system for electronic transactions without relying on trust”². Since then blockchain, and more generally DLT, a ‘disruptive technology’ which enables a replicated and shared ledger system to be built that renders an intermediary redundant, has attracted much interest from the financial world.

In 2015 a variant of DLT was combined with a programming language to create the Ethereum platform, which allows participants to execute self-enforcing transactions as “smart contracts”³. Since then more and more unpermissioned/public platforms (e.g. Ethereum, Factom, and Blockstream) and permissioned/private platforms (e.g. Hyperledger, Corda, Blockstack, Multichain, and Chain Inc.) have been launched to meet different needs. Growing interest in the technology has led financial institutions to announce plans to explore the possibilities of DLT beyond the field of cryptocurrencies.

Against this background, the Hong Kong Monetary Authority (HKMA) commissioned the Hong Kong Applied Science and Technology Research Institute (ASTRI) to undertake an in-depth, open-minded research analysis into the deployment of DLT, especially for financial applications. ASTRI delivered the first stage results of the project on 11 November 2016 with the publication of the *Whitepaper on Distributed Ledger Technology* (the first Whitepaper). The first Whitepaper described the technical building blocks of DLT, its modes of operation, its performance, and its disruptive properties and

interoperability. The first Whitepaper outlined the features of the various DLT platforms available at the time, and how they differed from each other. It also presented details of the three Proof-of-Concept (PoC) projects on which the HKMA was working with ASTRI and five leading banks, namely Bank of China (Hong Kong) Limited, The Bank of East Asia Limited, Hang Seng Bank Limited, the Hongkong and Shanghai Banking Corporation Limited, and Standard Chartered Bank (Hong Kong) Limited⁴, and described their progress. It further deliberated on various issues relating to governance, risk management, compliance, security and privacy, and the law which were identified during the various PoC projects — these are all issues that need to be adequately addressed if DLT is to be applied to critical financial applications.

3.2 Purpose and scope of the second Whitepaper

The HKMA is publishing this second Whitepaper as a follow-up based on its further research into DLT. The three PoC projects have been completed and various lessons taken from them. To address the governance, compliance and security issues identified, the HKMA sought professional contributions from Deloitte and PwC. In addition, the HKMA is honoured to receive contributions from The Law Society of Hong Kong and from law professors Dirk Zetzsche, Ross Buckley and Douglas Arner in relation to the privacy and legal issues identified. Finally, ASTRI has also provided assistance by preparing a technology update on the latest developments in DLT since the first Whitepaper was published.

Building on these expert contributions, this second Whitepaper aims to provide an update and overview of the development of DLT, describe the lessons taken from the three PoC projects, suggest some key principles concerning governance, controls and security management, and describe a number of legal and compliance issues encountered in the deployment of DLT along with possible steps to address these issues.

¹ Nakamoto, S. (2008). Bitcoin: A Peer-to-Peer Electronic Cash System.

² Ibid.

³ Smart contracts can be defined as automated transactions based on pre-defined events.

⁴ In alphabetical order.

Given the still evolving nature of DLT, the diverse possibilities for its application, and the evolving experience of those who are actively exploring the use and potential of DLT in their fields, it has not been possible for this second Whitepaper to pinpoint all the implementation issues and address them fully. Rather, its purpose is to provide readers with a window into the workings of DLT and to describe some of the benefits offered by DLT to the banking and payment industry, through reference to real-life PoC projects. Furthermore, the issues that have been identified in the PoC projects and discussed in the expert advice received will help those who are interested in implementing DLT but are concerned about possible pitfalls. This Whitepaper can help build confidence by clarifying the range of common factors/issues that need to be considered and the types of experts that need to be engaged. This may also help developers anticipate in good time any new issues that may surface in their specific areas of application.

3.3 Structure of the second Whitepaper

The rest of this Whitepaper provides overviews and summaries of developments in DLT, governance, compliance and legal issues arising from DLT, and insights taken from the three PoC projects.

Original expert contributions are included as separate Annexes, providing in-depth analyses of specific topics.

More specifically, Chapter 4 provides an overview of the latest developments in DLT and further expected developments in the future. Chapter 5 introduces a range of compliance issues that need to be considered when deploying DLT applications. Chapter 6 provides a more in-depth discussion on the topics of governance, control principles, and security and cybersecurity management. Chapter 7 deliberates on a range of legal issues that may arise. Finally, Chapter 8 describes the three PoC projects on trade finance, digital identity management and mortgage loan applications, and the lessons taken from them.

3.4 Ways forward

Many central banks and regulators have published papers on DLT and its application. Recognising the potential of DLT, the HKMA is contributing by engaging in PoC projects to obtain first-hand experience, and sharing details of these in the two Whitepapers. Like most technologies, DLT has its advantages and disadvantages. There are specific areas where its application may be especially beneficial, particularly those that require solid data integrity.

Five banks are moving forward with the trade finance PoC project. They are working on implementing a Hong Kong Trade Finance Platform that will use digitalised paper-based trade documents to automate the trade finance process, reduce the risk of duplicated trade finance, and increase the financing capacity of the banking industry. The design will incorporate a “connectivity highway” for cross-border data exchange with other jurisdictions using similar trade platforms.

Apart from the PoC projects, the HKMA has also commenced research to explore the potential of DLT for Central Bank Digital Currency (CBDC) with the three note-issuing banks, the Hong Kong Interbank Clearing Limited and the R3 consortium. This research aims to assess the potential benefits, challenges and implications of issuing CBDC, and represents another way forward for the potential use of DLT within the financial industry.

The HKMA has always adopted a risk-based, technology-neutral approach to regulation. This being so, we wish to point out that the issues identified in these two Whitepapers are not exhaustive, and any suggestions offered are for guidance only. Those deploying DLT applications must make their own assessments and judgements regarding compliance issues with the aim of striking the right balance between innovation, customer protection and risk management.

Chapter 4

Technology Update

Chapter 3 of the first Whitepaper gives an introduction of DLT. It is followed by Chapter 4 with in-depth details on the technology and security design. Chapter 6 of the first Whitepaper also describes the features of various DLT platforms available. As a follow-up, the HKMA has sought help from its strategic partner, ASTRI, to provide an update in this second Whitepaper on the recent developments of the technology. The remaining part of this chapter is contributed by ASTRI.

4 DLT Technology: Maturing towards production

As blockchain technology continues to gain acceptance, a growing number of individuals and businesses are using the technology for cryptocurrency transactions and smart contract applications. At the same time, various DLT Proof-of-Concept projects have been carried out to evaluate the benefits and the capabilities of DLT technologies for a wide spectrum of other applications. DLT technology developers are now setting their sights on full production. As a result, many development activities are now taking place that are focused on enhancing the technology in areas such as transaction processing performance, privacy protection, and versatility.

4.1 DLT Platforms

4.1.1 Hyperledger

Hyperledger is an open source blockchain technology hosted by The Linux Foundation. It represents a global collaboration between members of many different industries, including finance, banking, the Internet of Things, supply chain, manufacturing and technology¹.

4.1.1.1 Formal release of Hyperledger Fabric Version 1.0

Hyperledger announced the formal release of its Fabric blockchain on 11 July 2017², following several pre-releases. The announcement stated that Fabric 1.0 is a robust major release that aims at allowing consumers and vendors to use Hyperledger Fabric technology to advance to production deployment and operations.

The pre-releases and formal release included documentation improvements, testing, hardening, bug fixing and tooling³. UX (user experience) improvements were also introduced based on user feedback.

4.1.1.2 Performance and robustness enhancement of Fabric

The Fabric version 1.0 release announcement indicated that Hyperledger's developer will continue seeking to enhance performance. There are also plans to improve the robustness of Fabric by running performance, scale and chaotic testing.

Part of the performance enhancement concerns transaction ordering based on the Byzantine Fault Tolerant algorithm. Ordering of transactions in Hyperledger is determined by a distributed set of special nodes called "orderers". Together they implement an ordering service that provides a "guarantee of delivery", e.g. a guarantee of atomic broadcast. The strength of the algorithm is that it can tolerate failure or misbehaviour by some of the orderers without affecting the reliability of the ordering service operation⁴.

There are plans to explore the possibility of integrating Fabric with other Hyperledger projects such as Sawtooth. Sawtooth is an example of DLT which uses a consensus algorithm called "Proof of Elapsed Time" (PoET). Compared to the Proof-of-

¹ See "<https://www.hyperledger.org/about>"

² See "<https://www.hyperledger.org/blog/2017/07/11/hyperledger-fabric-1-0-is-released>"

³ See "<http://hyperledger-fabric.readthedocs.io/en/latest/releases.html>"

⁴ See "<http://hyperledger-fabric.readthedocs.io/en/latest/arch-deep-dive.html>"

Work (PoW) consensus, PoET operations consume a significantly lower amount of computational resources. This is achieved by secure CPU instructions in the hardware.

As Fabric is a DLT network for smart contract execution in which smart contracts, termed chaincode, are written in computer language, the versatility and security of the computer language is very important. Fabric's default smart contract language is Golang. Fabric plans to add Java and other programming languages to its list of chaincode development languages. According to the version 1.0.0-beta release notes of 8 June 2017, Java chaincode support has been disabled until a later version, when the feature has fully matured⁵. However, Java chaincode can currently be re-enabled for experimental purposes.

4.1.1.3 Blockchain technology spawned by Hyperledger

As the Hyperledger technology matures, businesses are beginning to build new technologies and services upon it. Fujitsu Laboratories Ltd has announced its development of technology that accelerates the speed of Hyperledger Fabric transaction processing by approximately 2.7 times its current speed in version 0.6.1⁶. The source of the bottleneck in Hyperledger was identified as being the communication between the application and the blockchain platform. The new technology resolves this bottleneck by introducing two features:

- **Differential Update State (DUS) Functionality**

This eliminates some of the steps involved in processing a transaction that involve unnecessary communication between the application and the blockchain platform. For example, if an application desires to decrease the value of an asset on a blockchain platform, the old way of doing this was to have the application first retrieve the asset value from the blockchain platform, then decrease the value and write it back to the blockchain platform.

With DUS, the application simply sends a differential computation instruction to the blockchain platform asking it to perform the decrement operation directly, thus reducing the number of communication exchanges and the associated computations.

- **Compound Request (CR) Functionality**

This reduces the amount of communication between the application and the blockchain platform by aggregating multiple processes into a single batch execution request, which is then sent to the blockchain platform. One example is if the application is performing an asset transfer between two accounts. Instead of sending multiple instructions to the blockchain platform (one to decrease the asset value of the paying account and another to increase the asset value of the receiving account), the application simply sends a single batch execution request to the blockchain platform asking it to perform both actions.

A press release of 31 July 2017 indicates that Fujitsu Laboratories Ltd plans to commercialise this technology in the fiscal year 2017.

4.1.2 Corda

Corda is open source blockchain technology developed by R3. In 2017, R3 has continued with its development and enhancement of Corda, a distributed ledger platform for financial and commercial transactions. A 3 May 2017 press release noted, "Financial technology innovator R3 has completed the first two of three tranches in its Series A fundraising round, securing USD 107 million in the world's largest distributed ledger technology (DLT) investment to date." ⁷ R3 is continuing to release newer versions of the Corda platform.

4.1.2.1 The design of Corda

R3's David Rutter, in a 24 February 2017 blog article, reiterated the relationship between Corda and blockchain. He writes, "Corda is a distributed ledger

⁵ See "<https://github.com/hyperledger/fabric/releases/tag/v1.0.0-beta>"

⁶ See "<http://www.fujitsu.com/global/about/resources/news/press-releases/2017/0731-01.html>"

⁷ See "<https://www.corda.net/wp-content/uploads/2017/05/R3FundingPressRelease.pdf>"

platform, not a traditional blockchain platform.”⁸ The article further clarifies, “Blockchains are specific pieces of software originally built to handle transactions of virtual currencies such as Bitcoin and Ether. Together with our bank members, we realised early on that this technology could not be applied blindly to wholesale financial markets without careful consideration: changes must be made to satisfy regulatory, privacy and scalability concerns. And that is what we have done with Corda.”

The article also clarifies, “Corda restricts access to data within an agreement to only those explicitly entitled to it, rather than the entire network. And financial agreements on Corda are intended to be enforceable, linking business logic and data to associated legal prose in order to ensure that the financial agreements on the platform are rooted firmly in law.”

4.1.2.2 The Corda platform releases

Corda announced the release of Corda Beta in June 2017^{9,10}. According to its announcement, Corda has made substantial improvements to the performance of RPC (Remote Procedure Calls). On the security side, Corda now supports the use of hardware security modules (HSMs) for key storage, and can now support transaction signing without the need to extract private signing keys from the HSM. Corda also supports multiple signature schemes, and not just EdDSA (the Edwards-curve Digital Signature Algorithm). As for Corda Milestone 13, the digital signature algorithms that are supported include ECDSA secp256K1, ECDSA secp256R1 (NIST P-256) and EdDSA ed25519.

On 3 Oct 2017, R3 announced the release of version 1.0 Corda. This marks a major milestone for the development and implementation of applications on the platform, known as CorDapps. One major achievement in this release is the stabilisation of application programming interface (API) used by CorDapps. Developers may now develop CorDapps

with the knowledge that they will be compatible with future Corda platform releases.¹¹

4.1.2.3 Corda Support

In an announcement of 29 June 2017¹², it was stated that Corda would soon launch a service named Corda Support. This would be an enterprise-grade support service for Corda implementation to support enterprises looking to deploy Corda for production, by providing professional assistance.

4.1.3 Bitcoin

The transaction volumes of Bitcoin have risen rapidly in the past few years, from a daily volume of around 100,000 transactions in 2015 to a peak of over 350,000 transactions in 2017¹³. Different strategies have been proposed to increase Bitcoin’s transaction processing capacity. The Bitcoin community, including both miners and users, are the ones that will ultimately decide on the proposal to be accepted.

4.1.3.1 Bitcoin Segregated Witness proposal

This proposal introduces a concept called Segregated Witness (SegWit), which brings with it multiple benefits. Among these are increased block size and transaction malleability protection. The current Bitcoin protocol adds transactions (comprising transaction details and transaction signer signatures) to the transaction Merkle tree to form a block. These blocks are then linked up to form the blockchain. The proposal introduces the SegWit concept and a new structure called “witness” for storing signatures and relevant scripts. These signatures and scripts are originally stored in the transaction structure in the block. They will now be separated and stored in the “witness” structure, hence the term SegWit, which stands for Segregated Witness. The witness structure is committed to a new tree. In the initial implementation, this tree will be linked to the block’s transaction Merkle tree through the block’s coinbase transaction¹⁴.

⁸ See “<http://www.r3cev.com/blog/2017/2/24/when-is-a-blockchain-not-a-blockchain>”

⁹ See “<https://www.corda.net/2017/06/announcing-corda-public-beta/>”

¹⁰ See “<https://www.corda.net/2017/06/corda-beta-released/>”

¹¹ See “<https://www.r3.com/blog/2017/10/03/r3-launches-version-1-0-of-corda-distributed-ledger-platform/>”

¹² See “<https://www.corda.net/2017/06/corda-support-available-soon/>”

¹³ See “<https://blockchain.info/charts/n-transactions?timespan=all>”

¹⁴ See “<https://github.com/bitcoin/bips/blob/master/bip-0141.mediawiki>”

Thus, the transmission of a signature becomes optional, and is not needed if a user is simply checking the existence of a transaction. This reduces overheads for lightweight wallets in terms of both processing time and storage.

The current block size limit of 1 Megabyte will be increased with Segregated Witness. The proposal introduces a parameter called Transaction Weight to set the total size of transactions permissible in a block. The total size depends on the amount of segregated witness data in the transactions inside the block. Transactions using the segregated witness feature will be accommodated with a bigger block size.

There are other benefits of this proposal, such as linear scaling of sighash operations and increased security for multisig via pay-to-script-hash (P2SH)¹⁵.

4.1.3.2 Bitcoin Unlimited

Bitcoin Unlimited makes a small change to the consensus in the Bitcoin core, so that the consensus no longer enforces a hardcoded block size limit. The maximum size of a block is freely adjustable by miners, who then engage in Emergent Consensus (EC) to set the maximum block size. Initially different miners may set their own maximum block size limit to different values (called Excessive Blocksize), and delay their acceptance of any block over that size. If a miner raises its Excessive Blocksize value, generates a block of that size and sends it to the network, it is left to all the other nodes to decide whether to accept this block based on their own Excessive Blocksize values. If the block's size does not exceed the Excessive Blocksize value setting of the receiving node, the node will accept it and will build future blocks on top of it. On the other hand, if the block size exceeds the Excessive Blocksize setting of the receiving node, the node will postpone accepting this oversized block until the block has reached a

certain block depth (called Acceptance Depth, or AD), meaning that the receiving node sees that the prevailing, or longest chain, has incorporated this block and has appended the required number of new blocks to it¹⁶.

Bitcoin Unlimited also introduces other technologies such as Extreme Thin Blocks (Xthin), Xpedited Forwarding, and Traffic Shaper.

4.1.3.3 Bitcoin Cash

Bitcoin Cash (BCC) takes another approach and provides an immediate increase of the block size limit to 8 Megabytes. Bitcoin Cash also introduces other changes such as Replay Protection and Wipeout Protection¹⁷.

Replay refers to an attack on the blockchain that could occur if a blockchain has forked into two, made up of the original blockchain and a new blockchain. The Bitcoin owner now can spend a coin twice, once in each of the two blockchains. If the owner of the cryptocurrency sends a transaction to the original blockchain to spend the coin, an attacker could capture the transaction and send it — in other words, replay it — to the new blockchain. While the attacker might not benefit from the attack, the owner no longer owns the coin in the new blockchain even though he has not spent it in that blockchain. Bitcoin Cash Replay Protection seeks to prevent this from happening.

Bitcoin Cash also introduces a new way of signing transactions as part of the replay protection technology. This involves defining a new SigHash type, and it brings the benefits of improved hardware wallet security and elimination of the quadratic hashing problem¹⁸. SigHash is a Bitcoin signature flag indicating which part of the transaction is signed by the signature¹⁹.

¹⁵ See "<https://bitcoincore.org/en/2016/01/26/segwit-benefits/>"

¹⁶ See "<https://www.bitcoinunlimited.info/faq/what-is-bu>"

¹⁷ See "<https://news.bitcoin.com/what-every-bitcoiner-should-know-about-bitcoin-cash/>"

¹⁸ See "<https://www.bitcoincash.org/>"

¹⁹ See "<https://bitcoin.org/en/glossary/signature-hash>"

4.1.4 Ethereum

There has been a similar demand for Ethereum to raise its transaction processing rate. Recent examples of ICO (Initial Coin Offering) activities on the Ethereum platform have demonstrated such a need, with investors sending a large number of transactions to Ethereum to make their investments.

4.1.4.1 Proof-of-stake

Ethereum developers are designing a Proof-of-Stake consensus algorithm called Casper²⁰. The traditional consensus of Ethereum is proof-of-work, which requires a large amount of electricity for miners to generate the blocks. Proof-of-Stake seeks to reduce electricity consumption. In the case of Ethereum, the consensus will be security-deposit based. Miners that have paid the security deposit become bonded validators and are entitled to take part in generating blocks through the consensus process.

With proof-of-stake mining, the Casper blockchain will also be able to create more blocks than the current proof-of-work mining can.

The developers are gradually revealing the migration path to Casper proof-of-stake²¹. A “Casper Version 1 Implementation Guide” document published on 7 May 2017 indicates that Ethereum will first transition from pure proof-of-work to a proof-of-work/proof-of-stake hybrid model.²² In this hybrid model, proof-of-work will still be used for generating blocks. However, every 100th block in the blockchain will be designated as a checkpoint. Proof-of-stake consensus will then be applied to finalise this checkpoint block. A finalised checkpoint block marks the point from which there is no going back to undo the previous blocks. The document also discusses methods for conflict resolution.

4.1.4.2 Other planned Ethereum enhancements

According to a recent interview with Vitalik Buterin, the co-founder of Ethereum, Ethereum wants to continue enhancing quite a number of areas, including privacy, scaling, and sharding²³.

4.2 Unpermissioned DLT technology extension for enterprises

Since some unpermissioned DLT platforms are rich in features and are relatively stable and mature, business sectors have begun to contemplate extending them to support their enterprise operations. Such extension includes introducing features and capabilities to the DLT platforms to address the specific needs of enterprise operations, such as the preservation of privacy, controls over membership, and the need for high transaction rates.

4.2.1 Quorum

Quorum is a permissioned DLT platform developed by JP Morgan. It is based on a modification of Ethereum designed to serve enterprise applications. Such applications do not simply include financial applications. Quorum brands itself as having the capability to process private transactions at high speeds, and with high throughput.

Quorum provides both the privacy and the transparency often desired. While transaction privacy is required by the financial industry, system and network transparency is also desirable for the transacting partners to ensure consistency. Quorum is also designed to be customisable to meet the differing requirements of various business applications.

These benefits are achieved as follows²⁴:

- All public and private smart contracts and the overall system state are derived from a single, shared, complete blockchain of transactions validated by every node in the network.

²⁰ See “<https://blog.ethereum.org/2015/08/01/introducing-casper-friendly-ghost/>”

²¹ See “<https://www.coindesk.com/etheriums-big-switch-the-new-roadmap-to-proof-of-stake/>”

²² See “<https://github.com/ethereum/research/wiki/Casper-Version-1-Implementation-Guide>”

²³ See “<https://bitcoinmagazine.com/articles/interview-vitalik-buterin-ethereum-scaling-issues-popularity-asia-and-icos/>”

²⁴ See “<https://github.com/jpmorganchase/quorum-docs/blob/master/Quorum%20Whitepaper%20v0.1.pdf>”

- A private smart contract state is only known to and validated by parties to the contract and approved third parties, such as regulators.
- The list of transactions is validated by all nodes, but only relevant parties have access to details of the private transactions and contracts.

Quorum emphasises its code maturity. JP Morgan has stated, “Quorum is designed to develop and evolve alongside Ethereum. Because it only minimally modifies Ethereum’s core, Quorum is able to incorporate the majority of Ethereum updates quickly and seamlessly.”²⁵

4.2.1.1 Zero-knowledge security layer

In a 22 May 2017 press release, Zerocoin Electric Coin Company, the developer of Zcash, announced that Zcash technology will be incorporated into Quorum²⁶. The technology creates a cryptographically enabled zero-knowledge security layer. It extends the ability of Quorum to protect the privacy of business transactions in a DLT platform with no central intermediaries.

The technology applies zero-knowledge cryptography and introduces a new methodology for transaction structures and validation. With the technology, transactions can be validated without revealing the details of the origins, destinations, or amounts of payments made. For example, the technology allows a party to perform computation on a set of parameters, and produces a statement of the computation results. It then passes the statement to a third party and tells it that it is true. This third party may then verify that the statement is true, without knowing the parameter details. This is generally known as zero-knowledge proof. zk-SNARKs is a well-known example of the zero-knowledge cryptography used by Zcash²⁷. Its full name is “zero-knowledge succinct non-interactive arguments of knowledge”²⁸. Among the ingredients of zk-SNARKs is homomorphic

encryption, which allows computation to be performed on encrypted data without its plain data value being known. The result, when decrypted, is identical with the result from the same computation performed on the plain data.

4.2.2 Enterprise Ethereum Alliance

The Enterprise Ethereum Alliance has recently received industry attention. It is an alliance with a broad membership, and includes Fortune 500 enterprises, start-ups, academics, and technical vendors. It aims to utilise Ethereum to build enterprise-grade software capable of handling complex software with high performance requirements. A 7 July 2017 press release²⁹ reiterates its mission thus: “EEA is a non-profit industry organisation that defines standards so applications built on an Ethereum-derived platform will run on all Ethereum platforms as well as supporting the development of enterprise tools and support.”

The Alliance also announced its support for pluggable consensus algorithms, and its first integration of the Practical Byzantine Fault Tolerant (PBFT) consensus with JP Morgan’s Quorum blockchain platform.

To enable Ethereum to support enterprise applications, the Alliance will focus on privacy and performance improvements³⁰. It indicates it will continue to commit to providing open source, free-to-use blockchain solutions.

Membership of the Enterprise Ethereum Alliance continues to grow, with members coming from various sectors. Current members include Microsoft, Cisco, Intel, Mastercard, Thomson Reuters, UBS, Monax, and Accenture.

4.2.3 Microsoft Enterprise DLT Framework

Instead of focusing on designing a new blockchain for enterprise applications, Microsoft has introduced a framework for adopting different popular permissioned/unpermissioned DLT platforms. The

²⁵ See “<https://www.jpmorgan.com/country/US/EN/Quorum>”

²⁶ See “<https://z.cash/blog/zsl-quorum.html>”

²⁷ See “<https://github.com/zcash/zips/blob/master/protocol/protocol.pdf>”

²⁸ See “<http://chriseth.github.io/notes/articles/zksnarks/zksnarks.pdf>”

²⁹ See “<https://entethalliance.org/enterprise-ethereum-alliance-announces-support-blockchain-consensus-algorithm-integration/>”

³⁰ See “<https://entethalliance.org/>”

framework provides both basic groundwork and features to enhance the security and performance of the DLT services, making them suitable for enterprise applications.

4.2.3.1 Project Bletchley

Bletchley is a cloud-based Enterprise blockchain architecture framework from Microsoft. The framework does not introduce a new blockchain protocol or stack. Instead, it is to be an “Enterprise Consortium Distributed Ledger Fabric” with the purpose of integrating blockchain platforms and related technologies to deliver enterprise-grade services³¹.

To achieve this, Bletchley adopts a modular design to enable easy integration of different technologies into the framework. Among such technologies are blockchain protocols, consensus algorithms, databases, and virtual machines.

The Bletchley framework provides a set of core services. Various blockchain stacks may then be plugged into the base of the framework, called the Base Platform Tier. Applications run at the top of the framework. The Bletchley core services sit in the middle between the applications at the top and the blockchain stacks at the bottom. Hence, the core services act as the middleware.

Bletchley core services include:

- Identity and Certificate Services
- Encryption Services
- Cryptlet Services
- Blockchain Gateway Services
- Data Services
- Management and Operation

According to the Bletchley whitepaper, the Base Platform Tier supports Smart Contract type blockchains such as Ethereum and Eris (now also known as Monax), and UTXO type blockchains such as Hyperledger.

4.2.3.2 Coco

Microsoft announced on 10 Aug 2017 its new enterprise blockchain platform called the Coco framework³². This aims to reduce the complexity of the development techniques needed for current blockchain technologies to meet the operational and security requirements of enterprises. It is designed to address the needs for high transaction speeds, distributed governance and confidentiality.

The press release lays out the key benefits as follows:

- Transaction speeds of more than 1,600 transactions per second
- Easily managed data confidentiality without sacrificing performance
- A comprehensive, industry-first distributed governance model for blockchain networks that establishes a network constitution and allows members to vote on all terms and conditions governing the consortium and the blockchain software system

Coco is designed to be compatible with any blockchain protocol and can be operated in different settings, such as on-cloud or on-premises. The initial Coco framework will include R3’s Corda, Intel’s Hyperledger Sawtooth, JP Morgan’s Quorum, and Ethereum.

The many benefits of Coco are based on the element of Trusted Execution Environments (TEEs)³³. TEE is a secure area of a processor where code is executed. Data and code within a TEE is protected, offering confidentiality and uncorrupted integrity. Examples of TEEs are Intel’s SGX and the Windows Virtual Secure Mode (VSM). TEE enables the building of a trusted network for running enterprise blockchain. TEE serves as an enclave containing the Coco core and configuration state information, the adapted blockchain core, and the replicated persistent store. The use of TEE will help improve blockchain

³¹ See “<https://github.com/Azure/azure-blockchain-projects/blob/master/bletchley/bletchley-whitepaper.md>”

³² See “<https://news.microsoft.com/2017/08/10/microsoft-announces-the-coco-framework/>”

³³ See “<https://github.com/Azure/coco-framework/blob/master/docs/Coco%20Framework%20whitepaper.pdf>”

transaction performance by reducing the consensus problem of Byzantine Fault Tolerance to crash fault tolerance. And because the code execution in TEE is trusted, a smart contract needs only be executed by a single node in the network. The trusted nature of TEE enables systems to reduce electricity consumption by not having to use computationally intensive proof-of-work consensus.

Microsoft plans to launch the Coco framework as an open source project in 2018.

4.3 Off-chain services technology for DLT

While popular DLT platforms are secured by cryptographic protection, their growing popularity and the resulting traffic are placing a strain on their performance. Examples of such DLT platforms are Bitcoin (as a cryptocurrency) and Ethereum (as an ICO vehicle). All are hard-pressed to increase their transaction processing rate. To dramatically improve their performance, one approach is to add off-chain services to these DLTs. The technology allows off-chain services to pick up a significant part of the transaction processing load on behalf of the DLT, and hence reduces the DLT processing load. Since off-chain processing can be conducted at a higher speed, the overall transaction volume also increases. Off-chain services are conducted in a secure manner, with their transaction processing results passed to the DLT for final validation and incorporation into the blockchain.

4.3.1 Lightning Network on Bitcoin

The Bitcoin network is reliable and Bitcoin has become widely used as a payment cryptocurrency. The Lightning Network is designed to extend the use of Bitcoin into new areas such as rapid and low-cost payments³⁴. In addition, it is helping the Bitcoin system to scale more efficiently as a global payment processing system.

In a Lightning Network, multiple payment transactions between trading partners may be conducted off the chain. Only the final settlement balance is recorded in the blockchain, thus reducing the DLT transaction processing burden. Another benefit is better privacy protection. Having transactions on the Lightning Network conducted between trading partners and without exposure to external parties, and having only the final transaction outcome recorded to the Bitcoin blockchain, means a higher level of transaction privacy can be achieved.

The Lightning Network is a service built on top of the Bitcoin blockchain³⁵. Through cryptographic technology, transactions may be conducted on the Lightning Network securely and quickly, not subject to the 10-minute mining period restriction of the Bitcoin network. All such transactions are nevertheless conducted in Bitcoin cryptocurrency, and the transactions are eventually combined and immutably committed to the Bitcoin blockchain.

The Lightning Network applies cryptographic technology to assure users that their off-chain processed transactions are guaranteed to be enforceable on the blockchain. The technology involves concepts such as multiple signature, Hashed Timelock Contract (HTLC)³⁶ and CheckLockTimeVerify (CLTV)³⁷. HTLC uses the cryptographic hash to enable payment across multiple parties, and even across multiple blockchains. CLTV provides the ability to restrict the creation of transactions so that they are valid only after a certain point of time. Its verification capability also enables transactions to be constructed in such a way that different actions are conditionally enabled based on the time. For example, a transaction may be constructed in such a way that it is spendable only if both Alice and Bob have signed to spend it. However, the transaction may use CLTV to specify that, after a certain period of time, only Alice's signature is required to spend it.

³⁴ See "<https://lightning.network/lightning-network-summary.pdf>"

³⁵ See "https://en.bitcoin.it/wiki/Lightning_Network"

³⁶ See "<https://lightning.network/lightning-network-paper.pdf>"

³⁷ See "<https://github.com/bitcoin/bips/blob/master/bip-0065.mediawiki>"

The Lightning Network is suitable for applications such as micropayments and instant payments, transactions which occur frequently and for which users are only willing to pay a low transaction fee. It is also suitable for machine-to-machine payments.

The Lightning Network is built using features from Bitcoin Segregated Witness. The alpha version of the Lightning Network node implementation, called Lightning Network Daemon, was announced in early 2017³⁸. Development is continuing, and several alpha release versions have been made available since then³⁹.

4.3.2 The Raiden Network on Ethereum

Like the Bitcoin Lightning Network, the Raiden Network is a layer added on top of Ethereum. It behaves as an off-chain network for Ethereum, and delivers certain desirable extra features. Transactions are conducted on it and are confirmed and finalised within a fraction of a second. While individual transactions are not stored in Ethereum, the final outcome is committed to Ethereum as the ultimate proof. Raiden aims to bring the following benefits⁴⁰:

- Scalability according to the size of participants
- Fast transaction confirmation
- Transaction confidentiality
- Interoperability with tokens that conform to Ethereum's standard token API
- Low fees

The low fees offered by Raiden make micropayment feasible. This in turn enables other applications that are transacted with micropayments. One example is video streaming, where viewing is charged by the second. Another example is IoT resource sharing, where services offered are measured in small units such as (for example) storage space sharing and CPU time sharing.

The Raiden Network enables Ethereum to scale in terms of overall transaction volume, and is currently under development.

4.3.3 Plasma on Ethereum

On 11 August 2017, a working draft of the Plasma framework was released⁴¹. It was co-authored by Vitalik Buterin and Joseph Poon, who is also a co-author of the Lightning Network whitepaper. The framework aims to enhance the scalability of smart contract execution so that potentially billions of smart contract state updates may be performed every second.

The Plasma framework defines the concept of a parent blockchain and child blockchains, with blockchains arranged in a tree hierarchy. At the root of the tree is the root blockchain. Ledger entries are added to the child blockchain. The root blockchain, e.g. Ethereum, will ultimately enforce transaction state changes for all smart contracts. There can be many child blockchains existing simultaneously, each with its own business logic and smart contract terms, e.g. micropayments and decentralised exchanges. Much of the computation for smart contract processing is done on a child blockchain, with the computation results ultimately passed to the parent blockchain for enforcement.

In the Plasma framework, blockchain computations are reframed into a set of functions called MapReduce. MapReduce computations on a child blockchain are committed to Merkle proofs, for effective verification, which are then enforced on the parent blockchain through a mechanism called fraud proof. The process continues until the enforcement reaches the root blockchain. Fraud proof ensures that all state transitions are valid. Participants creating fraudulent blocks will be penalised.

³⁸ See "<https://www.cryptocoinsnews.com/bitcoin-scaling-solution-lightning-network-releases-milestone-implementation/>"

³⁹ See "<https://github.com/lightningnetwork/lnd>"

⁴⁰ See "<http://raiden.network/>"

⁴¹ See "<http://plasma.io/plasma.pdf>"

Chapter 5

Compliance Issues

5.1 Background

“Compliance issues” is a loose term that can cover a range of concerns, including financial risk, operational risk (including technology and cybersecurity risk), governance, and legal matters. These issues may be broadly summarised into the following areas, each of which is particularly relevant to any DLT implementation:

1. Anti-money laundering and counter-financing of terrorism issues
2. Systemic risk
3. Technology and operational risks
4. Reporting and transparency
5. Governance and controls
6. Cybersecurity
7. Legal issues

This list is not exhaustive and could certainly be expanded depending on the actual purposes, circumstances and functions of any DLT application. Because the technologies and practices related to DLT are still evolving and the associated risks have not yet been adequately identified and understood, there is currently no specific regulatory guidance on DLT implementation. The issues identified in this chapter cannot therefore be considered as regulatory issues to be addressed. However, the chapter can still serve as a starting point for identifying the typical range of risks that need to be considered and addressed when designing and deploying DLT solutions. It should also be noted that there is no formal standard for categorising these items and determining their scopes, and it is quite acceptable that some scopes may overlap. Financial risks and operational risks unrelated to the use of DLT are outside the scope of this analysis, as they are specific to the types of financial applications being used.

5.2 Anti-money laundering (AML) and counter-financing of terrorism (CFT) issues

Given concerns over the misuse of the global financial system to facilitate money laundering (ML), terrorist financing (TF) and other criminal activities, legal and regulatory AML/CFT requirements have been established as part of a global framework of measures assessed against international standards. These include customer due diligence and ongoing monitoring to ensure that the identities of customers of a financial institution¹, whether individuals or legal entities, have been properly identified, verified and regularly reviewed, and that relevant records of financial transactions are maintained and can be made available to competent authorities.

Against this backdrop of tightened standards and regulatory scrutiny, the global trend of financial institutions in their AML/CFT work has been one of minimising risk. Implementing more complex emerging technologies such as DLT will require considerable innovation and internal technology capabilities on the part of financial institutions, and they will need to demonstrate the ability to truly understand and operate these technologies and mitigate any perceived ML/TF risks. While there is no specific AML/CFT regulation which precludes financial institutions from using DLT, there are nevertheless wide-ranging AML/CFT regulations requiring financial institutions to put in place proper measures, systems and controls to mitigate any ML/TF risks arising from their operations. Financial institutions may be uncertain of the suitability of unproven technologies such as DLT to meet these obligations. Also, a recent UK study² suggests that financial institutions have a clear preference for adopting proven technologies wherever possible. The risk of

¹ In Hong Kong, the CDD and record-keeping requirements are applicable to the financial institutions defined under Part 2 of Schedule 1 to the Anti-Money Laundering and Counter-Terrorist Financing (Financial Institutions) Ordinance (Cap 615).

² “New Technologies and Anti-Money Laundering Compliance”, UK Financial Conduct Authority, 31 March 2017

using unproven, non-regulator approved or endorsed technologies like unpermissioned DLT platforms may thus be considered too high, particularly given that questions regarding the anonymity of participants have not been resolved and therefore use of an unpermissioned DLT platform as a mainstream financial application could potentially expose a financial institution using the application to substantial ML/TF risks.

With respect to a permissioned DLT platform, the designs of a governance structure covering criteria for customer on-boarding and a transaction monitoring system need to take into account relevant AML/CFT legal and regulatory requirements applicable to financial institutions. Details of the relevant governance and controls for a DLT platform are set out in Chapter 6.

5.3 Systemic risk

Systemic risk is the risk of a collapse or breakdown of an entire system. This could be caused by failure of the technology, the failure of one or more major participants, a series of fraudulent or illegal activities, or a major cyber attack. It could also be the result of a major operational or network failure.

DLT is still in the early stages of development, and there are a number of competing DLT platforms offering varying features and having different characteristics. Whether the market is sufficiently large to sustain all these platforms is unknown, but there is a high likelihood that certain DLT platforms will not survive in the future. The effects of discontinuing a DLT platform on one or more participating institutions that have invested substantively in it could be serious, and need to be considered by all institutions that are currently planning to deploy DLT solutions.

Similarly, DLT standards are still evolving. Those who deploy a DLT solution without a standard having been established run the risk of having to upgrade to another compliant version of the DLT once a standard has been established. This will involve extra costs and effort associated with learning about the

differences, finding the relevant technical talent, and developing and testing a new system. In extreme cases, users may find themselves being left with a non-compliant version of the DLT platform that may cause interoperability and support issues in the longer term. These are all issues relating to DLT standards that need to be examined before any DLT solution is deployed. At the least, there needs to be awareness of the impact of standardisation on DLT solutions, and measures in place to track the drafting of standards and to ascertain the compatibility of the different DLT platforms and assess their future roadmaps.

Another source of systemic risk for DLT is its reliance on an encryption standard called PKI infrastructure. The protection could be undermined if fraudsters gain the computing powers needed to crack the keys (for example, through the use of very powerful or quantum computers, or similar techniques). If this were to happen when DLT was being widely used by the banking sector, and the encryption method could not be upgraded or was not quantum computer-proof, the level of systemic risk could be significant.

Some DLT platforms, notably unpermissioned DLT platforms, suffer from performance and scalability issues. However, this is not to say that permissioned DLTs perform better to the level suitable for the volume transactions demanded by financial systems. Those who wish to deploy DLT, whether for Proof-of-Concept projects, pilot trials or actual commercial production, need to look beyond their immediate needs and assess carefully whether their DLT solution is scalable to their target and future performance requirements.

Resilience and business continuity are two major issues associated with the stability and systemic risk of using a particular technology. Although DLT is meant to be resilient by design, many factors relating to specific implementations and peripheral support, such as the resilience level of the communication network on which it runs, may affect its overall resilience. Sections 6.5 and 6.6 in Chapter 6 on Governance and Control discuss these issues in more details.

5.4 Technology and operational risks

Given that the deployment of DLT involves outsourcing or the use of technologies such as cloud technology, the relevant HKMA regulatory guidance may need to be followed. Such regulatory guidance, in the form of Supervisory Policy Manuals (SPMs) or supervisory circulars, includes, among others, Outsourcing (SA-2), General principles for technology risk management (TM-G-1), and Business continuity planning (TM-G-2). SPMs and circulars are available on the HKMA website³, and these may be added to and updated from time to time due to technological advancements and industry developments. Those planning to deploy DLT, whether by themselves or through third party service providers, should recognise that supervisory guidance specific to DLT implementation may not necessarily be available because of the fact that DLT is still evolving.

Chapter 6 also identifies possible additional information and communications technology (ICT) controls to address potential technology risks arising from implementing DLT for financial applications. These ICT controls include security management, system development, information processing, and networks and communications.

5.5 Reporting and transparency

Reporting and transparency of financial data are important aspects of prudential regulation by overseers. In the past, it has often been the responsibility of financial institutions to prepare reports on a regular or ad hoc basis. The use of DLT opens up the possibility that regulators or auditors can directly access transactional data stored on the DLT ledger through a so-called “supervisory node” for monitoring or fraud detection and prevention, on a near real-time basis. Regulatory reporting and financial reporting (e.g. the filing of tax returns) can be made possible through the supervisory node. Those who are looking into deploying DLT should therefore consider the possibility that an independent party, such as a regulator or auditor, may request access to relevant transaction data. DLT

design and related agreements may have to take this into consideration to ensure that allowing such access is permissible.

5.6 Governance and controls, cybersecurity and legal risks

Due to their substantive nature, the topics of governance and controls (also covering technology risks, cybersecurity and resilience) are separately discussed in Chapter 6, while legal issues are deliberated upon in Chapter 7.

5.7 Conclusion

Compliance issues for financial institutions or systems cover a wide range of concerns, including financial, operational, technological, personnel and legal matters. This chapter cannot cover them all, especially since some issues are specific to particular types of financial institution or applications. However, the chapter offers a solid starting point to help those engaged in DLT design and deployment be aware of the implications from the outset, avoiding the need for after-thoughts or “bolt-on” measures which are often costly and ineffective.

³ SPMs may be found under <http://www.hkma.gov.hk/eng/key-functions/banking-stability/supervisory-policy-manual.shtml>.

Chapter 6

Governance and Control

6.1 Background

Chapter 7 of the first Whitepaper set out a number of potential governance and control issues which need to be adequately addressed prior to the implementation of DLT in financial applications. To address these issues, the HKMA has sought contributions from Deloitte Touche Tohmatsu and PricewaterhouseCoopers in relation to general governance and control principles. Details of their contributions are set out in Annexes D and E respectively. This chapter highlights some of the key principles suggested by these two firms, and adds input from the HKMA's Fintech Facilitation Office. The key general principles can be broadly categorised into the following five control areas:

- Governance
- Security Management
- System Development and Change Management
- Information Processing
- Communications Networks

As explained in Chapter 5, there is no specific regulatory guidance regarding the implementation of DLT. Reference can be made to the HKMA's Supervisory Policy Manuals on General principles for technology risk management and Business continuity planning and other relevant guidelines when applying the general principles set out in this chapter to the implementation of DLT in financial applications, bearing in mind that DLT is still evolving and not all risks associated with DLT may have been adequately identified and understood.

Given that access to financial applications is normally restricted to authorised users, and that such applications are expected to implement stringent governance structure and controls, it is likely that a permissioned DLT platform will be adopted in most cases of DLT implementation. Therefore, the discussion in this chapter only focuses on general governance and control principles for a permissioned DLT environment.

6.2 Governance

6.2.1 Governance structure

The distributed nature of DLT has the advantage of avoiding a centralised party who has absolute and full control of a platform. In an unpermissioned DLT platform, trust regarding the validity of a transaction is gained through a self-governing model that leverages DLT's built-in strong cryptography algorithm and consensus mechanism. However, in a permissioned DLT platform, appropriate legal arrangements and an effective governance structure are essential.

In general, there are many possible governance and operating models for permissioned DLT platforms. Below are several examples of feasible approaches and models:

- A consortium-like approach:- where several financial industry players join together to form an organisation with a governance committee, which manages the governance structure in order to achieve the common goals of the DLT platform;
- A joint venture approach:- where a separate autonomous entity is established by two or more financial institutions, through which the ownership, returns, and risk and governance responsibilities of the DLT platform are shared; and
- A statutory organisation approach:- where a statutory or regulatory body creates an organisation for governing and maintaining the operations of the DLT platform.

These three governance approaches and models have their own pros and cons in terms of cost, flexibility, time required for setup, legal certainty, market/industry recognition, and level of control. Institutions should consider their own circumstances before deciding on the most appropriate approach and model. A detailed analysis of these models is set out in Section 1 of Annex D.

Whichever governance approach or model is chosen, financial institutions should ensure that there is a proper definition of the Intellectual Property rights relating to the ownership of and access to the DLT applications and infrastructures. There should also be agreed dispute resolution mechanisms, covering issues such as how costs are shared and how liabilities are divided among the participants. All these should be cleared by a formal legal review. Also, the roles and responsibilities of members of the governance body should be formally agreed upon and documented. This should be done at the design and development stage, not after the launch of the DLT platform.

6.2.2 Membership on-boarding and ongoing operation

It is essential that a permissioned DLT environment has a set of commonly agreed on-boarding and operating rules to ensure that only authorised participants are allowed to access the platform, and that the platform is operated in an effective and efficient manner. A typical implementation of DLT for the financial industry would require the participants involved in any transaction to be traceable. Verifying the identities of the participants involved in any transaction usually relies on the Public Key Infrastructure (PKI) employed in the DLT environment.

On-boarding rules normally cover the following areas:

- **Due diligence:-** adequate due diligence should be performed for all new members to ensure that they meet applicable anti-money laundering requirements. The due diligence process can be performed by certain participants or by a designated party;
- **Security:-** as part of the on-boarding process, the governance body should ensure that the new member has implemented adequate cybersecurity measures and an effective internal control environment to prevent and detect any possible attacks on the DLT platform arising from its connection with the new member;

- **End-user agreement:-** prior to joining the platform, the new member should agree to and formally sign a legally binding end-user agreement making the member eligible to be connected with, obtain information from and conduct transactions on the network.

These governance and operating rules should apply to members not only for the on-boarding process, but also on an ongoing basis. The governance body should have an ongoing monitoring process and a re-certification mechanism in place to ensure that members continue to comply with these rules. Tiered membership is essential in any discussion of membership management in DLT. A typical DLT deployment usually has a clear distinction between nodes in terms of their roles and their access to privileged actions. For instance, only validating nodes can make a transaction committed, whereas common nodes are only able to propose new transactions. More restrictive rules may apply to some nodes, allowing them only to read transactions, or parts of them.

A very strong identity framework must be established to guarantee the identity of the participants involved in any given transactions. Transaction verification under a DLT environment relies heavily on PKI. This is because digital signing of transactions is an essential feature, as it provides trust in the system, guarantees non-repudiation of activities performed, ensures accountability and supports any possible claims process. Therefore, the processes related to key management for membership on-boarding and off-boarding, in terms of issuance, revocation and recovery, need to be carefully established. Although PKI can bring benefits in terms of providing encryption and generating trust, it also poses risks to a DLT system. One possible systemic risk associated with DLT is that PKI could be undermined if fraudsters are able to develop the computing ability to crack the keys.

6.2.3 Technology audit

A technology audit of a DLT platform is a challenging task, as DLT technology is still evolving and many new features continue to be developed. Also, a DLT platform usually uses smart contracts for automating certain processes, adding further complexity to the conducting of DLT platform audits.

Despite these technical challenges, the governance body should arrange for regular technology audits, such as audits of smart contracts, to ensure that proper governance and controls are in place. Smart contracts are pre-written executable programming codes/logics stored in the DLT platform. In some DLT platforms (e.g. Hyperledger), smart contracts are used to add records onto the chain. When performing a technology audit of the processes and controls associated with smart contracts, the following activities and processes should be reviewed:

- Approval of changes made to smart contracts;
- Administration of the access controls for smart contracts (e.g. who can deploy or activate a smart contract);
- Processes relating to the backup and recovery of keys, key protection and key revocation; and
- The use of oracles to verify the trustworthiness of the data sources (including external data sources), and the process or procedures for selecting these data sources.

6.3 Security management

6.3.1 Information protection

As in traditional application systems, access to read or update data on a DLT network is restricted to a 'need' basis, based on information/data classification that identifies which sets of data need to be protected. This information/data classification process, as well as the policies for approval, granting of access, and retention and destruction of information, should be properly established and documented.

In a typical permissioned DLT platform, only essential and non-sensitive data (e.g. hashes) are stored on-chain for efficiency and data privacy reasons. On-chain data, which is data copied to each node of a DLT network, is normally linked to off-chain data sources, which are large databases containing sensitive personal and transaction data that are either managed by centralised trusted parties or stored in a distributed file system. Information protection mechanisms should be in place for both on-chain and off-chain data.

Traditional information protection approaches, such as encryption and access controls, should be adopted for off-chain data so that only authorised parties can access sensitive data.

Besides these traditional controls, it is also important to keep the hashes of off-chain data in the DLT platform. The immutable nature of DLT can thus ensure that the integrity of the off-chain data is maintained. Regarding on-chain data, DLT platforms can, and most likely will, be connected to multiple external parties, making on-chain data available for participants in the DLT network. Therefore, proper data encryption should be required to ensure that access to data is restricted to authorised parties only.

6.3.2 Data privacy from a governance point of view

The shared and immutable nature of DLT allows many innovative designs and implementations of DLT for financial applications. However, it also creates potential issues relating to personal data privacy according to jurisdictional legal requirements on privacy, because personal data may be included and processed in a DLT platform. Therefore, adequate measures are required to ensure compliance with data privacy requirements.

Some DLT implementations may provide services and process information across more than one jurisdiction. It is therefore important to consult appropriately (e.g. by seeking legal advice) on whether privacy-related legal requirements have been catered for. Below is a list of some measures commonly adopted when personal data needs to be used, processed and stored on a DLT platform, but it is by no means exhaustive.

- **Privacy impact assessment:-** A privacy impact assessment is normally one of the first activities conducted to assess data privacy risks and address possible regulatory requirements when personal data is used, processed and stored on a platform. This assessment will provide further insights into the privacy issues relating to an envisioned DLT application, and will provide a useful point of reference that will help ensure compliance with privacy and data protection regulations. It is therefore desirable to conduct the assessment at an early stage of development so that relevant controls can be included at the design stage, thus minimising privacy compliance costs that may arise during the platform's operation.
- **Tokenisation¹:-** Another possible approach to anonymise the data stored on a DLT platform is tokenisation. Each participant

replaces the sensitive information it owns with a unique token and manages its own mapping between sensitive data elements and tokens.

- A Merkle tree is a common structure for safely redacting parts of the data of a transaction while ensuring the verifiability of the remaining data.

6.3.3 Authentication and access control (key management)

As discussed above, DLT leverages PKI to ensure strong security controls over transactions. User access to transactions and data, and users' ability to spend digital assets or initiate new transactions, are governed by a public and private key pair. Private keys are the direct means of authorising activities in a DLT platform. These keys are unique, and if lost, cannot be recovered in normal circumstances.

It is therefore important to ensure that security controls over private keys used for accessing the system and decrypting private data are in place. If private keys are accessed by an adversary, all wallets and assets secured by these keys will be compromised.

Against this background, stringent key management controls, including both physical and logical controls, are of the utmost importance. Robust key management is not only important for end-users (wallets in some DLT cases), but also for back-end administration. The controls could cover the following areas:

- **Hardware security module² (HSM):-** An HSM is a technology solution for safeguarding and managing digital keys. A successful DLT system needs highly reliable methods of interfacing with the strong key protection practices afforded by an HSM, especially for DLT administrators who need to maintain the public and private key pair.

¹ <https://www.enterpriseinnovation.net/article/survey-says-fsis-need-encryption-and-tokenization-limit-exposure-cloud-539611032>

² A hardware security module (HSM) is a physical computing device that safeguards and manages digital keys for strong authentication, and which provides crypto processing.

Moving the cryptographic functions from software to dedicated hardware devices can provide better protection. HSMs can be clustered for greater performance and availability, allowing encryption functions to scale without sacrificing security. By relieving servers from performing processor-intensive calculations, an HSM also increases operational efficiency. To mount a successful attack, attackers either need to have administrative privileges, access to data before encryption, or physical access to the HSM. Some DLT platforms may only support one centralised certificate authority. That said, an HSM could be the single point of failure, so a redundancy set-up for HSMs needs to be in place;

- Recovery agents:-engagement of recovery agents as trusted third-parties who keep the keying materials required to recover keys should be considered as a possible option.

6.3.4 Security administration and monitoring

A distributed ledger node within a private DLT platform is still a combination of data and software running on one or more servers, most likely within a Virtual Private Network (VPN), and hence standard controls apply to the DLT platform.

As with traditional control environments, a security administration function and a set of formal procedures should be established. Such procedures should, among others, include virus checking schedules, the zero-day exploit remediation process, maintenance schedules, capacity and backup management, incident reporting, and escalation and response procedures.

Whereas traditional databases are controlled by a centralised administrator, a permissioned DLT platform is governed by a consensus mechanism.

This in turn is administered by a central governance body, or an administrator appointed by the governance body. Either the governance body or the appointed administrator should be subject to proper control procedures and audit to detect and prevent unauthorised or fraudulent activities in a timely manner. Two suggested controls are given below.

- Staff engaged by the governance body, or the appointed administrator, should be subject to background checks; and
- Any activities involving privilege, power or special authority should be approved and monitored.

The decentralised nature of DLT platforms also calls for modifications to the current security administration model and protocols. The attack surface increases as the number of end points increases, making the risk of cyberattacks more likely. It is therefore essential that only authorised users and nodes can actually perform activities in the network. Also, the activities of external parties on the platform should be carefully controlled and monitored. Any nodes which have growing processing power or are executing a significantly high number of transactions should be carefully monitored, and concerns should be escalated to management for follow-up if necessary.

6.3.5 Physical security

The decentralised nature of DLT platforms warrants placing an additional focus on physical security, due to the presence of multiple nodes that provide a large number of physical access points. Traditional control environments and physical security measures, such as CCTV, physical barriers, physical key management and access controls should be implemented based on standard principles.

In addition, one approach for reducing unauthorised physical access is to centralise facilities, specifically by implementing a DLT platform within one or a few strictly controlled locations. This arrangement will reduce the number of physical access points to the DLT platform, but it may undermine the platform's resilience in case of power failure.

6.4 System development and change management

6.4.1 System development

A new system development element being introduced in DLT is the smart contract. In smart contracts, the programming codes/logics begin to execute when certain conditions are met, or specified dates are reached.

Smart contracts implemented on a DLT platform normally contain interfaces (e.g. for retrieving information from off-chain data sources), business rules, and data (to keep track of states of events). Interfaces, business rules and data need to be changed over the lifetime of the platform, because:

- Data that is used to keep track of states of events for triggering the contractual conditions will change once the pre-defined events occur;
- Business rules might change due to business decisions agreed upon by counterparties (for example, a counterparty may agree to a change in the settlement date in some cases); and
- The interfaces may change if there is an upgrade of the platform, say, for patching a security hole.

At some future date, data stored in one contract may need to be migrated to another contract, and the contract design should always ensure that such data migrations can occur in case the DLT platform needs to be upgraded.

Some smart contracts may also contain complex codes or logics which could easily have hidden bugs embedded within them. The Decentralised Autonomous Organisation (DAO) incident³ is a famous one in which hackers exploited a vulnerability inside a DAO smart contract to drain more than 3.6m ether (the cryptocurrency on Ethereum) from the platform. Apart from intentional attacks, poorly written smart contracts can also disrupt a DLT system.

The suggested controls set out below can help prevent similar incidents from happening:

- Just as is done in the development of traditional applications, standard libraries and interfaces that have been thoroughly tested as building blocks of new smart contracts can be reused. This can help reduce the development time required, and minimise the chance of programming errors in the smart contracts;
- Code reviews should be performed according to industry best practices;
- A robust governance process should be put in place to ensure that changes to smart contracts are valid and agreed by all participants. The governance body should establish a control process for reviewing and signing off the deployment of a smart contract before it is activated;

³ <https://www.bloomberg.com/features/2017-the-ether-thief/>

- The governance body should formulate a process that will identify and remove any malicious programmes from the network; and
- Agreed-upon standard interfaces (such as the ERC20 token standard for Ethereum) should be adopted to reduce the risk of security holes being introduced by non-standard interfaces.

Apart from controls related to smart contracts, traditional controls related to system development are still applicable, and attention should be paid to these also.

6.4.2 Portability and compatibility

The rapid evolution of DLT can lead to new versions of DLT platforms being released every few months, as there is a growing demand for new implementations and changes.

One commonly adopted industry practice to increase the portability and compatibility of application logics is to detach the application logics from the input/output code of the DLT layer. Increasing the portability of application logics on a DLT application could improve overall sustainability. This can be achieved by encapsulating the input/output codes by building abstracted application programming interfaces (APIs) to standardise the ways for reading from or writing to a DLT platform. Figure 1 illustrates how such portability can be achieved.

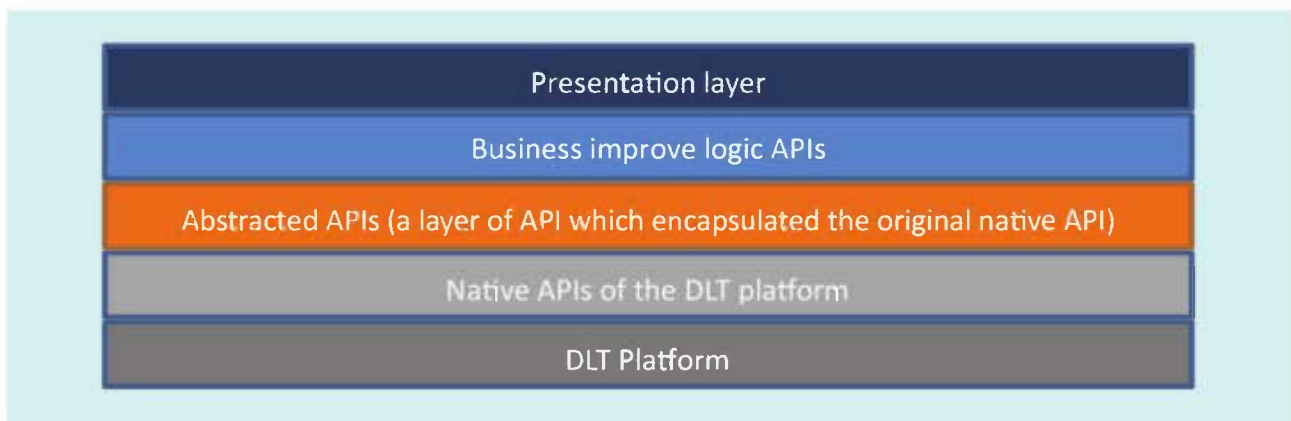


Figure 1

The effectiveness of the abstracted APIs is demonstrated by our PoC trade finance application work, set out in Annex A. In this case, the trade finance application was originally built on top of the Ethereum version parity. It was then ported to the Hyperledger Fabric version 1.0 in less than half the original development time. This was done relatively quickly and smoothly because of the abstracted API layer between the DLT platform and the business logic, as shown in Figure 1 above. Such a design gets rid of the need to rebuild the whole application from scratch. Only the abstracted API layer, which mainly contains basic function calls to the DLT platform, needs to be re-built, and this requires limited effort.

Some advanced implementations may include subscription-based models or push mechanisms. In these cases, other implementation techniques can also be considered for use together with the abstracted APIs.

6.4.3 Change management

A DLT platform normally involves a number of participants. In some DLT designs, new developments or changes can be made and deployed from any node with access or connection to the network.

New developments and system changes to current functionalities need to be properly handled to avoid possible confusion to participants and unnecessary disruption to operations. A mechanism should therefore be in place to engage and seek consensus among all the participants prior to any new functions or changes being implemented on the DLT platform. Participants should also be given enough time to accept new developments or changes within a reasonable timeframe. It is also important to ensure that only authorised users are granted permission to accept new developments or changes.

The recent Bitcoin split⁴ is a good example of such a change, and illustrates the importance of having proper change management and conflict resolution strategies to ensure that a unique outcome can be agreed upon within a reasonable time in a DLT environment.

6.5 Information processing

As the information processing and computer operation controls for centralised operating environments are also generally applicable to DLT operating environments, any DLT implementation should ensure that relevant and adequate controls are implemented for IT operations management support, performance monitoring and capacity planning, and IT facilities and equipment maintenance applicable to a centralised environment, in order to reduce the risk of operational disruptions.

One area in which DLT needs special attention due to its distributed operating environment is the design of disaster recovery and business continuity management processes. Some specific control principles which require special attention are set out below.

6.5.1 Disaster recovery and resilience

This heading can be categorised into two main topics:

- Network malfunction, resulting in a loss of connection to the DLT platform (this may be applicable to unconventional DLT designs); and
- Compromise of data integrity, which, in a normal situation, would result in the rolling back of any changes made within a specific time frame.

Losing connection to the network could impact the normal functionality of a DLT platform. This assumes a more severe outage than just the loss of a single node, as institutions would be expected to maintain multiple nodes in multiple locations to avoid any single point of failure. Besides, the mechanisms of recovering a node from data in the other nodes have to be defined clearly.

A network can be configured so that normal operation continues even if one of the peers is unavailable. To achieve this, it is important that major network functions, such as node authentication or access authorisation, are not centralised. DLT platforms usually have a high degree of resilience and this characteristic should be leveraged.

To ensure the continuity of key management services, the key management infrastructure should take the following into consideration in its design:

- The technical integrity of the key generation mechanisms (Certificate Authorities, Hardware Security Modules);
- The authorisation layer around the key generation mechanisms; and
- The redundancy requirements, such as no data loss or node authentication outage.

⁴ <http://money.cnn.com/2017/08/01/technology/business/bitcoin-cash-new-currency/index.html>

These three components should be planned carefully so as to minimise the attack surface area and to effectively increase operational security and continuity. Separately, the ability to recover data by reconnecting to the existing network nodes depends on the key management processes. Hence, it is crucial to ensure that the keys used to authorise access to the DLT platform can be recovered or recreated.

All these processes need review and involvement by internal security teams and possibly validation from external security specialists to ensure that best practices are adhered to in setup, implementation and testing. More information with respect to business continuity management and disaster recovery processes can be found in Section 6 of Annex D.

6.5.2 Minimum viable number of validating nodes

A permissioned DLT platform may not always have every node in the network acting as a validating node due to performance or governance issues. Under some consensus mechanisms, a minimum number of available validating nodes needs to be defined. In the event that the number of available validating nodes is less than the required minimum number, the DLT platform is unable to handle any new transactions. Institutions adopting a permissioned DLT platform with this kind of consensus mechanism need to take this factor into consideration when designing the architecture and recovery management processes of a network.

Different DLT platforms have different definitions of consensus. For instance, some DLT platforms only need parties to be involved in a transaction to perform the validation. In such a situation, fault tolerance and resilience are not available in the design, and resilience may need to be built in at the infrastructure level rather than relying on built-in DLT resilience design. That said, the architecture design must be tailored based on the DLT platform selected to achieve the desired resilience level.

6.6 Communication networks

6.6.1 Security and network connectivity among nodes

In a normal DLT environment, each participating node in the network is allowed to connect with all other nodes within the same network. This is how a distributed and resilient environment can be maintained. However, this may create issues for some large-scale DLT platform implementations.

In a global network, thousands of direct participants (or even more) may establish a node. If certain participating institutions host their nodes locally inside their own network, such an arrangement may result in many external participants/nodes having a direct connection to those nodes. Many of these external nodes may need to go behind the institutions' firewall(s) to make the direct connection, which could open up undesirable connections from outside the network and increase the risk of cyberattacks. There are a number of possible ways to address this issue. In particular:

- As a DLT node is similar to a database which normally contains sensitive information, it is not desirable to locate the DLT node within a De-Militarised Zone (DMZ). A possible option is to set up a gateway in the DMZ which can redirect authenticated requests to the DLT node residing in a more secure environment, subject to the availability of a gateway solution;
- Apart from putting the node on-premises, it may also be feasible to set up all the nodes of the DLT platform in a common infrastructure. This common infrastructure can provide a hybrid cloud service to all participating institutions. As a result, institutions are only required to connect to one service provider in a secure manner;

- A hybrid of the above two options:- an institution may only communicate with a limited number of nodes (say, only to local participating institution nodes), and a common gateway set up with high availability can be leveraged to connect with nodes outside the local community.

6.7 Outsourcing

The development and operation of a DLT platform may involve cooperation with third-party service providers, so the risks related to outsourcing should be considered carefully. When financial institutions assess risks related to outsourcing, they tend to focus on aspects of due diligence, such as the financial condition, technical capability, and oversight and monitoring activities of the service providers. This means they can sometimes overlook the impact that having a small number of service providers can have on risk.

The entry barriers to the service provider industry, including infrastructure requirements and technical capabilities, are relatively high. As a result, many financial institutions rely on the same provider. This increases concentration risk which, together with institutions' growing reliance on fintech services, means that technical or operational issues affecting certain fintech providers could pose systemic risks to financial institutions within and across borders, and even create risks for the entire financial system.

Financial institutions should work together with their service providers to prepare contingency/recovery plans for worst-case scenarios. Service providers could also consider segregating their infrastructures and/or services by geography, industry or financial services segment in order to mitigate systemic risks.

6.8 Other considerations

When considering the controls required for DLT implementation during the development process, certain standard controls such as those present in ISO 27001⁵, the Center for Internet Security Controls⁶ and SANS Critical Security Controls⁷ should also be taken into account. Relevant controls should be adequately implemented as part of a comprehensive cybersecurity control programme, with regular reviews and audits conducted to ensure compliance.

Since cryptographic algorithms are widely used in typical DLT implementations, it is important to have some clear control principles in place for selecting the right algorithms. In general, standardised algorithms that have been publicly scrutinised are preferable. In addition, the security of these algorithms needs to be regularly reviewed, since new vulnerabilities (in design or implementation) even of standardised algorithms are not uncommon. For instance, trapdoors have been found in the elliptic curve secp256r1, which is widely used in digital signature schemes.

Advances in technology may also impact DLT reliability. For example, emerging technologies such as quantum computing may pose a security risk to DLT. While not an immediate threat, quantum computing has the potential to threaten the security of asymmetric cryptography, an essential element of DLT.

⁵ <https://www.iso.org/isoiec-27001-information-security.html>

⁶ <https://www.cisecurity.org/controls/>

⁷ <https://www.sans.org/critical-security-controls>

6.9 Conclusion

This chapter highlights a number of key control principles governing possible financial applications using DLT. These key principles include governance, security management, information processing, and business continuity. The suggested key principles are not meant to be exhaustive, and institutions should also take into account their own implementation experience and any in-house control requirements when applying DLT to their own application development. In addition, given the rapid developments in DLT and the fact that new releases and versions of DLT are regularly introduced to address new issues, readers should not confine themselves to the suggested key principles in this chapter during DLT implementation, but also include any new control concepts and requirements as they evolve. Finally, the following two control areas require more attention, study and consideration going forward.

First, authentication and access control (key management) under security management is an area requiring very stringent controls in addition to conventional ones. This is due to the adoption of the advanced and complex technology of cryptographic algorithms, which play a critical role specifically for systems built on DLT. Without sufficient controls, a hacker will have a better chance of gaining access

to private keys, and digital assets secured by these keys could be compromised. Similarly, if sufficient controls are not in place, digital assets may become permanently irrecoverable in the event of the loss of a participant's private key. Therefore, controls such as the use of HSMs, multiple signatures and key revocation and recovery agents are essential. Further study is recommended to identify additional controls for ensuring the safety and soundness of DLT platforms.

Second, smart contracts represent another complex area requiring further study. The new protocol of the consensus mechanism is also creating brand new challenges, as there are not many precedent use cases that can be referred to. The DAO incident previously mentioned is a good reminder of the disastrous consequences of a lack of sufficient code review.

Undeniably, while advanced technology can bring many benefits to an industry, it can also create new challenges. We would like once again to stress that this chapter only provides key control principles that are relevant to the implementation of DLT solutions, and is by no means exhaustive. It is imperative to have a strong governance model under which all stakeholders can regularly review and stay abreast of the latest developments in the technology.

Chapter 7

Legal Issues

7.1 Background

Chapter 10 of the first Whitepaper identified a number of potential legal issues arising from the use of DLT. This chapter provides a more in-depth discussion of those issues. They may be broadly divided into the following areas:

1. Legal basis
2. Data protection and privacy
3. Cross-border and localisation issues
4. Smart contracts
5. Liability
6. Competition/Anti-trust laws
7. Legal issues in specific applications

The HKMA is honoured to have received professional contributions from The Law Society of Hong Kong and academic input from law professors Dirk Zetzsche, Ross Buckley and Douglas Arner in response to these potential legal issues. Details of these contributions are set out in Annexes F and G respectively. This chapter summarises these contributions and suggests some ways of addressing the issues. However, this chapter and the detailed analyses in Annexes F and G only provide some preliminary observations and suggest some general principles relating to the potential legal issues, and should not be considered as legal advice. Additionally, DLT continues to evolve rapidly and new technological concepts and models are constantly being built or derived from DLT. Anyone considering adopting a specific application of DLT should seek legal advice to ensure that all possible legal issues are adequately addressed.

This chapter focuses only on the use of permissioned DLT platforms for financial services. Although the following discussion concentrates on the Hong

Kong context, it also takes into account the legal requirements of some overseas jurisdictions due to the growing adoption of DLT for some cross-border initiatives. Many of these general principles are also applicable to other jurisdictions.

7.2 Legal basis

DLT is good at replacing processes that are labour intensive or involve a lot of paperwork, as it helps to manage and track the movements and execution of digitised documents. Generally the validity and enforceability of digitised documents depend on mutual agreement between participating parties, so such uses should be adequately addressed in the contracts or terms and conditions of any DLT solutions. Furthermore, if a DLT solution wishes to use digital signatures to authenticate legal documents, checks should be carried out to ascertain whether digital signatures are recognised under local legislation. For example, the Hong Kong Electronic Transactions Ordinance (ETO) gives the same rights to digital signatures as to handwritten ones for legal documents for government use, and allows private parties to agree on the same. However, checks should also be done on any exclusions, such as the exclusion under the ETO of the use of digital signatures for any assignment, mortgage or legal charge within the meaning of the Conveyancing and Property Ordinance.

More detailed discussion on the legal basis of deploying DLT may be found in Sections 11, 12, 13 and 15 of Annex F.

7.3 Data protection and privacy

In some cases, personal data will be stored in the ledger. In Hong Kong, the handling of personal data is regulated under the Personal Data (Privacy) Ordinance (PDPO), so the six data protection principles (DPP) under the PDPO, including the definition of personal data¹, apply. However, as the PDPO is based on the privacy principles of

¹ The first part of this leaflet gives a basic introduction: https://www.pcpd.org.hk/english/resources_centre/publications/files/PCPDbooklet_about_the_PCPD_201509.pdf

the Organisation for Economic Co-operation and Development (OECD), the following analysis also applies to jurisdictions that have data protection laws based on the OECD privacy principles.

Of the six DPPs, DPPs 1 and 3 state that personal data is to be collected and used for a direct purpose of the data user, while DPP 2 provides that personal data is to be kept accurately, and no longer than necessary.

The three key characteristics of DLT that need addressing under the PDPO are, first, the accessibility of some DLT platforms, in which all nodes have equal access to all stored personal data regardless of whether they need to see it; second, the immutability of stored data, whereby data cannot be amended or erased; and third, the often cross-border nature of DLT, meaning that personal data may be stored outside Hong Kong.

If personal data can be accessed by all nodes of a DLT platform, DPPs 1 and 3 may be contravened unless there is some justification for all nodes to have such access. It is worth noting, however, that some versions of DLT can be configured so that not all stored data is replicated to all other nodes. Even so, such a version of DLT faces the second challenge of immutability.

To address the DPP 2 requirement for accurate data, it may be acceptable to maintain the accuracy of data by superseding older data with newer data, and having a system in place to ensure that only the most up-to-date data is used. However, such an arrangement still does not resolve the issue of the retention requirement under DPP 2. Even though the PDPO does not give individuals the right-to-be-forgotten or the right-to-erasure, it does require that any personal data that is no longer needed by a data user should be deleted.

One development noted is a DLT design that allows the redaction of stored data. Inevitably such a design weakens the very foundation of DLT — its ability to

guarantee the integrity of non-repudiated data — so its use may raise more questions than it answers. Organisations considering such a kind of redactable DLT deployment will need to weigh up the benefits carefully.

Against this background, the simplest way to address privacy concerns would seem to be to avoid storing personal data in the ledger, but rather only keep the hashes of personal data in it. Storing personal data off the ledger in more conventional databases while keeping hashes in the ledger could continue to ensure data integrity while controlling and limiting access to personal data.

To address the immutability issue, it has been suggested that when encrypted personal data in a ledger is no longer needed, the corresponding encryption key could simply be discarded. This notion is fraught with problems, as such an arrangement would require almost every piece of personal data to have its own encryption key. It is also uncertain whether discarded keys could be regenerated or kept beyond their expiry. Furthermore, the increasing power and speed of computers makes it possible that encrypted data may be able to be decrypted in the future.

As a final word on the topic of the collection of personal data, data users should observe the PDPO regardless of whether data is to be stored using DLT or not. The Office of the Privacy Commissioner for Personal Data has published many useful guidance notes for data users on compliance matters. Among them is the Guidance on Preparing Personal Information Collection Statement and Privacy Policy Statement², which may be useful in helping data users explain to data subjects how they intend to process the personal data that they collect.

More detailed discussion on data protection issues in deploying DLT may be found in Sections 1, 3, 4, 5 and 6 of Annex F.

² See https://www.pcpd.org.hk/english/resources_centre/publications/files/GN_picspss_e.pdf

7.4 Cross-border and localisation issues

The requirement under Section 33 of the PDPO that prohibits the transfer of personal data outside of Hong Kong unless certain conditions are met is not currently in force. If and when this becomes effective, the storage of personal data using DLT will have to be supported by conditions such as the consent of data subjects, the location of the storage being endorsed by the Privacy Commissioner, an assessment that the location of the storage operates under a substantially similar law as the PDPO, or other conditions as listed under Section 33 of the PDPO.

Other jurisdictions may have localisation regulations or legislation in place by which certain data stored in DLT, whether or not it is personal data, must remain in the jurisdiction or have a copy stored in the jurisdiction. In such cases, the purpose is often to ensure that law enforcement authorities of that jurisdiction can access the data. In a DLT platform, if the ledger is replicated to all nodes, then personal data belonging to one jurisdiction may be stored in another jurisdiction and therefore become subject to access by law enforcement authorities of that jurisdiction. Such an arrangement may be in conflict with the data protection regime of the first jurisdiction, and needs to be addressed.

These scenarios further reinforce the benefits of not storing personal data in the ledger, but only storing its hashes there for the purpose of integrity checks.

Other than these considerations relating to personal data, the cross-border nature of DLT also requires participants to consider their legal footing in terms of applicable law (i.e. which jurisdiction's law applies to the arrangement), applicable jurisdiction (i.e. which jurisdiction's courts resolve any legal dispute), and dispute resolution (i.e. whether arbitration is acceptable as an alternative to adjudication). There are no right or wrong answers to such questions, but it is vital that participants take the time to consider these arrangements and seek appropriate legal advice on common grounds that are acceptable to all.

This suggests that at least a set of formal terms and conditions, if not a legal contract, should be drawn up to protect the interests of all participants.

More detailed discussion on the cross-border legality of deploying DLT may be found in Sections 2, 8 and 10 of Annex F.

7.5 Smart contracts

A smart contract may be considered as an arrangement whereby autonomous software running on a DLT platform automatically exchanges assets that are stored or represented on the DLT platform (e.g. the delivery vs payment arrangement). The autonomous nature of the software removes intermediaries and therefore reduces risk, while also saving time and money.

Whether a smart contract can be considered as a legal contract is still an open debate. However, the notion that smart contracts can be used to completely replace legal contracts or govern the relationships between participants in a DLT platform is misguided. Using a smart contract without explicit contractual terms could cause uncertainty for participants in the event of unforeseen consequences or disputes.

The Decentralised Autonomous Organisation hack³ was a wake-up call and a reminder that programming/modelling errors and complex contract interdependencies can give rise to the risk of smart contracts failing to reflect the intention of the creator. Steps must therefore be taken to ensure that, if an undesirable consequence should occur, there is already a pre-agreed governance structure and contractual framework in place to handle the situation. Furthermore, the smart contract should contain an "escape hatch" enabling contracts to be modified or undone in the light of unforeseen eventualities.

The liability issue of smart contracts is covered in the next section.

³ See one explanation at <http://www.kwm.com/en/knowledge/insights/smart-contracts-open-source-model-dna-digital-analogue-human-20160630>

More detailed discussion on the legal issues relating to smart contracts may be found in Sections 16, 17 and 18 of Annex F.

7.6 Liability

The issue of liability associated with participation in a DLT platform, including the use of smart contracts, is a complex one.

First of all, liability arising from harm or losses caused by a failure in the use of DLT (such as data breaches, hacking and non-delivery of assets) can be dealt with or be governed by the terms and conditions of contracts. In cases where there is no contractual relationship, liability is covered by the duty of care or tort, as in the case of negligence. As such, it is important that participants in a DLT platform fully understand the legal obligations that contractual terms and conditions impose on them. At the same time it is worth noting that the enactment of the Contracts (Rights of Third Parties) Ordinance in Hong Kong means that rights to third parties may be conferred, so any contractual terms will need to be carefully drafted to avoid unintended liability.

More detailed discussion on the direct liability associated with DLT may be found in Sections 7 and 9 of Annex F.

Furthermore, the notion that no one is in control and therefore no one can be held legally liable in an autonomous or disintermediated system such as a DLT platform or smart contract is unwarranted. It has been long established that owners of machines are responsible for the actions of the machine, so ownership or control over a DLT ledger can be a determining factor in the degree of liability vested to participants. Given the participative and decentralised nature of DLT, whereby control or even ownership of the ledger is shared, joint liability could be a likely outcome. As such, a party to the ledger, regardless of whether that party designs it, operates it, takes on administrative roles such as validator/ notary, or uses it in the simplest sense, may well share some liability. Therefore, before deciding to

take part in a distributed ledger as a joint venture or multiparty contract, legal advice should be sought to understand liability. Participants should also consider factoring in an appropriate amount of risk capital or taking out insurance coverage.

More detailed discussion on the liability implications of DLT may be found in Annex G.

7.7 Competition/Anti-trust

DLT may pose a risk to fair competition if it functions as an artificial or technological barrier that enables or facilitates monopolies, for example by making it difficult for new members to join a ledger or to interoperate with an existing ledger and thus driving some firms out of the market. In such cases additional liability may arise from the relevant-competition/anti-trust law.

Given that competition law is relatively new in Hong Kong, the anti-competition aspect of deploying DLT may need to be carefully studied.

More detailed discussion on the competition law-related aspect of DLT may be found in Section III. D. 4 of Annex G.

7.8 Specific applications

Physical asset management

One of the most appealing uses of DLT is to tokenise physical assets so that smart contracts can be deployed to manage asset transactions. All parties in such arrangements are normally subject to private agreements and terms and conditions of use. The custodian naturally has a great responsibility to ensure that the physical asset is only released to the rightful owner, and therefore should develop sufficient proactive and reactive measures to facilitate a safe redemption process. Furthermore, all the legal issues highlighted in the earlier part of this chapter regarding liability and smart contracts also apply here.

More detailed discussion on the legal issues surrounding the use of DLT for tokenised physical assets may be found in Section 14 of Annex F.

Mortgages/e-Conveyancing

Procedures for the conveyancing of land are highly formalised and operate according to various statutory requirements. They often hinge on the key requirement that land transactions must be made in writing to be valid. In this respect, there is some uncertainty about whether Hong Kong law recognises computer-generated contracts as “writing”. Furthermore, the ETO was explicitly drafted to exclude electronic records as examples of “writing” and electronic signatures as “signing” for contracts for the sale of land and deeds for the deposition of land. It is therefore clear that, unless there is a change in government policy and legislation, electronic conveyancing is not a possibility in Hong Kong at the moment.

More detailed discussion on the issues that need to be addressed for electronic conveyancing to take place may be found in Section 19 of Annex F.

Trade finance

The use of DLT for trade finance can increase transparency of information along the trade chain, but such transparency of information belonging to multiple parties may need legal support. Furthermore, the legality of digitising many types of trade finance-related documents may also need to be studied.

More detailed discussion on the legal basis of digitising the workflow of trade finance may be found in Sections 20 and 21 of Annex F.

Digital ID Management

Using DLT for digital identity management inevitably touches upon the issue of privacy protection, and the PDPO should be studied carefully to ensure compliance. Furthermore, if the digital identity

Legal

Legal Basis

Validity and enforceability

Data Protection and Privacy

Accessibility, immutability and cross-border consideration

Cross-border and localisation

Cross-border data flow, legal enforceability and localisation law

Smart Contract

Legal basis and effects of smart contract

Liability

Governance model and liability of participants

Competition/Anti-trust

Fair competition and anti-trust practice

Specific DLT Applications

Legal considerations on asset management, trade finance and digital ID management

Permissioned DLT Application

Compliance

AML and CFT

AML and CFT requirements

Systemic Risk

Roadmaps of products and standards, performance, scalability and resilience

Technology and Operational Risks

HKMA regulatory guidance on technology and operational risks

Reporting and Transparency

Impacts and considerations on "supervisory node" access

Governance and controls, cybersecurity and legal risks

Governance and Control

Governance

Governance structure, membership operations and technology audit

Security Management

Information protection, data privacy, authentication and security

System Development and Change Management

Smart contracts, portability, compatibility and change management

Information Processing

Disaster recovery and resilience, and validation nodes

Communication Network

Security and network connectivity among nodes

Outsourcing

Due diligence, concentration risk and contingency

management application involves the collection of Hong Kong Identity Card images or numbers, the Code of Practice on the Identity Card Number and Other Personal Identifiers issued by the Privacy Commission for Personal Data should be consulted.

More detailed discussion on the privacy issues related to identity management may be found in Sections 22 and 23 of Annex F.

7.9 Conclusion

A number of legal issues, including legal basis, data protection, cross-border and localisation issues, smart contracts, liability, competition/anti-trust laws and legal issues in specific applications, have been discussed in this chapter.

The issue of legal basis is a fundamental one that needs to be addressed quite early in any project planning. While legal solutions are readily available, detailed analysis of specific DLT applications does need to be carried out in order to identify all possible legal basis challenges. As for the issue of data protection, there is no doubt that this poses one of the more challenging legal problems due to the impact of new technology and its escalating capabilities. One point worth noting in terms of future planning is that the EU's General Data Protection Regulation (GDPR), due to come into force on 25 May 2018, is expected to bring regulations into line with recent technological developments. However, its clarity, effectiveness and impact on the use of DLT for storing information related to individuals have yet to be tested. In the meantime, many data protection laws are being examined to see if they come up to the same standards as the GDPR. Those looking to implement DLT with personal data should therefore consider ensuring that their design is GDPR-ready.

Issues related to smart contracts, liability, and competition are also complicated because these issues are relatively new to the technology or to Hong Kong. As more DLT Proofs-of-Concept and DLT applications are examined and studied, the industry as a whole should accumulate more practical knowledge about these issues, and develop ways of handling them.

This chapter is not meant to provide an exhaustive list of legal issues and solutions. Rather, it offers a general appraisal of the types of legal issues that may be encountered when deploying DLT, so that users may be sensitive to them and seek legal advice at the appropriate time. More specific DLT applications will no doubt give rise to domain-based legal issues that will need to be dealt with in the future. Engagement with the legal profession is therefore encouraged as early as possible in any DLT-related project, so that its design takes all possible legal implications into consideration.

Chapter 8

Proof-of-Concept Work

8.1 Background

In the first phase of this research project on Distributed Ledger Technology, three use cases were selected for Proof-of-Concept (PoC) work: trade finance, digital identity management, and mortgage loan applications. All three areas share the fact that their underlying business processes involve multiple parties, are usually non-standardised, and are manually intensive, paper-based, and error-prone.

This chapter provides a summary of developments in the three PoC cases. It discusses the design decisions made, the benefits discovered and challenges encountered, and finishes with discussion of some considerations arising from the research. We would like to thank Deloitte, ASTRI and all the participating parties from the working groups for providing the technical assistance and business analysis to enable the development of prototypes within a short period of time. Detailed reports on each case are set out in Annexes A (trade finance), B (digital identity management), and C (mortgage applications) for readers looking for a more in-depth understanding.

8.2 General observations and lessons learned

8.2.1 Trade finance

The Prototype

The trade finance DLT use case covered trade finance arrangements on open account terms. The goal was to leverage the data distribution nature of DLT to achieve the following goals:

- To share the status of each transaction throughout the process with all trade participants in the ecosystem in order to prove the authenticity of all trade documents (e.g. POs, bills of lading and invoices);

- To create alerts on duplicated financing to reduce fraud loss;
- To automate selected manual processes with smart contracts and reduce the human effort required for invoice reconciliations; and
- To protect customer privacy and sensitive business information from other players in the network, and allow only authorised access to privileged data.

While the entire trade finance DLT prototype was hosted on cloud infrastructure, it was built in two layers, the data layer and the business application layer. The underlying data layer, which distributes data across the platform and facilitates consensus, adopts an open source DLT network such as Ethereum or Hyperledger. These networks have their own Application Programming Interface ('API') for system integration. On top of the data layer is the user interface and business application layer. However, large banks and corporates can integrate their own trade finance and trade systems with the underlying data layer without needing to use this application layer. Figure 1 in Annex A provides a detailed explanation.

Smart contracts have been used in a number of areas. One is to store the status of a transaction with a stated data structure so that enquiries can be made quickly. Another is to distribute event-triggered logic among nodes so that finance can be provided to customers more promptly based on "triggering events" built into the smart contract. Also, reconciliations between POs and invoices are automated in the DLT network using smart contracts.

Benefits and challenges

The benefits identified from the PoC work are summarised in the table below:

Benefit	Description
Transparency and Fraud-resistance	Increases transparency and lowers risk of fraud, helping to create trust among transaction parties
Error-resistance	Increases automation to lower error-proneness
Data access	Provides faster access to the data stored on the network
Efficiency and Cost-reduction	Delivers higher efficiency and lowers costs due to standardisation and digitisation of documents, and elimination of intermediaries and a central authority
Regulatory oversight	Offers real-time oversight and an immutable document trail

The challenges identified are set out in the table below:

Challenge	Description
Governance model	Requires a governance mechanism to be established
Data security	Requires cyber resilience of the platform and network recovery to protect distributed data
Industry Standards	Industry standards in areas such as data structure not fully established, though these are necessary for cross-border collaboration
Interoperability	Requires alignment and mechanism to enable the communication and interoperability between different DLT systems, between DLT systems and existing systems

Considerations

The next step is to move the PoC work on to the commercial pilot stage. Technology appears not to be the major obstacle, but issues regarding the governance structure, system integration, data storage and standards, and legal and compliance matters all need to be addressed before the project can move into production.

Governance Structure

Given that trade finance platforms normally involve financial transactions and sensitive banking data, a permissioned DLT platform is recommended. A governance mechanism and structure governing on-boarding, daily operations and monitoring, and

dispute resolution is necessary to ensure that proper controls and security measures are in place. Three governance structure options were considered: (i) a "Working Group"; (ii) a "Private Sector Entity"; and (iii) a "Hybrid Entity".

A "Working Group" would allow decisions to be made through information sharing as an association, but not as a legal entity by definition. Each participant would own and operate its own node, and contribute resources to drive common objectives forward. A separate, autonomous "Private Sector Entity" would own and develop the platform with the founding participants as core stakeholders. The platform would be offered as a utility to other participants who would operate their individual

nodes. The third option, a “Hybrid Entity”, is one where a public sector player would take on the governance role while private sector participants would sponsor the development and operation of the platform. The detailed implications of these governance structures are discussed in Section 6.2.1.

Data storage and standards

There has been some debate on what data should be kept “on-chain” and “off-chain”. Storing all information on-chain would certainly maximise the value of the DLT network. However, it would also increase the risk of having a negative impact on network performance and difficulties in reaching consensus over a common data standard among participants. In general, data containing personal information is better stored off-chain. Further discussion on this subject can be found in Section 6.3.1 (Information protection) and Section 7.3 (Data protection and privacy).

Another debate centres around whether the stored data should be accessible by all participants or only by selected participants. As smart contracts are also distributed across the network, the intellectual property ownership of the smart contract software brings further discussion of the topic. The immutability of the ledger also gives rise to issues relating to data retention and housekeeping requirements.

Legal and compliance issues

Although Hong Kong has a legal framework that supports the application of DLT, disputes arising from cross-border transactions may involve international trade laws. A legal framework should therefore be established, preferably by a legal and regulatory committee that is able to represent Hong Kong in negotiations with other jurisdictions.

8.2.2 Digital identity management

The Prototype

The second use case explores the feasibility of using DLT for digital identity management. Financial

institutions are required to carry out the Know-Your-Customer (KYC) process as part of their customer onboarding process, before they conduct business with a new customer. Customers are normally required to present their identification documents and have a face-to-face interview as part of this identification and verification process. There is thus an incentive for financial institutions to find a cost-effective and user-friendly solution for carrying out the KYC process. Digital identity management has been identified as a possible way of streamlining the KYC process, allowing multiple institutions to rely on the same source of digitised customer information.

In the first phase of this research project, a working group was formed to identify major issues and possible solutions and to ascertain whether or not DLT could provide an appropriate solution. In this second phase, the working group has formulated the following features and overall structure for the PoC prototype:

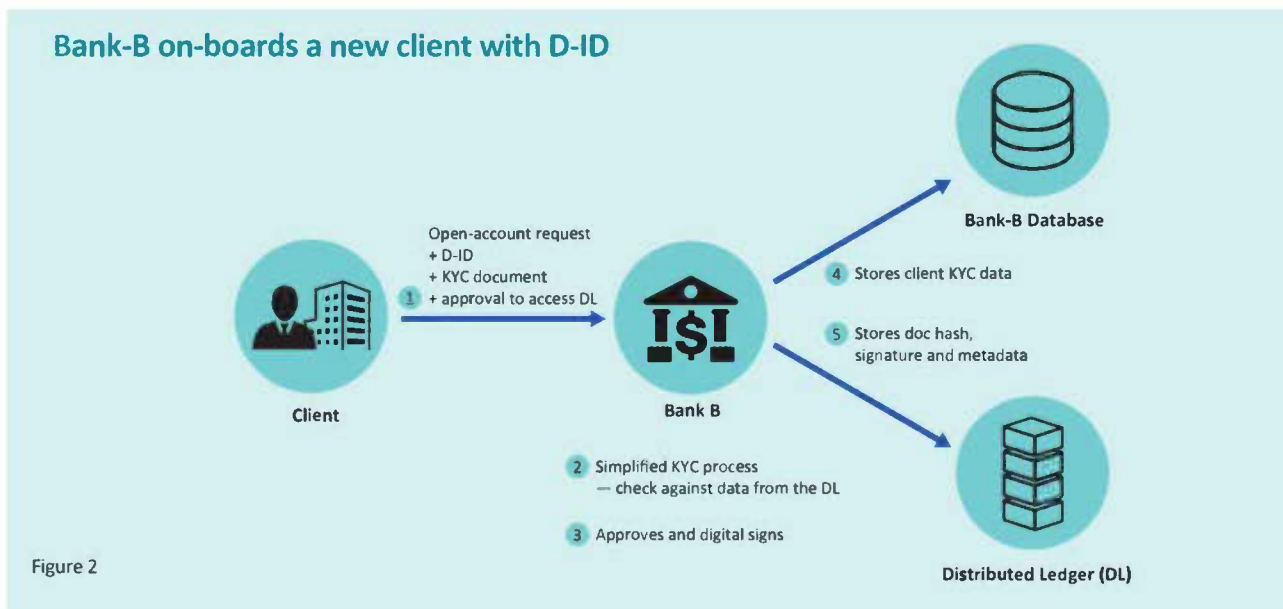
- selective customer information is stored as data on the DLT platform, which is immutable and auditable;
- the data stored on the DLT platform is verifiable through a consensus process;
- the data is simultaneously synchronised and maintained in multiple locations to provide data redundancy; and
- user privacy is protected transparently through a customer-controlled interface relating to banks’ access to customer data.

In the prototype, if a customer does not possess a digital identity, one will be created for the customer. A relationship is then established between the customer and the participating bank (Figure 1). The bank will verify all the customer’s important identity information, including digital documents, on top of the regular on-boarding KYC process, and store the hashes of the data and related metadata in the DLT platform, accessible by all other participating banks.



If the customer later establishes a relationship with another participating bank, that bank may utilise data stored in the DLT platform by comparing the hashes

stored in the documents submitted by the customer for authentication (Figure 2).



An API enables the customer to check and update the stored data via a mobile application, and control the banks' access to the customer's data. Furthermore,

the customer can apply for products or services provided by any of the participating banks (e.g. credit cards, account opening) through the mobile application.

Benefits and challenges

The benefits identified from the PoC work are summarised in the table below:

Benefit	Description
Sharing of previous KYC work by other banks	The work of verifying customer identity is shared among banks, thus cutting down on repetition and reducing overall costs
Improved Customer Experience	End-customers can control banks' access to their personal identification information, and apply for new products and services at any participating bank

The challenges identified are set out in the table below:

Challenge	Description
Legal and Regulatory Requirements	More work needs to be done to ensure customer privacy is protected, and relevant arrangements satisfactorily comply with legal requirements
Cyber security	The DLT platform must ensure that malicious validating nodes can be identified and excluded, and that cyberattacks will not result in network damage and data loss

Considerations

Sector-wide Platform vs Global Internal Platform

There are two configuration options for a DLT-based digital identity management system. The first one allows multiple banks to form a consortium with a high degree of collaboration among parties, or to jointly subscribe to the same digital identity service provider. The second one allows a global bank to use the platform across different jurisdictions and lines of business to consolidate its KYC work across them.

Given that multiple banks are involved in the working group, it was decided that the first option should form the basis of this prototype.

Data Stored

Discussion took place over what data should be stored on the DLT platform. To minimise the effort required to integrate this DLT platform with banks' internal KYC systems, the working group decided that the DLT platform should only store the hashes of the digital documents submitted by the customer, rather than the digital documents themselves. The original documents submitted by the customer should continue to be stored in banks' private databases, but additional supporting information can be obtained from the DLT platform to facilitate the banks' KYC work.

Choice of DLT network

As with the trade finance PoC work, the choice of DLT network was also an important decision requiring careful assessment. Whether the system is interoperable in a way that supports joint operations by multiple banks is something that will greatly affect whether or not banks will decide to join the platform. It will also affect the subsequent success of the platform, which will depend on how much of the banks' KYC work can be readily "shared" on the platform.

8.2.3 Mortgage loan application

The Prototype

As discussed in Chapter 11 of the first Whitepaper, the current mortgage loan application process is time-consuming, laborious, manually intensive and paper-based. This makes it an ideal area for which to explore the potential of applying DLT.

In the first stage of the research project, the working group for mortgage loan applications had arrived at the final stage of building the prototype for

property valuation in the mortgage loan application process. In this second stage, the prototype has been completed. One of the banks participating in the working group further launched its commercialisation project to turn the PoC prototype into a fully functional commercial platform. Up to mid-October 2017, more than 15,000 property valuation cases had taken place on the commercial platform. The following sections discuss lessons taken from both the prototype and the commercial service.

The working group developed a property valuation platform with two layers of ledgers. The lower layer allows an individual bank to exchange data with its corresponding set of surveyors only, and the upper interbank ledger enables banks to share information among themselves.

The two layers are logically separated rather than physically segregated. This means that a surveyor can make use of the same node to provide valuation reports to different banks, saving the resources needed for setting up and maintaining multiple nodes.

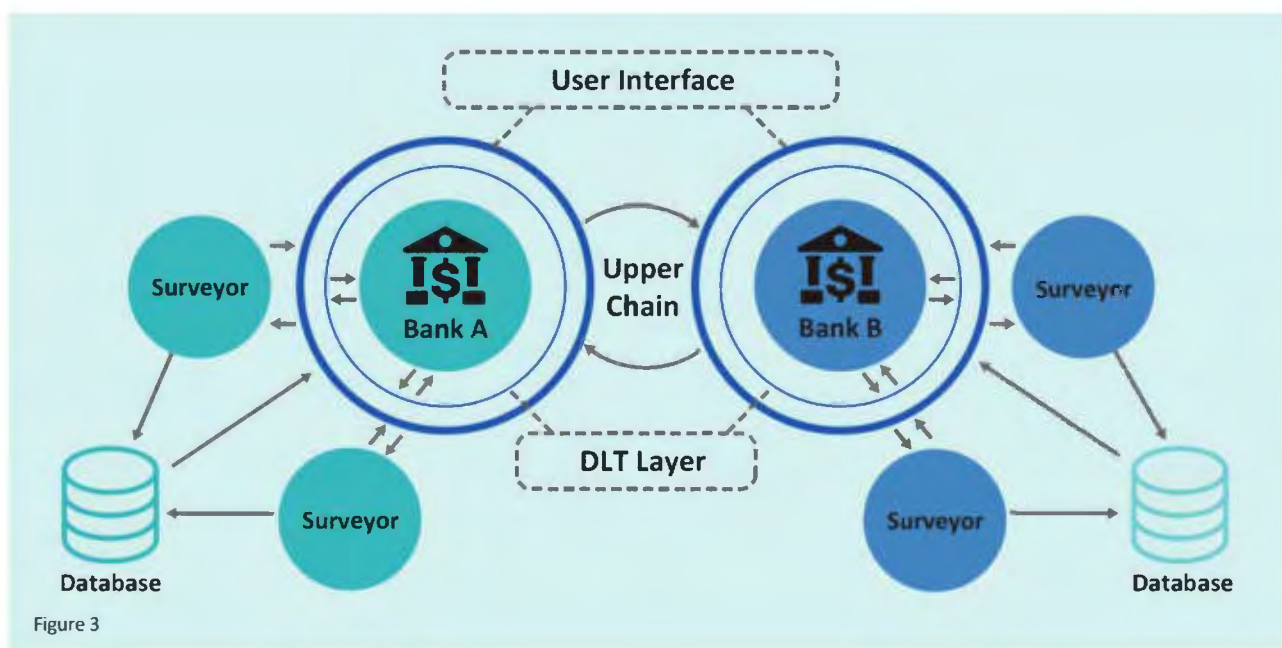


Figure 3

Banks send valuation requests to surveyors through a user interface. The surveyors, upon receipt of any request, submit selected data from the valuation report to the DLT platform via the same user interface, and upload the entire report to a separate database.

Considerations

Since the mortgage loan application prototype is currently the only PoC to have been brought into production, this section discusses the major considerations and challenges encountered during this particular commercialisation process.

Lack of Tools and Utilities

This property valuation platform has been developed based on DLT, a new technology which is completely different from existing platforms. Existing IT tools and utilities for conventional platforms are therefore not applicable for this DLT platform. There is a need to develop corresponding DLT-based procedures, tools and utilities by making reference to existing ones for purposes such as housekeeping, backup and recovery.

Lack of Standards

Other than the lack of tools and utilities for handling the development and daily operations of the platform, there is also no applicable DLT standard. There is a strong need for a reputable and industry recognised authority or body to formulate industry standards for DLT.

Operation and Maintenance

To achieve a sufficient level of confidence in the consensus, tests were conducted to identify the appropriate design of the consensus mechanism. Results revealed that when over two-thirds of all nodes are up and running, the level of confidence achieved is sufficient to validate a transaction.

8.3 Conclusion

All of the PoC work developed in this project shares common issues in areas such as governance, legal and compliance, choice of platform, and data standards. On the technical side, the most significant concern relates to the choice of DLT platform, as which particular DLT platform will ultimately win the technology race is uncertain. Currently, many DLT protocols are not interoperable due to their different underlying consensus mechanisms. The technology community is fully aware of this and is working towards the convergence of network protocols, which may resolve the interoperability issue in the future. On the non-technical side, a major challenge is in achieving collaboration across jurisdictions in different countries, where conflicts between differing laws and regulations need to be resolved. We hope this chapter has provided some practical insights into these issues through its discussion of the real-life implementation of DLT projects.

To: Kirk, Tyler [mailto:tkirk@wsgr.com]
From: Szczepanik, Valerie
Sent: 2018-10-12T18:39:24Z
Subject: RE: WSGR Practitioner Insight: Overview of the Patent Landscape in the Blockchain, Cryptocurrency, and Cryptographic Token Space
Received: 2018-10-12T18:39:24Z

Thanks Tyler! I'm losing track of time, so a reminder that it is Friday is very welcome. ☺ I look forward to reading these alerts and appreciate your forwarding them to me. Have a great weekend.

From: Kirk, Tyler [mailto:tkirk@wsgr.com]
Sent: Friday, October 12, 2018 1:25 PM
To: Szczepanik, Valerie
Subject: FW: WSGR Practitioner Insight: Overview of the Patent Landscape in the Blockchain, Cryptocurrency, and Cryptographic Token Space

Happy Friday Val. Here's another alert you may find useful.

Tyler Kirk

WSGR | (202) 973-8851 (w) | (b)(6) (m)

From: Heinisch, Erica
Sent: Friday, October 12, 2018 12:59 PM
To: wsgr. Attorneys; wsgr. Paralegals and Corporate Assistants
Cc: wsgr. Marketing
Subject: WSGR Practitioner Insight: Overview of the Patent Landscape in the Blockchain, Cryptocurrency, and Cryptographic Token Space

Later today, the firm will distribute the Practitioner Insight shown below, written by Marius Domokos. The article discusses an analysis that identified and processed more than 8,000 patents and patent applications worldwide relating to blockchain, cryptocurrencies, and cryptographic tokens as of July 2018. Please feel free to share this Practitioner Insight with any current or prospective clients who might be interested in the information.

Thank you.

Erica Heinisch
Marketing Communications Specialist



Overview of the Patent Landscape in the Blockchain, Cryptocurrency, and Cryptographic Token Space

A. Overview of the Analysis

This analysis identified and processed over 8,000 patents and patent applications worldwide relating to blockchain, cryptocurrencies, and cryptographic tokens as of July 2018. The analysis did not include patents and applications with a priority date before 1998, with the assumption that patents have a maximum validity of 20 years and therefore patents with priority dates before 1998 have expired.

1. Blockchain Platform Architecture and Scope of Search

Blockchain, cryptocurrencies, and cryptographic tokens leverage a combination of preexisting technologies to implement distributed information storage and transaction management processes, including elliptic curve cryptography (ECC) applied to public and private keys, cryptographic hashes, Merkle trees, emergent consensus based on distributed inputs, dynamic adjustments to computing difficulty, proof of work concepts (currently driving Ethereum and Bitcoin), proof of stake concepts (currently driving some cryptocurrencies and planned for adoption by Ethereum), and conditional contracts that can self-execute.

These fundamental blockchain technologies are deployed in various configurations for different applications, and the

platforms continue to evolve actively. Consequently, an ecosystem patent analysis focused on blockchain and cryptocurrencies may choose to be more focused on today's implementations, or may try to anticipate where blockchain and blockchain-based business models will be years in the future. For example, Bitcoin and Ethereum do not currently encrypt the transaction data while stored across nodes, and the flow of crypto funds can be traced sequentially by examining the transaction ledger at any time. This means that to maintain privacy for financial transactions, the accounts themselves must be secured and anonymized, and data stored within crypto wallets must be encrypted. Techniques exist to transmit or store encrypted data across the blockchain (e.g., via message payloads, through smart contracts, etc.), but those are inefficient methods for managing encrypted information and are not logical applications for the current Bitcoin or Ethereum frameworks. A proposal exists, however, to deploy encryption more broadly across Ethereum, which would alter the data architecture of the Ethereum blockchain platform, change the dynamics of privacy, and enable a new class of blockchain applications centered on encrypted data.

To select the dataset for this analysis, the patent search focused on the fundamental aspects of blockchain technology, cryptographic currencies, and cryptographic tokens, as currently implemented in existing blockchain applications and as expected to evolve in the foreseeable future. The search focused on claims of pending patent applications and issued patents, worldwide, and sought to identify applications and patents related to blockchain architecture, distributed ledger technology, competing and parallel consensus algorithms, and smart contracts.

A broader search identified an additional 5,000 patents and applications by expanding the scope of the analysis to include patents from related fields while also searching within the specifications of applications and patents. To achieve a sharper focus on the core aspects of blockchain, cryptocurrencies, and crypto-tokens, these results were not included in the dataset analyzed below, but may be considered in a follow-up analysis.

Depending on applications of blockchain, additional applications and patents may be relevant. For example, a previous analysis of patenting activities in the payments and omnichannel commerce space identified over one million applications and patents (more details [here](#)), and to the extent that blockchain business models include commerce aspects, a subset of these application and patents may also be of interest. A follow-up to this analysis may also include other industry segments in which blockchain and cryptocurrency/tokens are likely to be deployed in the future.

2. Limitations of this Study

Patents are an indicator of technical innovation and business activities in specific industry areas, and can be used as a metric for R&D investment (see, e.g., the discussion of the relationship of patents and R&D [here](#)). But it is important to understand that the correlation between patenting and business operations is imperfect, and therefore patent-based Key Performance Indicators (KPIs) should not be used as stand-alone metrics to evaluate or compare any entity.

Please see Section C (About This Analysis) below for a deeper discussion of how patent-based metrics can understate or overstate the business activities and technical innovation of specific entities.

It is also important to understand that any patent search in high-growth areas like blockchain and cryptocurrencies is just a snapshot in time based on then-current public data, and that the figures and rankings presented in this study are likely to change significantly within the next 12 months. Rather than focusing on any particular ranking or number, the data below should be reviewed more for trends. For example, it is interesting to note that entities from the financial space, like MasterCard, Visa, Bank of America, and Nasdaq, are among the top patent filers in emerging technology areas like blockchain and cryptocurrencies, along some of the largest traditional patent holders like Microsoft, Samsung, and Intel, which was not common in the past in other traditional industries.

Section C (About This Analysis) below discusses additional limitations in the data and results of this study.

B. Discussion

1. Global Patent Landscape

Fig. 1 shows the total number of patents granted and pending patent applications for the top 45 patent filers worldwide as of July 2018.



Fig. 1
Top 45 Worldwide Patent Filers
(Patents Granted and Applications Pending)

Before addressing individual entities from Fig. 1, it is interesting to note that IBM and Mastercard together account for almost 20 percent of all patents and applications held by the top 45 filers in the blockchain and cryptocurrency/token space. The top five patent filers hold almost 30 percent of the patents and applications shown in Fig. 1, and the top 12 filers hold over 50 percent. In relative terms, this type of concentration is also seen in other technology segments, with a few prolific patent filers tending to hold a disproportionate percentage of patents and applications relative to the rest of the industry. This suggests that as the blockchain and cryptocurrency industries mature, they may also experience strategies and trends similar to those previously seen in other industries (e.g., licensing programs run by some of the top patent holders, development of large patent portfolios for deterrence and defensive purposes, patent-centric technology transactions and acquisitions, offensive and defensive patent assertions and litigation, etc.).

From Fig. 1, it is noteworthy that financial entities like Mastercard, Visa, and Bank of America are major patent filers in the blockchain and cryptocurrency spaces. This is a positive surprise given that financial entities were not patenting heavily in the past. It is not surprising, however, to see these three companies among the more prolific patent filers since an analysis of commerce patents from 2017 also identified them as strong patent filers in commerce (see Fig. 1 [here](#)). Additionally, since both Visa and Mastercard have a public track record of strategic acquisitions, it is possible that they may own additional applications and patents that are not held under their direct names yet, and therefore the number of applications and patents held by each of them in the blockchain and cryptocurrency/token segments may be even larger than shown here.

IBM's top ranking suggests that the company plans to include blockchain in its patent licensing program going forward, which is something that other entities operating in the blockchain space may want to consider as they shape their own patent programs.

Other top filers in Fig.1 are also traditional leading patent holders, including Sony, Microsoft, Panasonic, Canon, Philips, Hitachi, Fujitsu, NEC, Samsung, and Toshiba. The presence of these household names among the top blockchain and cryptocurrency/token filers is not surprising and confirms that these companies are continuing to evolve with new technologies. In particular, Microsoft's emergence as a leading cloud player in the past few years and its consistently-high patenting rate make it a predictable presence on this list.

It is interesting to note the presence of Coinplug among the top filers, a prominent Korean player in the Bitcoin space that operates a trading platform for Bitcoin and other cryptocurrencies. This shows that emerging leaders in the blockchain and cryptocurrency segments are learning from industry leaders in other technology sectors to develop strong patent positions while building their businesses (e.g., Samsung, also a Korean company, has been a leading patent filer across many industry segments for years). Of the 73 patents and applications identified for Coinplug, 63 are presently in Korea and 9 are in the U.S., but the proportion of filings outside Korea is likely to increase as the Korean applications mature into global patent families.

Alibaba and Amazon have been strong patent filers for the past few years in other technology areas, and given their diversification across additional economic and technology sectors, their high ranking in the blockchain patent landscape is also not surprising. The geographic distribution of their patents is quite different, however, with Alibaba showing most patents and applications in China and Amazon showing most patents and applications in the U.S. It is interesting to note that Amazon's portfolio includes filings across a broad range of geographies, including China, Europe, Japan, Korea, Canada, Australia, and India, which suggests that Amazon's business plans are global.

nChain Holdings is not a household name, but is well known within the blockchain industry. nChain is developing various applications running on top of blockchain. The company was apparently acquired by a private equity firm in 2017 and continues to execute towards an "Internet of Transactions." HP, Intel, and Oracle have always had sophisticated patent programs, and their leading rankings in this analysis suggest that blockchain and cryptocurrencies/tokens are definitely part of their future business plans. In particular, it is certainly not unexpected to see Oracle focused on blockchain given its high patenting rate and increasing focus on commerce (e.g., consider Oracle's strong ERP platform and its acquisition of Micros a few years ago). Same with HP and Intel: as the companies morph into broader technology and services providers, expanding away from their traditional core offerings, their interest in blockchain, cryptocurrencies, and cryptographic tokens should be expected.

Google's broad activities in commerce (e.g., Google Pay) and in other emerging technologies also make it an expected presence in the top blockchain patent filers. Google's patent portfolio shows a particularly broad geographic dispersion compared to other companies, which suggests that Google is mapping its interests in blockchain at a global scale. This is not surprising since Google's business is global in reach already, and new commerce offerings (e.g., Google Pay) are natural complements to its suite of products and services across all geographies.

Walmart's presence among the top 45 blockchain patent filers may appear unexpected, but it is not: Walmart has been investing heavily in digital transformation and omnichannel technologies over the past few years and has developed a significant patent portfolio in commerce.

Accenture's high ranking is also not surprising given its strong global activities in technology development and professional services in the recent past. This suggests that Accenture is positioning its business to expand across blockchain and cryptocurrencies, so it will likely be a leading consulting and strategic adviser in this industry for years to come.

Digital Asset is a strong emerging player in the blockchain space, backed by prominent strategic and financial investors. Digital Asset seeks to deploy a platform leveraging distributed ledger technology for regulated financial institutions. The company's patent portfolio is concentrated in the U.S., but alludes to global business plans given its other filings in China, Europe, Canada, Australia, and Singapore.

tZERO's business model seeks to leverage the immutability of blockchain transactions to develop a securities trading platform. tZERO's patent portfolio is a bit unusual because the company appears to be located in the U.S., but its patent portfolio does not include any U.S. applications of patents based on the records identified in this search. Instead, its portfolio is dispersed across Australia, Canada, China, Europe, Korea, and Singapore.

Finally, the high global rankings of Chinese patent filers in the blockchain space are noteworthy and are consistent with the concentration of companies in APAC with activities in the areas of cryptocurrency, blockchain investments, ICOs, and emerging blockchain-based business models. Aside from Huawei and ZTE, which are already well-known and leading patent filers across a broader technology space, a number of newcomers are making a strong patent showing, such as Hangzhou Fuzamei Technology, University of Electronic Science, and Tsinghua University Beijing.

Fig. 2 shows the geographic distribution of patents granted and pending patent applications for the top 45 patent filers worldwide as of July 2018.

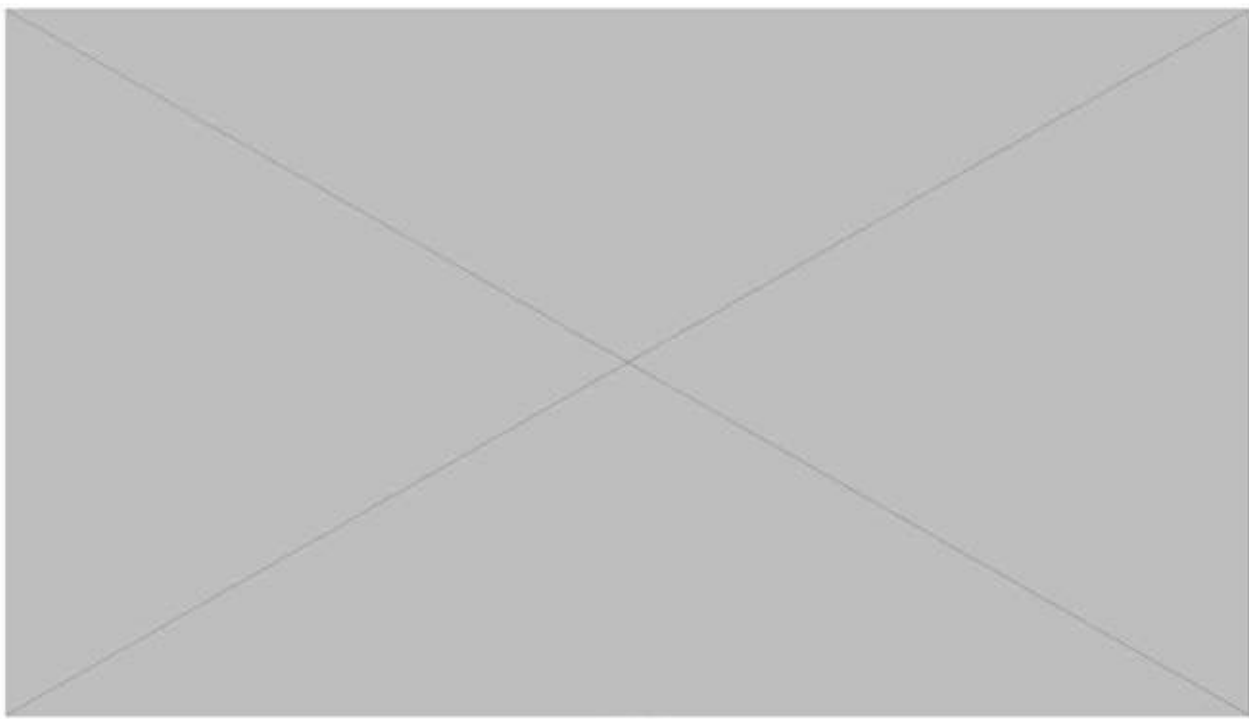


Fig. 2
Top 45 Worldwide Patent Filers
(Patents Granted and Applications Filed, Worldwide, by Filing Country)

Case 1:24-cv-01858-AGR Document 34-4 Filed 06/20/25 Page 457 of 601

Fig. 2 shows that while the U.S. remains the most popular intellectual property framework for major patent filers, China ranks as a strong number two destination, ahead of the European Union and Japan. This is consistent with the strong activities in blockchain and cryptocurrencies shown by Chinese entities over the past three years, including a high concentration of Bitcoin mining, ICOs and blockchain-centric business models. The total number of filings outside the U.S. for the top 45 filers shown in Fig. 1 exceeds the U.S. filings, which suggests that any company with global aspirations for blockchain-related business models will see an intricate international web of patents in three-to-five years.

Fig. 3 shows the total number of patents granted and pending patent applications relating to blockchain, cryptocurrencies, and cryptographic tokens, aggregated for all patent filers, worldwide, by year. The chart shows the number of patents granted and applications published during each calendar year. The chart starts with 2007 and shows an annualized figure for 2018 using the January-June 2018 numbers. This analysis identified more than 2,800 assignees, which are included in Fig. 3.

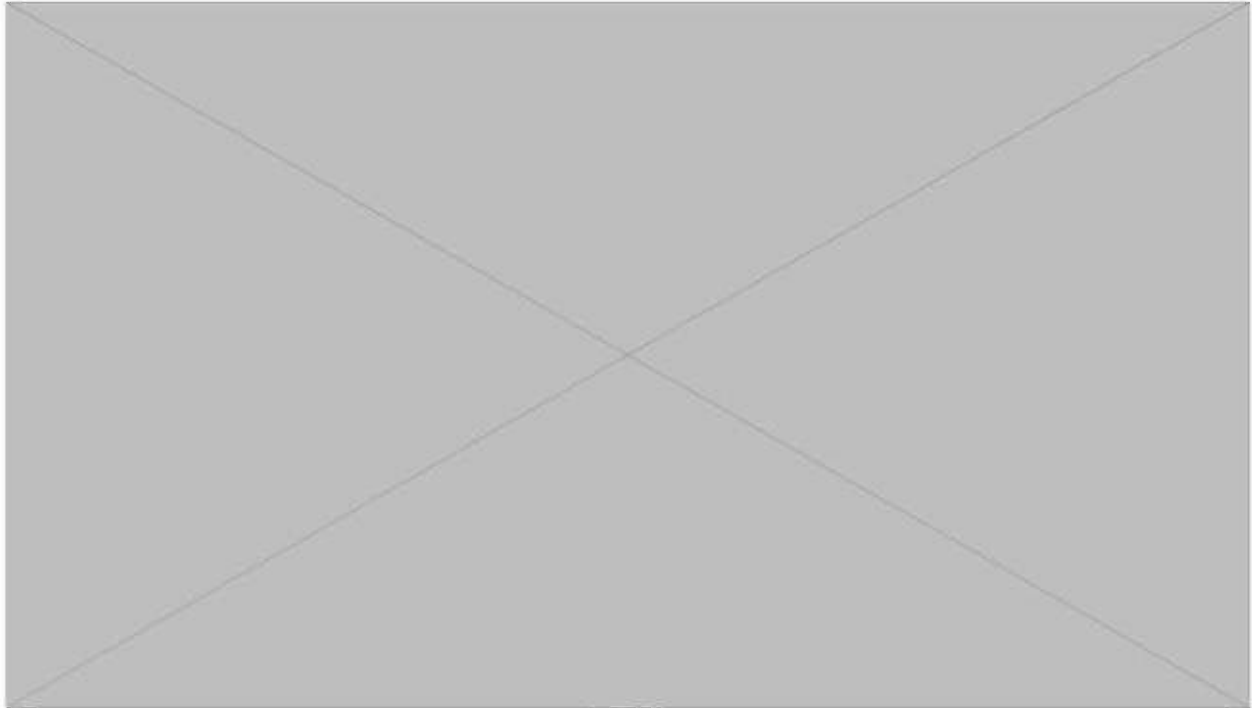


Fig. 3
Patents Granted and Applications Published
(Worldwide, All Filers, by Year of Grant/Publication)

To understand the trends shown in Fig. 3, it is important to remember that the figures shown are patent publication dates and patent issuance dates, and that the underlying filing dates for each year shown in Fig. 3 occurred sometime in the preceding five years, depending on the publication delay for applications and length of the prosecution stage for patents. Consequently, the figures captured in Fig. 3 are a real-time reflection of patent grants and application publications by year, but trail by a few years the underlying industry focus on blockchain and cryptocurrencies that led to those filings. To get a better understanding of the annual investment rate in blockchain R&D as reflected by patent filings, the numbers shown in Fig. 3 should be viewed in parallel with application filing dates. Fig. 4 provides that information.

Fig. 4 shows the total number of patent applications relating to blockchain, cryptocurrencies, and cryptographic tokens, aggregated for all patent filers, worldwide, by filing year. The chart shows the number of patent applications filed during each calendar year. The chart starts with 2004 and shows annualized figures for 2018 using the January-June 2018 figure.



Fig. 4
Patent Applications Filed
(Worldwide, All Filers, by Filing Year)

The 2004-2006 years, which are the starting point for Fig. 4, were intentionally selected to predate by one-to-three years the first data point shown in Fig. 3, and should be a representative metric for the economic activity that led to the patents granted and applications published in 2007 shown in Fig. 3. This correlation window continues for the figures shown in Fig. 4 relative to Fig. 3, such that the 2014-2016 numbers from Fig. 4 should be an indicator for the global investment in blockchain R&D that led to the 2017 number in Fig. 3. Indeed, a higher filing rate in 2014-2015 coupled with a significant jump in 2016 filings as shown in Fig. 4 explain the jump in 2017 patent grants and application publications shown in Fig. 3. Analogously, the acceleration of application filings in the 2015-2017 period shown in Fig. 4 explains the large increase in 2018 grants and publications shown in Fig. 3.

As a side note, the predictive value and the accuracy of the data shown in Fig. 4 ends in 2017, because many of the patent applications filed in 2017 and most of the applications filed in 2018 have not been published yet and are still confidential as of the date of this article (July 2018), which is why the 2018 datapoint is not shown in Fig. 4.

Overall, considering the data from Fig. 3 and Fig. 4 together, it is clear that patenting in the areas of blockchain, cryptocurrencies, and crypto tokens ramped up substantially starting in 2015, and it is safe to predict that when the full figures will be available for 2018, they will show a further jump in patent grants and application publications.

2. U.S. Patent Landscape

Figs. 5-a and 5-b show the total number of patent applications relating to blockchain, cryptocurrencies and cryptographic tokens, aggregated for all patent filers, in the U.S., as of July 2018. The charts show the number of patent applications pending and the number of patents issued for each assignee as of July 2018. The ranking sample was selected to include the top 57 U.S. assignees, ordered based on the total number of U.S. applications and patents. For convenience, the dataset was split in two, with Fig. 5-a showing the top 25 assignees and Fig. 5-b showing the next 32 assignees.

It is important to note that the numbers shown in Figs. 5-a and 5-b do not include published applications filed under the Pacific Patent Cooperation Treaty (PCT) system, many of which were likely filed in the U.S. For example, Visa has 10+ pending PCT applications that were filed in the U.S. and were not included in this dataset, which would make Visa one of the largest filers in the U.S. In Figs. 5-a and 5-b, however, only applications directly filed in the U.S. were considered to narrow down the scope of the analysis and to avoid parsing out PCT application filings. The PCT applications are included in the numbers from Fig. 1, and therefore Fig. 1 shows all global applications and patents across individual countries and the PCT framework.

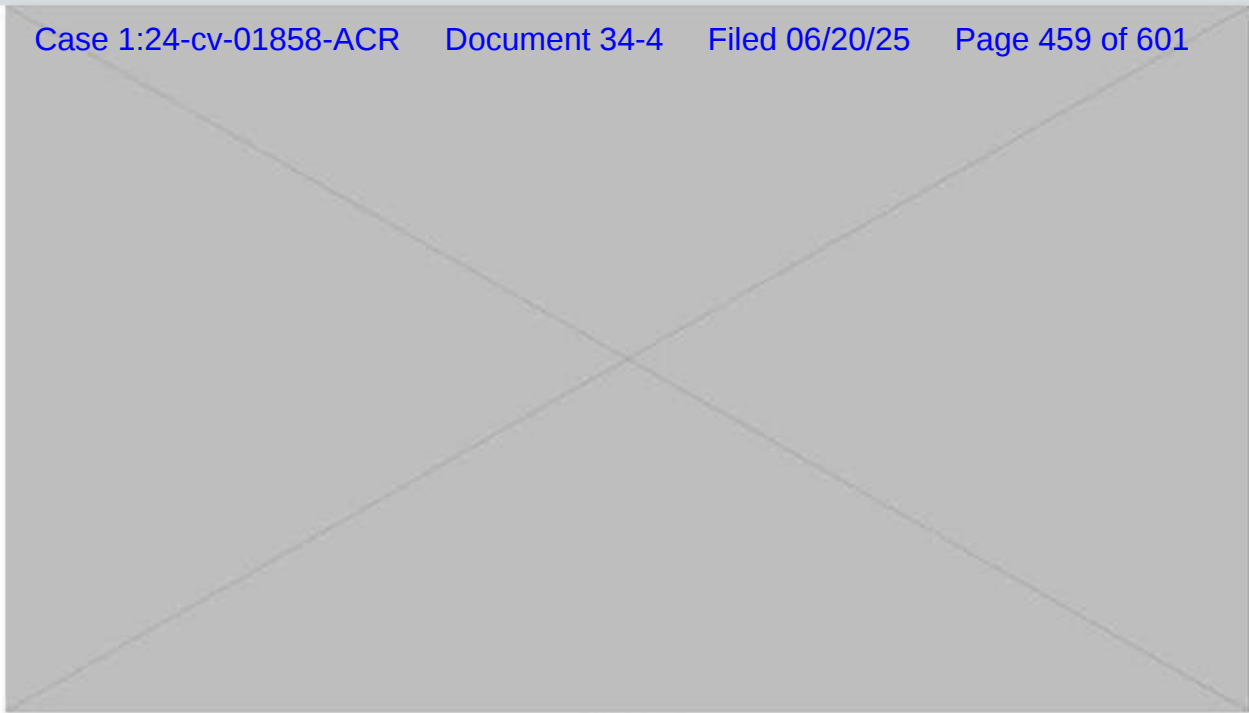


Fig. 5-a
Top Assignees in the US (1-25)
(U.S. Applications Pending and Patents Granted, Excluding PCT/WIPO Applications)

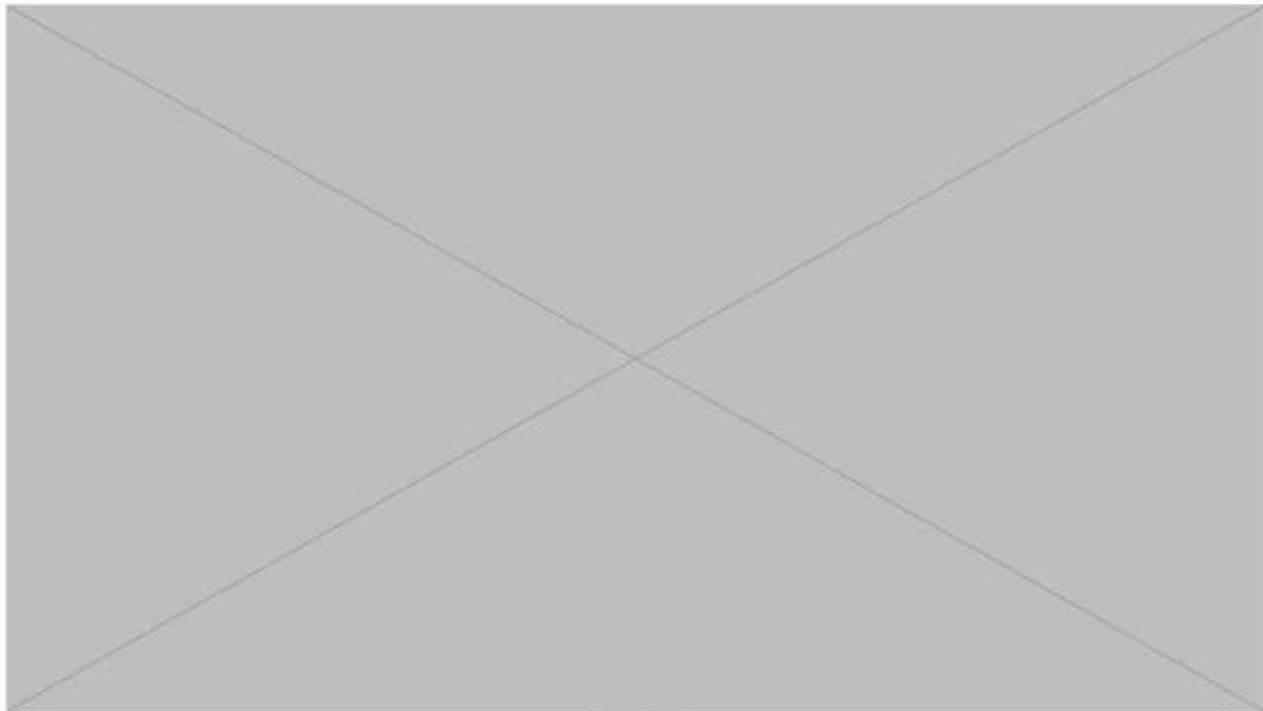


Fig. 5-b
Top Assignees in the U.S. (26-57)
(U.S. Applications Pending and Patents Granted, Excluding PCT/WIPO Applications)

As a high-level observation, the presence in this U.S. top ranking of leading commerce and financial entities like Bank of America, Mastercard, Visa, Amazon, and Walmart is consistent with their strong global showing in Fig. 1. Also, the top rankings for IBM, Microsoft and other traditional large patent filers are also not surprising.

An interesting name among the top U.S. patent filers is Red Hat, a leading advocate for Open Source software. This is not surprising, however, since Red Hat has been active in the blockchain space, including its focus on a Blockchain-as-a-Service platform based on Ethereum. More generally, Open Source is an active field in blockchain—see for example Hyperledger, an industry-wide umbrella project of Open Source blockchains and related tools initiated by the Linux Foundation. Open Source has a natural synergy with public blockchains given that they share inherent characteristics such as distributed development, transparency to review, and trust premised on community policing.

With the exception of IBM, the absolute ranking of the companies shown in Figs. 5-a and 5-b is not meaningful because the total numbers do not vary much among entities next to each other. Instead, Figs. 5-a and 5-b should be studied for more general trends, such as the types of entities that are patenting in the blockchain segment (e.g., traditional large filers vs. financial institutions vs. pure blockchain/cryptocurrency players vs. newcomers).

3. Financial Institutions

Fig. 6 shows the total number of patent applications relating to blockchain, cryptocurrencies, and cryptographic tokens filed by financial institutions, aggregated globally, as of July 2018. The chart shows the number of patent applications pending and the number of patents issued globally for a number of entities whose primary business can be determined to fall within the financial space.

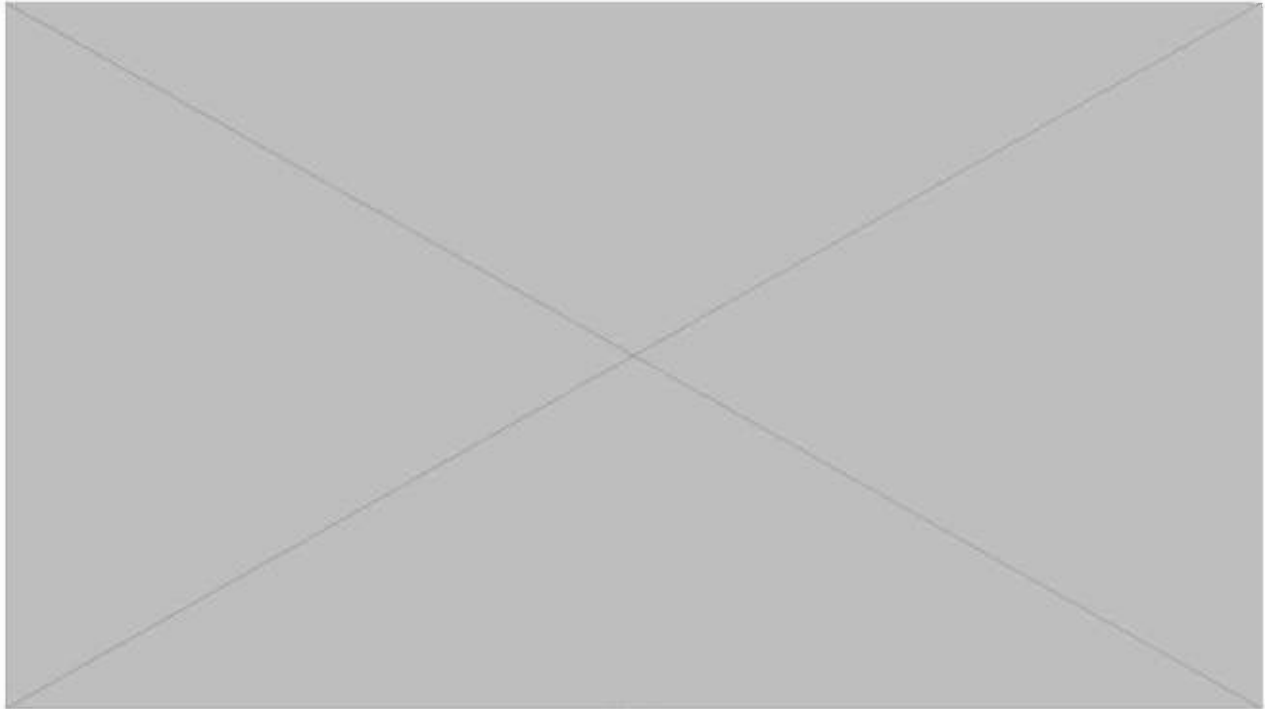


Fig. 6
Top Financial Institution Assignees
(Worldwide, Applications Pending, and Patents Granted)

Fig. 6 shows that financial institutions have embraced patenting in the blockchain, cryptocurrency, and cryptographic token industries. This is not a surprise given the strong showing of financial institutions in commerce patent rankings (see, e.g., [this article](#)). Banks and other financial institutions outside the U.S. are heavily represented in this ranking, which is consistent with the global interest in blockchain applications for financial applications. As banks and financial institutions experiment with blockchain as a platform for transfer and settlement of funds across geographies, patenting activities by banks and other financial entities are likely to increase further and quickly, both in the U.S. and outside the U.S.

4. Universities

Figs. 7-a and 7-b show the total number of patent applications relating to blockchain, cryptocurrencies, and cryptographic tokens filed by universities, aggregated globally, as of July 2018. The charts show the number of patent applications pending and the number of patents issued globally for a number of academic institutions. Due to the large number of assignees identified, the results are shown only for universities with at least three applications and patents, and were divided into two different charts for clarity.



Fig. 7-a
Top University Assignees (1-24)
(Worldwide, Applications Pending, and Patents Granted)



Fig. 7-b
Top University Assignees (25-49)
(Worldwide, Applications Pending, and Patents Granted)

Fig. 7-a and 7-b show that blockchain, cryptocurrency, and cryptographic token innovation is occurring in academia on a global scale. The strong presence of Chinese universities in these rankings is noteworthy and suggests that the Chinese economy will play a major role in adopting blockchain technologies in the future and shaping the evolution of the industry.

5. Unknown Assignees

A classic problem in any patent search is the inability to accurately identify all assignees for the patents and applications included in the analysis dataset. The issue may arise either inadvertently or intentionally. The inadvertent omission or misidentification of assignees can occur due to innocuous issues that occur during the patent prosecution process, such as delayed identification of the actual assignee after the application filing, listing inventors as assignees or joint assignees, or mistakes made by the Patent Office in the receiving country or in other countries. The intentional omission or misidentification of assignees can occur when a company seeks to obscure the fact that it is indeed the owner of the patents, in which case patents could be assigned to a shell entity with an unrelated name or the assignee name may be intentionally omitted during the prosecution process.

Case 1:24-cv-01858-ACR Document 37-1 Filed 06/20/25 Page 462 of 601

There are techniques to identify the real assignees in interest (e.g., parsing out the applications and patents by CPC classes and subject matter, searching by inventors, running parallel corporate entity searches to establish parent-subsidary relationships, etc.), but such techniques require significant efforts that go beyond the scope of this project. In this analysis, efforts were made to consolidate easily ascertainable related entities into a single corporate assignee, but no attempt was made to identify missing assignees or to correct for unknown entity names.

The inability to identify assignees accurately triggers two immediate concerns. The first concern is that the patent holdings of any particular entity may be understated. For example, looking at some of the household names shown in the rankings in Fig 5-b and known to be prolific patent filers in other technology segments, some of the figures shown are surprisingly low. It is certainly possible that some of those companies only ramped up their blockchain patenting efforts in the past 18 months, and therefore their recent applications are not publicly known yet. But it is also possible that some of those companies already have significant patent portfolios in the blockchain and cryptocurrency space, whether organically developed or acquired, and they cannot be identified fully without a concerted effort to identify and consolidate unknown assignees.

A second concern about unknown assignees is that patents may be aggregating under the control of entities that could later assert them broadly across the industry, seeking to extract mass royalties or possibly even injunctions, without early industry visibility.

How significant is the issue of unknown assignees in the blockchain and cryptocurrency/crypto-token space? The search retrieved 355 U.S. patents and 1,115 worldwide patents and applications with unknown assignees, which is more than 12 percent of the total holdings in both cases. Many of these missing assignees will be added over time, as applications are prosecuted towards issuance, but a significant level of uncertainty regarding patent ownership will almost certainly remain in the blockchain and cryptocurrency industries.

It is also worth mentioning that there are 425 Chinese applications and patents that do not identify any assignee as of July 2018, so even more than in the U.S. Because many Chinese companies pursue a China-first filing strategy with subsequent expansion into the U.S. and other countries through the Patent Cooperation Treaty (PCT), these applications and patents are likely to further compound the level of assignee uncertainty in the U.S. and in other countries around the world, depending on how many of those families will eventually add accurate assignee information.

Overall, the issue of patent ownership will likely be a concern for the blockchain and cryptocurrency industries given these early datapoints, and the industry should consider taking steps to address this issue sooner rather than later.

6. The Extended Blockchain and Cryptocurrency Patent Landscape

The search discussed in this study identified 8,000 patents and patent applications worldwide relating to blockchain, cryptocurrencies, and cryptographic tokens as of July 2018, and a broader search that traded specificity for overinclusion identified an additional 5,000 patents and patent applications worldwide that have some direct nexus with blockchain technology and architecture. It is important to understand, however, that a comprehensive analysis of the blockchain patent landscape needs to consider a much broader patent dataset. For example, since cryptocurrency transactions rely heavily on encryption, patents relating to elliptic curve cryptography, cryptographic hashes, and other techniques for efficient data encryption using public and private keys would also need to be considered as fundamental enabling blocks. Some pioneering patents that relate to technologies that underpin blockchain have expired, but others remain in effect and may be relevant.

Also, since blockchain is being deployed globally as a platform that supports a wide range of business models, patents, and applications that relate to each such business model may deserve consideration on a case-by-case basis. For example, a 2017 patent landscape analysis focused on commerce identified over one million patents and applications relating to a wide range of commerce technologies and business models (see, e.g., [this article](#)), and some of those may be relevant to specific applications of blockchain, cryptocurrencies, and cryptographic tokens in the commerce space.

C. About This Analysis

1. Limitations of Patent-Based KPIs

Using patents as a metric for the business activities of individual companies in the technology space must be cross-checked against other factors to establish its relevance and accuracy. Without additional analysis, the patenting rate for any specific company may understate or overstate the company's investment in technology development.

For example, some companies may spend more on R&D while patenting less, in which case a patent-based KPI would understate their R&D efforts. Conversely, some companies may be prolific patent filers while spending comparatively less on R&D, in which case a patent-based KPI would overstate R&D activities. In either case, however, the exclusionary value of patents and the potential to monetize patent portfolios in the future will likely tend to counterbalance both under-patenting and over-patenting in the long term. For example, a company that patents at a higher rate than its natural R&D activities may find out in the long term that its larger volume of patents are narrower and only incrementally more valuable than a smaller and more targeted portfolio (e.g., statistically, they may experience ongoing complications with enablement, double patenting disclaimers, and overlapping claims) or that the return from patenting is lower than expected, so it may eventually decrease its patent filing rate.

Analogously, a company that patents below its natural R&D investment rate may find in the long term that its

Case 1:24-cv-01858-ACR Document 34-4 Filed 06/20/25 Page 463 of 601

competitors are making more inroads in its R&D space while facing fewer patent challenges, and may eventually reexamine its patenting strategy, particularly if it becomes the target of patent infringement litigation and finds itself with limited counterclaim options. As a special class of patent holders, entities that look at patents as a revenue-generating mechanism may also find themselves overinvesting in patents relative to their normal revenue-generating business activities, and while they may be able to indeed generate revenue from patent licensing and sustain a higher rate of patenting, the sophistication needed and peripheral costs for such patenting and licensing programs are high. Consequently, in general, the patenting rate is an imperfect predictor or metric for actual business activities and/or technical innovation for individual companies at any particular point in time, and therefore patenting rates should not be used as a stand-alone metric to compare or evaluate any entity.

2. Limitations in Data Accuracy

As another observation about the limitation of patent searches, it is interesting to note that some entities are unexpectedly missing from these rankings or are ranking lower than expected. Square, for example, has developed a robust patent program in the past few years and ranked very high in a 2017 commerce patent analysis (see Fig. 1 [here](#)). In parallel, Square has been expanding its business to cover blockchain and cryptocurrency segments, including obtaining a virtual currency license from the New York Department of Financial Services that permits N.Y. users of Square's Cash app to trade Bitcoin in New York. Consequently, it is highly likely that Square has filed a meaningful number of patent applications relating to blockchain and/or cryptocurrencies, which were not identified through this search. This means that those applications are likely to publish in the next few months, when they would become publicly known for the first time. This likely also applies to other entities that are ranking lower than expected in these charts, such as Google and Apple. Consequently, any patent search in high-growth areas like blockchain and cryptocurrencies should be perceived as a snapshot in time and not as a definitive ranking, and the figures and rankings presented in this study are likely to change significantly within the next 12 months.

3. Search Details

This analysis was performed using Boolean searches across large patent databases and techniques for automated processing of large datasets, without a review of actual claims. Consequently, individual patents and claims were not reviewed, and therefore no knowledge of any particular patent or application was acquired.

Note:

The opinions in this article are limited to the scope of this article and to the dataset used for this analysis, and do not necessarily reflect the author's opinions in general, the opinions of Wilson Sonsini Goodrich & Rosati (WSGR) or of any attorneys or other personnel affiliated with WSGR, or the opinions of any WSGR clients or partners.

If you would like to discuss any aspect of this article, please do not hesitate to contact [Marius Domokos](mailto:Marius.Domokos@wsgr.com) at mdomokos@wsgr.com or any attorney in WSGR's [technology transactions](#), [patents and innovations](#), or [blockchain and cryptocurrency](#) practices.

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To: (b)(6)
Cc: (b)(6) Case 1:24-cv-01858-ACB Document 34-4 Filed 06/20/25 Page 464 of 601
(b)(6) @mas.gov.sg]; (b)(6) @iosco.org]; (b)(6) @iosco.org]; (b)(6) @iosco.org]; (b)(6) @iosco.org];
(b)(6) @fca.org.uk]; (b)(6) @fca.org.uk]; (b)(6) @fca.org.uk]; (b)(6) @fca.org.uk];
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(MAS) (b)(6) @mas.gov.sg]; (b)(6) (MAS) (b)(6) @mas.gov.sg];
From: Szczepanik, Valerie
Sent: 2022-10-13T21:17:50Z
Subject: Re: FTF Chair's IOSCO Board Update on FTF
Received: 2022-10-13T21:17:50Z
[2022-10-18 IOSCO Board FTF Update deck.pptx](#)

Hi- looks fine from my perspective
Sent from my iPhone

On Oct 13, 2022, at 3:28 PM, (b)(6) (MAS) (b)(6) @mas.gov.sg> wrote:

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Message Classification: Restricted

Dear all,
Pls see the attached slide deck that FTF Chair will be using to update IOSCO Board on the work of the FTF in Marrakech next week. Pls also note that this version has not been reviewed by FTF Chair.
Given that the Board meeting is very soon, I would appreciate if colleagues could respond with your comments by the following timeline to facilitate turnaround of any revisions by the MAS team:

- UK FCA/IOSCO GS – by noon of 14 October, earlier if possible
- US SEC (Val) – by cob 13 October

Thanks all!
Regards,
(b)(6)

This e-mail may contain privileged or confidential information. If you are not the intended addressee, you must not copy, distribute or take any action in reliance thereon. Communication of any information in this email to any unauthorised person is an offence under the Official Secrets Act (Cap. 213). Please notify the sender immediately and delete all copies of this email and its attachments. Thank you.

To: (b)(6)
From: Srour, Dani
Sent: 2020-03-27T18:16:30Z
Subject: FW: crypto and blockchain articles
Received: 2020-03-27T18:16:31Z
[Investigating Cryptocurrencies.pdf](#)

From: Srour, Dani
Sent: Friday, March 27, 2020 2:07 PM
To: (b)(6)
Subject: FW: crypto and blockchain articles

From: Srour, Dani
Sent: Thursday, March 26, 2020 4:52 PM
To: (b)(6)
Subject: FW: crypto and blockchain articles

Eric, I hope this helps. It is LONG but take it in small doses. – Dani

From: Ward Doran, Morgan (b)(6) @sec.gov>
Sent: Thursday, March 26, 2020 4:39 PM
To: Srour, Dani (b)(6) @SEC.GOV>
Subject: RE: crypto and blockchain articles

This is supposed to be good. – M.

From: Srour, Dani (b)(6) @SEC.GOV>
Sent: Wednesday, March 25, 2020 10:56 AM
To: Ward Doran, Morgan (b)(6) @sec.gov>
Subject: crypto and blockchain articles

Hello Morgan! We have an intern who really cannot do much right now because intern's do not have remote access. It's really a shame, in the few weeks we worked together he really was great!
He just texted me to say he would like to use time that he would have spent at the SEC learning as much as he can about crypto currencies and blockchain. Please pass on any articles you think could be of use.

Dani
Danielle Srour
Division of Enforcement
U.S. Securities and Exchange Commission
100 F Street NE
Washington, DC 20549

(b)(6) @sec.gov | (b)(6)

To: dkantor@bizpundit.com[dkantor@bizpundit.com]
From: Smolar, Gregory
Sent: 2021-05-24T18:19:13Z
Subject: FW: Money Stuff: Merrill Lynch Puts Down the Phone
Received: 2021-05-24T18:19:13Z

Nice summary of SPAC sponsorship:

The way it works for a SPAC sponsor is:

You pay some money out of pocket (for startup and administrative costs, a seed investment, etc.) to form a SPAC.

Public investors put money in a pot.

You go out and look for a startup to merge with the pot.

If you find a target and negotiate a deal within two years (or perhaps more realistically six months), you get rich.

If the deal is good, hey, that's super. If the deal is bad, that's fine too, as long as the deal gets done. You get shares equal to 20% of the money in the pot, as compensation for your work; they are worth much more than the money you put in. Even if your shares lose half their value after the deal closes, you are still doing great.

If you don't find a target and do a deal, the investors get their money back, you get nothing, you eat your out-of-pocket costs and you miss out on what felt, a few months ago, like an enormous free-money boom. Also of course you are out the time that you spent carefully crafting cold pitches to a hundred startups.

Successfully closing a deal, with any company, on any terms, makes the SPAC sponsors rich; failing to do so costs the sponsors money. When it comes to sponsor incentives, the company *is* irrelevant!

From: Matt Levine
Sent: Monday, May 24, 2021 12:31 PM
To: Smolar, Gregory
Subject: Money Stuff: Merrill Lynch Puts Down the Phone

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Cold calling

I don't know a lot about how the private wealth management business worked in the 1800s but let's imagine, shall we?[1] I assume that the main way that PWM advisers got clients was through referrals: Wealth was frequently inherited, wealthy people formed a closed social set, a rich person who needed a financial adviser could ask a few friends and use their adviser, etc. It is a high-touch, trust-based business, and the most reliable way to win clients is through a warm introduction.

At the same time, some people probably didn't use their friends' financial advisers, for whatever reason: They were new in town, or they were nouveau riche industrialists without fancy friends, or they didn't like their

friends' adviser's approach to asset allocation. And some advisers needed to start new businesses without a network of clients and referrals. And so presumably some number of ambitious financial advisers traveled the country, looked for the biggest house in the neighborhood, and then walked up and knocked on the door. "Excuse me, are you in the market for financial advice," they would ask. "Can I tell you about the excellent business prospects of Amalgamated Buggy Whips Ltd.?" That sort of thing.

Then the telephone was invented and, for a while, financial advisers ignored it and kept knocking on the doors of the big houses, because telephoning was gauche and impersonal and you'd never win a really good piece of business over the phone. But eventually some tech-savvy and ambitious financial advisers realized that they could reach a lot more people over the phone than they could by traipsing around knocking on doors, and even if the connections were weaker and the hit rate lower the overall results might be better. Sure the very wealthiest people might never entrust their money to an adviser over the phone, but you could make it up on volume.

And so for decades the popular image of the retail brokerage business was of people sitting in a big room cold-calling dentists. And then LinkedIn was invented, and everyone spent like a decade joking and complaining about annoying LinkedIn messages. And here we are:

Merrill Lynch Wealth Management's new training program for 3,000 fresh-faced brokers includes a ban on cold calls.

Participants will instead be directed to use internal referrals or LinkedIn messages, according to a person familiar with matter. The change is part of an overhaul of the more than three-year-long program that will be announced Monday, the person said, asking not to be identified because the information hasn't been made public.

I read this as more of a story about communications technology than about the right way to build wealth-management relationships. The phone is just an outdated technology:

"We are leaning much more heavily on leads and referrals from the broader company," Merrill President Andy Sieg said in April. "There is also an opportunity to be much more modern in terms of the way we are reaching out to prospective clients." ...

While cold calling offers the opportunity for a gifted salesperson

to build a network from scratch, it is hard to succeed the way in an era when no one picks up. Personal referrals lead to a response around 40% of the time, Merrill executives said, but less than 2% of people who are cold called even answer the phone.

For a volume-based cold-caller, LinkedIn messages have obvious advantages over the phone: You are never exactly “cold,” because you can always be like “I see you are a third-degree connection of my friend Jen” or “I see that you and I are both interested in golf” or whatever. A LinkedIn profile also gives more clues about *wealth* than a phone number does. And you can write a good template LinkedIn message and copy-and-paste it to a bunch of people, whereas over the phone you have to dial each person individually and then talk until they hang up on you.

Reading these stories I found myself a little offended that, as far as I can recall, I’ve never gotten a cold call from a Merrill Lynch wealth manager. Maybe I’ve gotten a LinkedIn message, I don’t know, I never check them.

Elsewhere in cold calling

If you are a sponsor of a special purpose acquisition company, you are, uh, probably spending a lot of time on LinkedIn right now:

The cooling demand is set against formidable supply: There are more than 400 SPACs searching for startups to merge with, according to data provider SPAC Research. SPACs generally have two years to complete their deal, although startups tend to shy away from those that haven’t found a partner after about six months, investors and CEOs say.

CEOs said they are inundated with SPAC mail that they just delete or ignore. Some SPACs are emailing cut-and-paste boilerplate letters, according to interviews with CEOs and letters viewed by The Wall Street Journal. In one case, a SPAC sent a pitch to a CEO emblazoned with the logo of the wrong startup.

Jamie Hodari, CEO of co-working startup Industrious, said about 30 SPACs have approached him in the past year to make a deal. He took four meetings. Some, he said, are thoughtful in their overtures, but with many of them “it’s almost to the point where your company is irrelevant—they just want a deal.”

Well, yes? The way it works for a SPAC sponsor is:

You pay some money out of pocket (for startup and administrative costs, a seed investment, etc.) to form a SPAC.

Public investors put money in a pot.

You go out and look for a startup to merge with the pot.

If you find a target and negotiate a deal within two years (or perhaps more realistically six months), you get rich. If the deal is good, hey, that's super.

If the deal is bad, that's fine too, as long as the deal gets done. You get shares equal to 20% of the money in the pot, as compensation for your work; they are worth much more than the money you put in. Even if your shares lose half their value after the deal closes, you are still doing great.

If you don't find a target and do a deal, the investors get their money back, you get nothing, you eat your out-of-pocket costs and you miss out on what felt, a few months ago, like an enormous free-money boom. Also of course you are out the time that you spent carefully crafting cold pitches to a hundred startups.

Successfully closing a deal, with any company, on any terms, makes the SPAC sponsors rich; failing to do so costs the sponsors money. When it comes to sponsor incentives, the company *is* irrelevant!

I don't know what the endgame is going to be for the hundreds of SPACs from the recent boom that are still searching for targets. The problem is basically that a SPAC is a middleman between public investors and startups. If it offers a startup a bad deal — a low valuation — then the startup can say “no thanks there are 30 other SPACs vying for my attention.” If it offers a startup a good deal — a high valuation — then its own shareholders will say “no thanks I'd rather take my \$10 back” and vote down (or just withdraw their money from) the deal. Back when SPACs were hot, this was an easy gap to bridge: You gave the startup a great deal (so it said yes), and investors bid up the stock anyway because they loved SPACs indiscriminately. Now it may be an impossible gap to bridge. SPAC sponsors are richly rewarded for *being successful middlemen*, for making transactions happen, for bringing together startups that are happy to sell with investors who are happy to buy. If they can't do that, they get nothing.

Robinhood IPOs

You may not like Robinhood Markets but you have to hand it to them, they are good at marketing. This is smart:

[Last Thursday], we're starting to roll out IPO Access, a new product that will give you the opportunity to buy shares of companies at their IPO price, before trading on public exchanges. With IPO Access, you can now participate in

Most IPO shares typically go to institutions or wealthier investors. With IPO Access, everyday investors at Robinhood will have the chance to get in at the IPO price.

The pitch to Robinhood's customers writes itself. In a hot IPO market, initial public offerings mostly go up. If you buy a newly public company at the IPO price, it will trade up the next morning, and you will make money. If you are a Robinhood customer, you want to make money. Also, though, you want a little bit of a gamble, something exciting, and buying shares of a newly public company is more exciting than buying shares of Apple Inc. or whatever. Also buying IPO shares is a bit of a lottery not only in that the company is new and untested, but also in that you don't know how many shares you will get: "Watch and wait," says Robinhood's blog, because "IPO shares can be very limited, but all Robinhood customers get an equal shot at shares regardless of order size or account value." You get a random amount of stock with a random value! How fun is that?

Also there is such an ingrained story of "big institutional investors get to buy stock at the IPO price, but retail investors only get to buy it the next day after it has already gone up," which makes Robinhood's IPO Access program feel like it evens the playing field and strikes a blow for the little guy and is just generally Robin Hood-like.

But this is obvious stuff and every retail brokerage would like to be able to allocate hot IPO shares to customers. Robinhood's pitch to issuers — to get shares to allocate to its customers — is also very good though. Like here it is[2]:

You had better allocate 10% of your IPO to us. (Or whatever, that number is probably too aggressive, but it's where I'd start if I were Robinhood.)

If you do, our customers will buy stock in the IPO with no price sensitivity, and you will be able to price and size your deal more aggressively than if you just allocated to the institutional customers that your banks like.

If you don't, our customers will buy stock *the day after* the IPO with no price sensitivity, and your stock will double on the first day, and **Bill Gurley will complain** that you left money on the table.

And he will be right! If price-insensitive Robinhood customers are going to buy your stock anyway, they might as well buy it from you, so you get the money, instead of giving it to the institutional investors that your banks like.

When IPOs go up a lot in the first day of trading, issuers are naturally going to say "wait we sold stock at \$20 and now it's at \$45, why didn't we sell it at \$45?" And their investment bankers are going to say a lot of

sensible and correct things about marginal prices, but to some extent what the issuer will hear is “you sold stock to institutional investors at \$20, but those crazy day traders at Robinhood bid it up to \$45 the next day.” And so issuers will start thinking, “hmm, we should sell stock to those crazy day traders at Robinhood.”

Did a leveraged selloff in crypto markets lead to contagion elsewhere, as levered investors were forced to dump liquid stocks and bonds to meet margin calls and redemptions on their crypto positions?

Nope:

Traditional assets are riding out the cryptocurrency storm so far, a sign that mainstream exposure to volatile digital tokens may be comparatively limited.

MSCI Inc.’s global equity gauge edged up last week even as the Bloomberg Galaxy Crypto Index endured a near 40% plunge, the worst since the onset of the pandemic last March. Treasuries and the dollar were largely steady.

“Anyone with a reasonable asset allocation would have a very small asset allocation to crypto,” Saxo Markets APAC Chief Executive Officer Adam Reynolds said in an interview with Bloomberg Television. “I don’t think it should make up so much of someone’s portfolio that these sorts of moves are going to be damaging to someone’s own finances.”

The rest of that article is mostly people saying “... but maybe that sort of thing could happen in the future”:

Still, others argue that the sector bears close monitoring. For instance Ben Emons, managing director of global macro strategy at Medley Global Advisors LLC in New York, said in a note that Bitcoin is “firming its grip on markets through volatility, liquidity and correlation.”

He added that the potential for “financial contagion should Bitcoin drop well below \$20,000 cannot be dismissed.”

Presumably recent crypto volatility makes it *less* likely that a bunch of traditional asset managers will start allocating 10% of their assets to levered Bitcoin positions in the near future, but I suppose, in the long run, sure. If Bitcoin ends up being a normal asset that everyone owns as part of

The first time that happens will be ... funny ... but also kind of a win for Bitcoin? Like some normal-ish biggish hedge fund will own a bunch of stocks and also some levered Bitcoin futures or whatever, and Bitcoin will go down and the fund will blow up and have to liquidate everything and briefly hammer the prices of its stock holdings, and the investors will be like "we thought we were getting concentrated equity exposure, not this!" and commentators will be like "tsk tsk this shows the risk of opaque complex Bitcoin derivatives," in the same way they say those things about structured credit or equity total return swaps or whatever caused the most recent unexpected blowup. And there will be something of a retreat from Bitcoin, and talk of new regulations and transparency, blah blah blah. But in the grand scheme of things this will show that Bitcoin has *arrived*, that it is the sort of thing that some big diversified asset manager can buy without comment in intemperate size, that crypto is important enough to be dangerous to the mainstream financial system.

But not yet. Now the crypto crash isn't really deleveraging the rest of the system. Elsewhere in crypto:

'New comments from the Chinese government spurred fears of a regulatory clampdown in a country where most bitcoins are created.'

'Two Canadian bitcoin ETFs issued 'market disruption' warnings during this week's crypto turmoil, highlighting the risks faced by the vehicles that are increasingly popular with retail traders.'

Elon Musk is still tweeting stuff. We might have reached the stage where, when Elon Musk tweets about Bitcoin, the way to figure out if he's saying something positive or negative is not by trying to parse the words of the tweet but by looking at whether the price of Bitcoin goes up or down.

'Talen Energy Corp., a debt-laden power producer operating in the U.S. Northeast and Texas, unveiled a sweeping plan to focus more on clean energy and expand into crypto mining. Its bondholders aren't sold.' I remember a time when absolutely any company — Long Island Iced Tea Corp., to take a famous example — could make its stock go up by mumbling something about crypto. I assume that was always harder with *bonds*, but in any case it's much harder now.

It cannot possibly be true, but it does *feel like* I have been reading stories about how Ethereum is about to switch to a proof-of-stake-based system for as long as I've been alive. Here's one from yesterday.

Art Stuff

Friend of Money Stuff Sarah Meyohas, who was an NFT artist *avant la*

racket:

Long before Beeple's digital collage fetched tens of millions of dollars at auction, Ms. Meyohas was experimenting with using the blockchain technology behind bitcoin to make art. The result looked a lot like the so-called nonfungible tokens that have powered millions in art sales in recent months, along with NBA Top Shot and other digital collectibles. NFTs are similar to bitcoin: Each one is unique, allowing them to act like deeds proving ownership of digital assets.

Ms. Meyohas's work places her at the vanguard of this art-world revolution. She will be relaunching an early project, Bitchcoin, on the Ethereum network, with a public presale at Phillips auction house on May 25. Her 2015 project sold tokens entitling investors to portions of her photographic prints. The new Bitchcoins will be backed by flower petals from a previous work called "Cloud of Petals."

"Big artists are like central banks, you control the supply, you have to show it at museums, it has to be appreciated culturally, and you create a market for your work," said Ms. Meyohas in a recent interview. "The extreme of this is the artist becomes the currency."

Here is where I was going to say that I first wrote about Meyohas when she manipulated the prices of penny stocks and then painted the resulting stock charts, but the Journal article helpfully explains that too:

Her 2016 "Stock Performance" earned Ms. Meyohas attention from Wall Street. In that work, she day-traded from Manhattan's 303 Gallery, attempting to shift the share prices of various small, thinly traded companies. Then she painted the resulting stock charts. The paintings sold for \$10,000, and the residency earned nationwide media coverage, with fans including Bloomberg financial columnist Matt Levine.

Not wrong. A fun fact is that Meyohas's undergraduate degree is from Wharton, surely the best possible training ground for a contemporary artist. If you want to make contemporary art, studying anatomy and practicing drawing is surely less valuable than learning about derivatives and market structure.

Elsewhere in artist friends of Money Stuff, Zoe Piel, whom you may

remember from the brilliant “Unlocking Braden’s Potential” has a new thing called “The Marvelous Money Machine.” If you’ve ever sent Dogecoins to an Elon Musk impersonator it will feel uncomfortably familiar!

And elsewhere in art: “This is the only major art discovery made in our lifetimes, apart from the occasional Caravaggio or something,” says a guy, somehow *not* about NFTs.

NFT NFT NFT

Elsewhere in the NFT racket, here’s an email I got about this event:

On May 27th, famed Marvel and DC Comics artist Rob Prior will burn his original painting on camera and unveil the digitized NFT after the burn during a live-stream event.

The painting, which is inspired by the Wolf of Wall Street, will have fiat money falling from the sky; it will be burnt to demonstrate that the future of art, and Wall Street, is meant to be on the blockchain.

Prior’s painting will only live on as a digitized ERC1155 NFT and will be auctioned exclusively on the Mogul platform. Rob will also be live painting and unveiling his next two NFT drops during the event, including a Marvel-inspired Deadpool rendition and a Star Wars painting of Luke Skywalker.

He apparently did this last month too? Look. I write a lot around here about what I have called the “‘object-fire-token-money’ NFT cycle,” where you take a painting or other art object, light it on fire, and then sell an NFT “of” the burning of the painting. And while I initially thought I was kidding, it does increasingly seem like this is just how NFTs work: The default way to create an NFT is that you make or buy a painting and then destroy it, and that that combination *is* an NFT.

At one level, I get it: Erasing other art, commenting on the commercialization of art, making art of impermanence and absence, these are all common and frankly now somewhat clichéd gestures in the artistic tradition, and the rise of NFTs has reinvigorated those gestures and overlaid some techno-futuristic excitement onto them.

On the other hand, this is very very stupid and everyone should knock it off. I wrote the other day that the end result of the NFT craze will be “that the concept of burning art on the blockchain becomes reliably more valuable than actual art, so that all of the world’s paintings are burnt up to increase their value.” That’s bad! I don’t want that! I want artists to

consider the possibility that the fashion for crypto-graphic tokens representing the burning of art might not last as long as the fashion for, you know, pretty paintings to hang on the wall, and eventually you might wish you had the paintings instead.

Also the possibility that this burning-stuff-for-NFTs thing is really hackneyed and boring and actually has nothing interesting to say!

Also the fact that the “object-fire-token-money” cycle is not *necessary* to the nature of NFTs; you can make a non-fungible token representing an *existing* artwork rather than just one that you’ve destroyed. (As Sarah Meyohas does with the rose petals, or Unisocks with the socks, etc.) I suppose there is a theoretical problem here in that if you have a blockchain reference to a painting, and also the physical painting, someone could separate them and then you might have questions about ownership, which is the “real” work, etc. But that’s good! If you burn the painting you answer those questions in the dumbest and bluntest possible way: “Only the blockchain pointer is real because I destroyed the physical object.” If you don’t destroy the painting then those questions become subtler and more interesting.

Anyway to the extent that this column is influential on trends in financial art, which, lol, is no extent at all, let me say again: Knock it off with the burning of the paintings! Make more interesting NFTs!

Things happen

Inside the Race to Avert Disaster at China’s Biggest ‘Bad Bank.’ Theranos CEO’s Lavish Lifestyle Ruled Fair Game for Trial. Elizabeth Holmes Jury to Hear of Faulty Theranos Tests From Patients. China Targets ‘Speculators and Hoarders’ to Stop Commodity Boom. Jack Ma to step down as president of his elite business school. Shale Drillers Cabot, Cimarex to Merge in \$7.4 Billion Deal. Gupta’s GFG Touts ‘Progress’ in Debt Talks With Credit Suisse. Why Asian Americans on Wall Street from Goldman Sachs to Wells Fargo are breaking their silence. ‘Woke capitalists’ provoke backlash from US conservatives. Bosses Still Aren’t Sure Remote Workers Have ‘Hustle.’ Silicon Valley Wants Dogs to Live Longer So Humans Can, Too. A Fungus Is Pushing Cicada Sex Into Hyperdrive And Leaving Them Dismembered. Cannibal Mice Plague Threatens Sydney Homes and Australian Farms.

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[1] This is all somewhat tongue-in-cheek and I recognize that “private

wealth management in the 1800s was not quite the mass business that it is today. Anyway here's a claim that cold calling was invented in 1873, a few years before the telephone, though I suspect that, like, medieval peddlers would disagree.

[2] I wrote a more complicated version of it earlier this year. To be clear, I have no idea of the *mechanics* of how Robinhood plans to get shares, if it's trying to partner with big banks or pitch issuers directly or something else. In any case this pitch to issuers is what makes it feasible.

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From: Le, Tuongvy T
Sent: 2021-09-22T18:00:27Z
Subject: FW:
Received: 2021-09-22T18:00:27Z
[The TradFi to Crypto Pipeline \(@VirtualElena\).docx](#)

-----Original Message-----

From: Le, Tuongvy T (b)(6) [redacted]@SEC.GOV>
Sent: Wednesday, September 22, 2021 10:16 AM
To: Le, Tuongvy T (b)(6) [redacted]@SEC.GOV>
Subject: FW:

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From: Tuongvy Le (b)(6) [redacted]
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Subject:

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The TradFi to Crypto Pipeline

An unaudited introductory syllabus by [@VirtualElena](#)

These are some of the foundational texts and personal obsessions I discovered while first learning about the world of crypto. I've put together a reading list intended mostly for people in traditional finance who are curious about the space. With that in mind, the resources below are mostly focused on stuff like transactions/payments, decentralized finance, dApps, DAOs, and MEV. In the interest of keeping this as slim and approachable as possible, I've excluded reading related to NFTs, crypto-gaming, the regulatory landscape. This is not meant to be a comprehensive/prescriptive list -- more so an orientation and catalyst for more exploration. As always, click all the hyperlinks and then DYOR :)

This reading list looks mostly at activity on the Bitcoin and Ethereum blockchains. There are also plenty of L1s that you should explore, as they're beginning to see serious adoption: a list of the top chains by total value locked is available on [DefiLlama](#).

Protocols and smart contracts have source-code available for anyone to view, so you can do a lot of digging and discovery there. There are also countless Discord servers to join, lower-profile tokens and protocols to discover (again...exercise good judgement and DYOR), and plenty of whitepapers to be read. Follow your curiosity.

Beginnings (Bitcoin, Headless Brands, Early Applications...)

The Bitcoin Whitepaper (Satoshi Nakamoto) - <https://bitcoin.org/bitcoin.pdf>

Headless Brands (Toby Shorin, Laura Lotti, Sam Hart, Brian Lehrer) - a fantastic essay published in 2019 from some of the folks at Other Internet that looks at the emergence of Bitcoin and other decentralized protocols as "Headless Brands" -- in other words, ideas in which every user is a stakeholder and no one individual is the pilot:

<https://otherinter.net/research/headless-brands/>

Plus a fun related thread in the Bitcoin Forum from 2010, illustrating the communal effort to give Bitcoin a "brand" in the form of the now widely-recognized BTC logo: <https://bitcointalk.org/index.php?topic=41.msg238#msg238>

The VCs ask...what's next?

I found this sequence of posts from [Fred Wilson](#), [Chris Dixon](#), and [Adam Ludwin](#) all published within a few weeks of each other 2014 to be a really interesting harbinger of what kinds of applications would soon arrive, not on the Bitcoin blockchain (as they were envisioning), but on Ethereum (which officially launched in 2015).

The Bitcoin Hype Cycle (Fred Wilson) <https://avc.com/2014/09/the-bitcoin-hype-cycle/>

Bitcoin Price and Promise (Fred Wilson) <https://avc.com/2014/10/bitcoin-price-and-promise/>

Some Ideas for Native Bitcoin Apps (Chris Dixon) <https://cdixon.org/2014/10/04/some-ideas-for-native-bitcoin-apps>

Bitcoin's Killer Apps: A Look Into the Future (Adam Ludwin) <https://www.coindesk.com/bitcoins-killer-apps-look-future>

Eth Time

The Ethereum Whitepaper (Vitalik Buterin) <https://ethereum.org/en/whitepaper/>

A Prehistory of the Ethereum Protocol (Vitalik Buterin) - <https://vitalik.ca/general/2017/09/14/prehistory.html>

The Meaning of Decentralization (Vitalik Buterin) - <https://medium.com/@VitalikButerin/the-meaning-of-decentralization-a0c92b76a274>

Ethereum is the Forefront of Digital Currency (Fred Ehrsam) - <https://blog.coinbase.com/ethereum-is-the-forefront-of-digital-currency-5300298f6c75>

Blockchain Tokens and the dawn of the Decentralized Business Model (Fred Ehrsam) - <https://blog.coinbase.com/app-coins-and-the-dawn-of-the-decentralized-business-model-8b8c951e734f>

Crypto Tokens: A Breakthrough in Open Network Design (Chris Dixon) - <https://medium.com/@cdixon/crypto-tokens-a-breakthrough-in-open-network-design-e600975be2ef>

Progressive Decentralization: A Playbook for Building Crypto Applications (Jesse Walden) - <https://a16z.com/2020/01/09/progressive-decentralization-crypto-product-management/>

Crypto's Business Model is Familiar. What Isn't is Who Benefits (Jesse Walden) - <https://a16z.com/2020/04/08/crypto-network-effects/>

Scaling - (Ethereum Foundation) <https://ethereum.org/en/developers/docs/scaling/>

A good introductory orientation on scaling solutions for Ethereum

- If you want to read more about Ethereum scaling solutions specifically, the blog "[What's New in Eth2](#)" is a great resource.

The Dao of DAOs (Packy McCormick) - <https://www.notboring.co/p/the-dao-of-daos>

DAO Landscape (Cooper Turley) - https://coopahtroopa.mirror.xyz/_EDyn4cs9tDoOxNGZLfKL7JiLo5rGkkEfRa_a-6VEWw

DeFi (Decentralized Finance)

With these resources, be sure to check the dates. Some of the stats related to things like TVL (total value locked) and revenue may be a bit outdated. For ongoing market data, I recommend looking at sites like:

- <https://defipulse.com/> (NOTE: I would recommend reading the whitepapers and perhaps more importantly...directly interacting with the protocols on this list with your crypto wallet)
- <https://duneanalytics.com/home>
- <https://cryptofees.info/>
- And also look at data available on the sites of many of the protocols themselves, which have constant updates on things like TVL, lending rates, and APYs

DeFi 101 (Uncommon Core podcast with Hasu and Su Zhu)

<https://open.spotify.com/episode/7Ir4dMAnKWYXVj0lNQLJVK?si=d8ccdabcbefef4811>

This is a particularly fun intro to DeFi podcast for so many reasons. It was recorded in June, 2020 (right when I was beginning to fall down the crypto rabbit hole and right when DeFi summer was in full swing), and the most striking thing about it is just how nascent the industry was at this point. So nascent, that a lot of this stuff is new to [Hasu](#) (...so to hear him learning in real time from Su Zhu is truly cool.). They go through a lot of introductory concepts (decentralized vs centralized exchanges) and round up a couple of the largest protocols today ([Uniswap](#), [Compound](#), [Aave](#), [Curve](#), [Synthetix](#), and [MakerDAO](#)). It's also worth noting that some of the stuff they say is outdated (not their fault, the industry moves fast!). Some of the stuff that happened after the podcast was recorded: at one point, Su remarks that there aren't any large anonymous DeFi protocols...this changed in August with the launch of [Sushiswap](#). Other things that have changed since the recording include (but aren't limited to): there are now many synthetic asset products available thanks to protocols like [UMA](#) and [Mirror Finance](#); [Compound will begin using Chainlink's oracle feed](#) (on the pod, they said that Compound doesn't publish from where they get their price feed), and Uniswap hadn't yet launched a token. But it's still worth a listen (though again, some stuff isn't totally up to date).

FinTech 3.0 Re-Architecting Financial Market Infrastructure & DeFi (John Street Capital) - <https://john-street-capital.medium.com/fintech-3-0-re-architecting-financial-market-infrastructure-defi-b554c634f261>

To be honest, one of the best high-level overviews of TradFi/Fintech vs DeFi I've ever read.

DeFi's Two Cultures (Graeme Boy) -

https://q.mirror.xyz/KJFMrrKHwv2pAygNy3WFECICSqHISOPn8EWEJYR_YOc

A fun, almost anthropological look at the landscape of DeFi.

Crypto Market Structure 3.0 (Arjun Balaji) -

<https://www.paradiqm.xyz/2020/10/crypto-market-structure-3-0/>

So You Want To Use a Price Oracle (Samczsun) -

<https://www.paradigm.xyz/2020/11/so-you-want-to-use-a-price-oracle/>

Analyst Brain

If you still haven't shaken the DCF-tinted glasses that frame your worldview, here are a few good posts that take DeFi protocols and give them the TradFi treatment. None of this is investment advice or endorsement.

How DAOs Should Approach Treasury Management (Shreyas Hariharan) -

<https://newsletter.banklesshq.com/p/how-daos-should-approach-treasury>

Crypto Banking 101 (Sébastien Derivaux) -

<https://medium.com/@sebastien.derivaux/crypto-banking-101-ece9f1c2b031>

MEV

MEV (Miner Extractable Value or Maximal Extractable Value, depending on the chain/PoW vs PoS) is probably one of the most fascinating crucibles within crypto right now. It's impossible to understand how a system really works until you understand how people are trying to exploit it -- so if you want to understand how participants on the Ethereum blockchain actually behave, understanding MEV is a good place to start. Depending on who you are (and how MEV is being used), you either think that MEV is a fundamentally destabilizing force, something that attracts developers, capital, and talent to Ethereum, or somewhere in the middle if it's monitored and mitigated effectively (hence the emergence of the organization [Flashbots](#)). Another great thing about Flashbots specifically is that they put out really helpful research on how MEV dovetails with a number of changes in the Ethereum ecosystem -- e.g. if you want to understand the transition from proof-of-work to proof-of-stake, or changes to fee mechanisms like EIP-1559, the lens of MEV will illuminate not only MEV, but the changes to Ethereum in question.

Flash Boys 2.0: Frontrunning, Transaction Reordering, and Consensus

Instability in Decentralized Exchanges (Philip Daian, Steven Goldfeder, Tyler Kell, Yunqi Li, Xueyuan Zhao, Iddo Bentov, Lorenz Breidenbach, Ari Juels) -

<https://arxiv.org/pdf/1904.05234.pdf>

Ethereum is a Dark Forest (Dan Robinson and Georgios Konstantopoulos) -

<https://www.paradigm.xyz/2020/08/ethereum-is-a-dark-forest/>

Escaping the Dark Forest (samczsun) - <https://samczsun.com/escaping-the-dark-forest/>

Quantifying MEV: Introducing MEV-Explore v0 (Alex Obadia) -

<https://medium.com/flashbots/quantifying-mev-introducing-mev-explore-v0-5ccbee0f6d02>

MEV in eth2 - an early exploration (Alex Obadia and Taarush Vemulapalli) - <https://hackmd.io/@flashbots/mev-in-eth2>

The State and Future of MEV (Hasu, Phil Daian, Dan Robinson, Georgios Konstantopoulos, Vitalik Buterin, Mahimna Kelkar) - <https://www.youtube.com/watch?v=s3nACF7uVZw&t=17490s>
Funnily, they spend the last ~3 minutes or so of this panel comparing controversies re: MEV to Robinhood's tensions around payment for order flow. What is old is new again, eternal recurrence, etc.

MEV and EIP-1559 (Kristof Gazso & Alejo Salles) <https://hackmd.io/@flashbots/MEV-1559>

Thread of MEV-related Tweets - Robert Miller (<https://twitter.com/bertcmiller/status/1402665992422047747>)

Flashbots Github - <https://github.com/flashbots/pm>

MEV Explore - <https://explore.flashbots.net/>

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From: Jacobs, Elizabeth
Sent: 2021-10-01T10:22:46Z
Received: 2021-10-01T10:22:46Z

- [Algorithms could guide life-changing decisions. But they need work__ Financial Times.pdf](#)
- [Inside the battle to be Europe's Robinhood__ Financial Times.pdf](#)
- [Will the next web be built on ethereum__ Financial Times.pdf](#)
- [China Proposes Three-Year Plan to Regulate Algorithms.pdf](#)

Ethereum

Will the next web be built on ethereum?

Developers are flocking to the platform's blockchain but nimbler rivals are emerging



© FT montage; Dreamstime

Richard Waters in San Francisco 6 HOURS AGO

Is ethereum the future of the internet?

Interest in the ethereum blockchain has soared over the past year, as developers have turned to it to create a wave of decentralised finance projects, known as DeFi, and unique digital tokens called NFTs.

The rise of new applications like these — among the first running on a public blockchain — have already created what supporters claim is a powerful network effect, as increasing activity brings more and more developers to ethereum. That could make it the platform of choice for what has become known as Web 3.0, where a series of decentralised apps could one day challenge Big Tech's offerings.

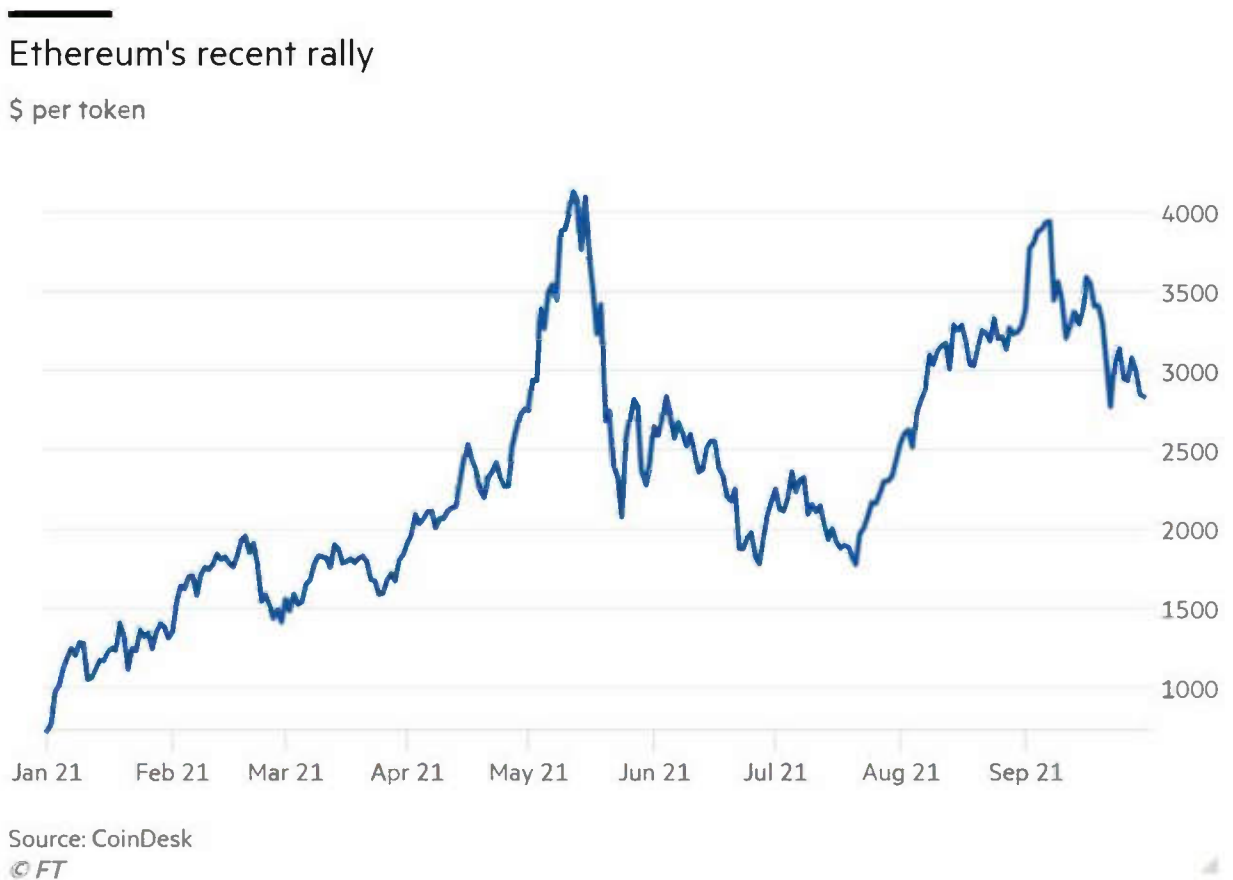
“Sixty to 70 per cent of the industry runs on ethereum. It's very sticky,” said Sandeep Nailwal, co-founder of Polygon, one of a growing number of companies that operate on top of ethereum.

As a result, the price of ethereum's currency, known as ether or eth, which is used to pay for the computing power needed to run the blockchain, has jumped ninefold. At around \$350bn, the outstanding tokens on ethereum are now worth more than 40 per cent as much as all the bitcoin in issue, more than double the proportion of a year ago.

But there remain fundamental questions over whether ethereum, which is heavily behind schedule with a complex set of technical upgrades, will be able to compete with nimbler rivals, and whether any consensus will emerge on its long-term role as the crypto world evolves.

“There isn’t a shared narrative in the ethereum ecosystem,” said Avichal Garg at Electric Capital, an investment firm in San Francisco. “Is it a commodity like oil, digital gold, a better bitcoin?”

Until the investment world decides on an answer, the price of ethereum’s tokens, is likely to be volatile, he and others warned.



The rally in the price of eth has been powered by two hopes. One is that ethereum has entered a new phase in which the number of tokens in circulation will grow far more slowly than it has in the past, or even shrink. For financial speculators, that has raised the possibility that its tokens will become more like bitcoin.

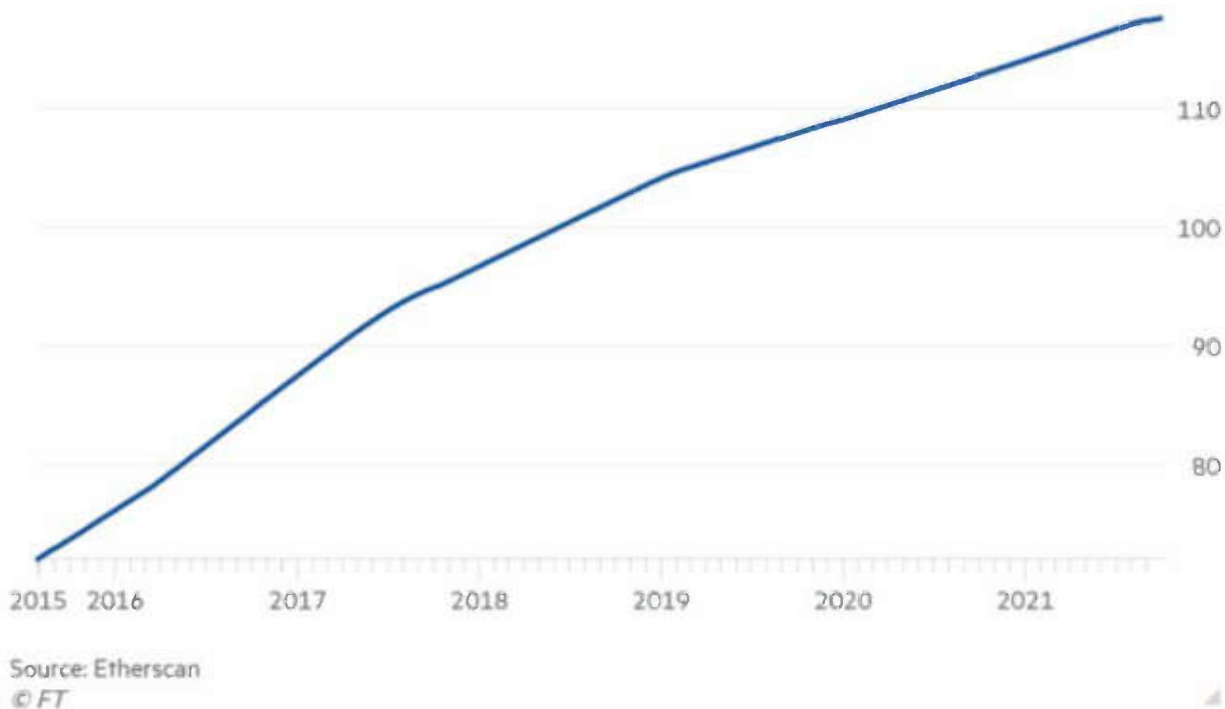
The supply of tokens has already been reduced following a change last month to the way transactions are validated on the network. Some of the eth tokens that were previously paid in fees to miners who validate transactions are now destroyed, or “burnt”.

Another big step could come late this year or early next, when the blockchain is due to move away from its current “proof of work” system, which relies on miners committing their computing power to the network in exchange for rewards.

Instead, it will be based on “proof of stake”, in which validators participate by lodging some of their eth holdings. Along with the environmental benefits that come from cutting processing demands, the move has big monetary implications.

Ethereum's growth is set to slow

Number of tokens in circulation (m)

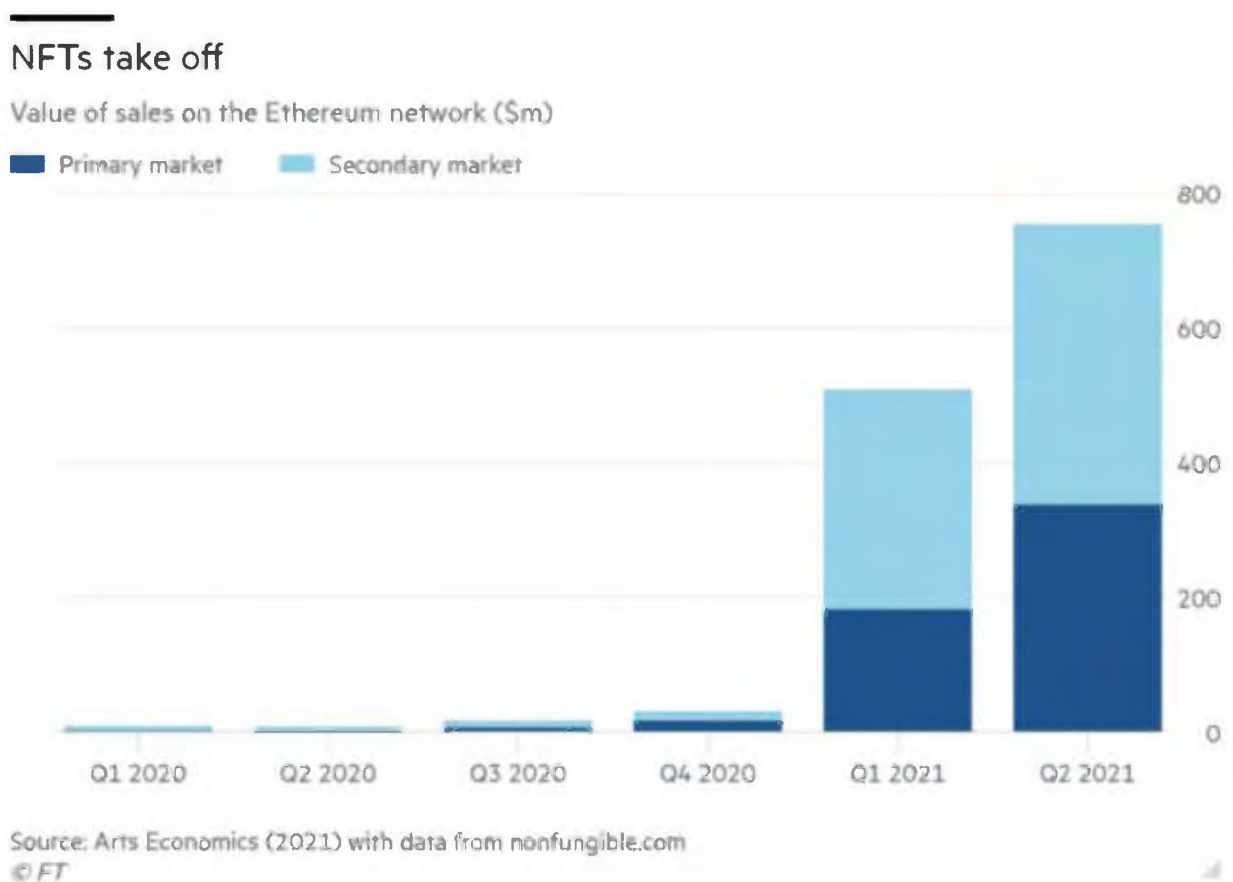


A proof of stake chain was launched to run in parallel late last year. Some 6 per cent of the supply of eth has already been lodged there by holders to back transactions, earning holders an annual return of up to 5 per cent — an early sign, according to the bulls, of how much eth will be taken out of circulation once the full transition is completed.

Until now, eth has been viewed as the crypto equivalent of oil, said Ninos Mansor at Arrington XRP Capital, a crypto investment firm — a commodity that is consumed to fuel the digital economy but where there is no cap on supply. But a big reduction in supply of the tokens could change that, making it more attractive to investors interested in a deflationary asset, he added.

Unlike bitcoin, however, ethereum was not founded on a clear monetary vision or with an upper ceiling to the number of tokens that can be created. [Vitalik Buterin](#), ethereum's founder and lead evangelist, has said only that it will adapt to whatever needs its users have for it. That has left open the possibility of further changes in how tokens are created, and hence the long-term supply of eth, said Mansor.

The second hope behind this year's price spike is that ethereum will be a core part of the infrastructure because of its "smart contracts" function, software code that automatically executes when certain conditions are met and which enables peer-to-peer decentralised finance projects, for example.



Yet the network's capacity is severely limited, and a series of proposals to relieve the pressure is years behind schedule.

The network's maximum capacity of only around 15 transactions per second has meant that, at busy times, the so-called "gas" fees to use it have been bid up to high levels, squeezing out all but the most high-value transactions. That is one reason that financial applications have come to play a much bigger role on the network this year, according to Buterin.

Meanwhile, newer blockchains with greater processing capacity, including Avalanche, Solana and Cardano, have sprung up.

“What you’re seeing globally is a rush to scale — and there aren’t that many that are scalable,” said [Emin Gün Sirer](#), founder of Avalanche, which last week disclosed that it had raised \$230m through a recent sale of tokens.

The new blockchains have been heavily backed but are yet to prove themselves. The price of tokens on the Solana blockchain has more than quadrupled since the start of August as it has become the platform for the sale of new collections of NFTs such as the Degenerate Ape Academy. But a technical failure earlier this month meant the network suffered a 17-hour outage.

While ethereum’s limitations have provided an opening for newer blockchains, the network’s supporters claim its early lead in smart contracts will be unassailable.

The hopes rest heavily on the large number of developers who are already creating applications using its technology. Solidity, the blockchain’s programming language, has become as much a part of life for crypto developers as javascript is among web developers, said Nailwal, the co-founder of Polygon.

To attract more developers, most of the new blockchains let them run their applications in “ethereum virtual machines”, creating bridges back to the ethereum blockchain and maintaining the demand for eth to secure transactions in their applications.

Other mechanisms that are starting to bring relief from the transaction processing bottleneck include so-called “layer two” networks like Polygon. These run on top of ethereum and take some of the strain, for instance acting as aggregators that process transactions on their own networks before batching them up and lodging them on the ethereum blockchain in a single transaction.

According to supporters, today’s layer two networks contain the seeds of a wider technology industry that is starting to take shape, with ethereum at its heart. “We believe it will be a multi-chain world — but on ethereum,” said Nailwal.

“There should eventually be space for all applications,” said Dan Finlay at Metamask, which offers wallets on ethereum and claims more than 10m users. But he added: “We’re still at a stage where a lot of scaling strategies are being tried at once. I don’t think any of them has been validated yet.”

Ethereum itself, meanwhile, has embarked on a series of changes to its own network. The planned shift to proof of stake has become the biggest technical hurdle but is only one step in a series that could take years to play out.

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Another involves “sharding” the network — splintering it into 64 separate but linked ledgers, reducing the strain on each node in the network by no longer requiring it to validate every transaction. Buterin says he is also working on other changes to the underlying protocol to reduce the load on nodes, and says he is optimistic that within two years some of these initiatives will have greatly increased capacity.

“The success of the currency will rely on ethereum opening up more,” said Jack O’Holleran, CEO of Skale, a network that operates on top of ethereum. “It will become the global settlement layer” for decentralised applications of all kinds, he and others

predict.

But with ethereum’s long-term role still a matter of debate, investors like Garg warn, the cryptocurrency markets could be overdue for a reversal that will see bitcoin vault back to unquestioned dominance.

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From: (b)(6); (b)(7)(C)
Sent: 2022-02-08T20:04:59Z
Subject: RE: Ex 3
Received: 2022-02-08T20:04:59Z
[PA-3.pdf](#)

From: Bridget Lombardoizzi (b)(6); (b)(7)(C) @aim.com>
Sent: Tuesday, February 8, 2022 12:27 PM
To: (b)(6); (b)(7)(C) @SEC.GOV>
Subject: Re: Ex 23

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Thank you!

-----Original Message-----
From: (b)(6); (b)(7)(C) @SEC.GOV>
To: Bridget Lombardoizzi <(b)(6); (b)(7)(C) @aim.com>
Sent: Tue, Feb 8, 2022 12:25 pm
Subject: RE: Ex 23

From: Bridget Lombardoizzi (b)(6); (b)(7)(C) @aim.com>
Sent: Tuesday, February 8, 2022 12:22 PM
To: (b)(6); (b)(7)(C) @SEC.GOV>
Subject: Re: Ex 1 & 2

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Thanks (b)(6); (b)(7)(C) Do you have Ex 23?

-----Original Message-----
From: (b)(6); (b)(7)(C) @SEC.GOV>
To: Bridget Lombardoizzi (b)(6); (b)(7)(C) @aim.com>
Sent: Tue, Feb 8, 2022 9:18 am
Subject: Ex 1 & 2

Hi Bridget,
Exhibits 1 and 2 are attached.
Thank you.
Stella

Kind Regards,

(b)(6); (b)(7)(C)

U.S. Securities and Exchange Commission
NYRO – Division of Enforcement
Brookfield Place
200 Vesey Street, Suite 16-209
New York, NY 10281-1022
Direct: (b)(6); (b)(7)(C)

To: Bridget Lombardozzi (b)(6); (b)(7)(C) @aim.com] Document 34-4 Filed 06/20/25 Page 491 of 601
From: (b)(6); (b)(7)(C) Case 1:24-cv-01858-AGR
Sent: 2022-02-09T00:06:17Z
Subject: Re: 2-8-22 ROUGH DRAFT ONLY - ADRIAENS SEC v Ripple 220208BLO
Received: 2022-02-09T00:06:17Z
[2-8-22 SEC v Ripple \(ROUGH DRAFT ONLY - ADRIAENS\).txt](#)

Thanks Bridget!

Sent from my iPhone

On Feb 8, 2022, at 7:03 PM, Bridget Lombardozzi (b)(6); (b)(7)(C) @aim.com> wrote:

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Good evening, Counsel:
Attached is the ROUGH DRAFT ONLY transcript of the deposition of Peter Adriaens taken today.

Thank you and have a good night!

Bridget Lombardozzi, CSR, RMR, CRR
Gradillas Court Reporters

To: (b)(6)
From: Jacobs, Elizabeth
Sent: 2021-06-08T11:14:11Z
Received: 2021-06-08T11:14:12Z
[WEF_DeFi_Policy_Maker_Toolkit_2021.pdf](#)

In collaboration with
the Wharton Blockchain and Digital Asset Project



Decentralized Finance (DeFi) Policy-Maker Toolkit

WHITE PAPER
JUNE 2021

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Contents

3	Foreword
4	Executive summary
5	1 What is DeFi?
6	1.1 Distinguishing characteristics
7	1.2 The DeFi architecture
10	1.3 DeFi service categories
12	2 Risks
14	2.1 Financial
15	2.2 Technical
16	2.3 Operational
18	2.4 Legal compliance
18	2.5 Emergent risks
20	3 Policy approaches
21	3.1 DeFi and financial regulation
22	3.2 Available policy tools
24	3.3 Decision tree
25	Conclusion
26	Appendix 1: Background assessment
28	Appendix 2: Stakeholder mapping tool
30	Appendix 3: Decentralization spectrum
31	Appendix 4: DeFi policy-maker canvas
34	Contributors
35	Acknowledgements
36	Endnotes

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Foreword



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Decentralized finance (DeFi) is an emerging and rapidly evolving area in the blockchain environment. Although examples of DeFi have existed for several years, there was a sudden upsurge of activity in 2020. In one year, the value of digital assets¹ locked in DeFi smart contracts grew by a factor of 18, from \$670 million to \$13 billion; the number of associated user wallets grew by a factor of 11, from 100,000 to 1.2 million; and the number of DeFi-related applications grew from 8 to more than 200.² This growth in turn has stimulated interest from both the private and public sectors.

DeFi aims to reconstruct and reimagine financial services on the foundations of distributed ledger technology, digital assets and smart contracts. As such, DeFi is a noteworthy sector of financial technology (fintech) activity.

However, serious questions remain:

- What, if any, are the distinctive aspects of DeFi? What distinguishes a DeFi service from a similar service based on traditional finance?
- What are the opportunities and potential benefits of DeFi? To whom will these benefits accrue – and who might be excluded or left behind?
- What are the risks – individual, organizational and systemic – of using DeFi? How do these risks apply to clients, markets, counterparties and beyond?

- Can DeFi become a significant alternative to traditional financial services? If so, will there be points of integration? If not, what if anything will DeFi represent in the market?
- What novel legal and policy questions does DeFi raise? How should policy-makers approach DeFi? What options exist for addressing these questions?

Notably, the DeFi space is relatively nascent and rapidly evolving, so the full scope of risks and potential for innovation remain to be seen – and there are unique challenges in regulating and creating policies for such a new and changing area. This report does not recommend any one single approach; instead, it is designed as a set of tools that can be applied in light of the legal contexts and policy positions of each jurisdiction, which may vary. In the appendices we offer a series of worksheets and other tools to assist with the evaluation of DeFi activities. A companion piece, [DeFi Beyond the Hype](#), provides additional detail about the major DeFi service categories.

Our hope is that this resource will enable regulators and policy-makers to develop thoughtful approaches to DeFi, while helping industry participants understand and appreciate public-sector concerns. It is the result of an international collaboration among academics, legal practitioners, DeFi entrepreneurs, technologists and regulatory experts. It provides a solid foundation for understanding the major factors that should drive policy-making decisions.

Executive summary

Decentralized finance (“DeFi”) is a broad term for financial services that build on top of the decentralized foundations of blockchain technology. The space has evolved since the 2015 launch of the Ethereum network, which laid the groundwork by implementing blockchain-based smart contracts.³ There has been increased interest recently, paralleling the 2013 spike in bitcoin price and the 2017 boom in initial coin offerings.⁴ As new DeFi services aspire to reinvent elements of financial services, and billions of dollars of digital assets are pledged to DeFi capital pools, policy-makers and regulators face significant challenges in balancing its risks and opportunities.

DeFi proponents say it can address challenges within the traditional financial system.^{5,6} Open-source technology, economic rewards, programmable smart contracts and decentralized governance might offer greater efficiencies, opportunities for inclusion, rapid innovation and entirely new financial service arrangements.⁷ On the other hand, DeFi raises considerations related to consumer protection, loss of funds, governance complexities, technical risk and systemic risk. Significant incidents involving technical failures and attacks on DeFi services have already occurred.⁸ Moreover, questions remain about the actual extent of decentralization of some protocols – and associated risks, e.g. for manipulation – and whether DeFi is more than a risky new vehicle for speculation that may open the door to fraud and illicit activity.⁹

The purpose of this document is to highlight DeFi’s distinguishing characteristics and opportunities while also calling attention to new and existing risks – including the scope, significance and challenges of the fast-growing DeFi ecosystem. Understanding DeFi business models and the full set of relationships underlying DeFi is crucial for an accurate risk assessment and nuanced policy-making.

This toolkit:

- Provides an overview of the DeFi space generally, and the major classes of DeFi protocols, with tools to help understand the implications of new services
- Explores the potential benefits of the DeFi approach, along with the challenges that DeFi businesses will face
- Offers a detailed breakdown of the risks that DeFi may pose. Many of these are familiar concerns (although sometimes manifested differently), while others are unique to the decentralized, programmable and composable structure of DeFi
- Maps out potential legal and regulatory responses to DeFi

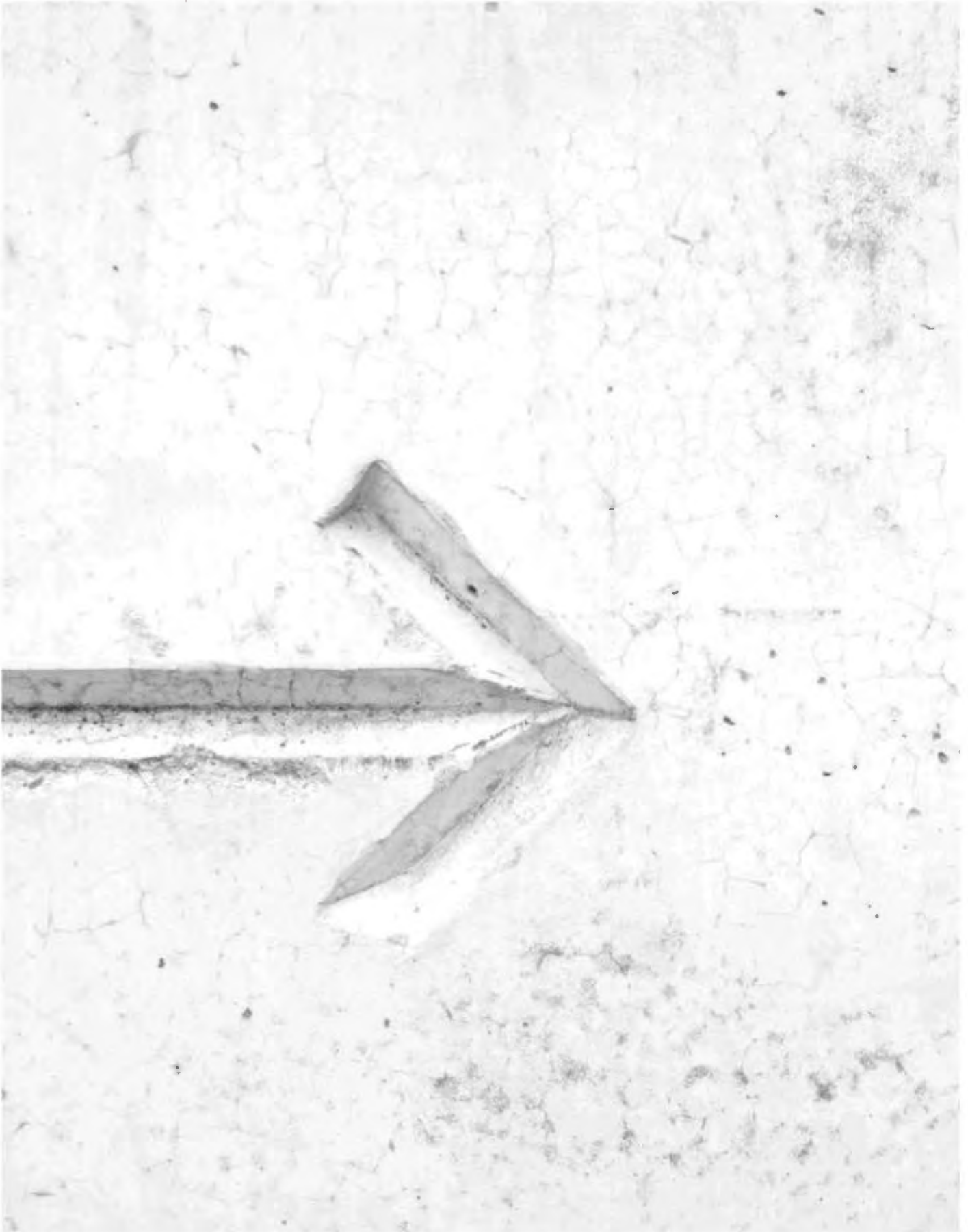
Our goal is not to recommend any specific actions universally, but to identify potential approaches and important considerations for the DeFi context. Financial regulatory regimes vary from jurisdiction to jurisdiction, as do policy-makers’ judgements about the relative risks and rewards. DeFi will raise further questions about whether regulators have the proper tools to address evolving market activity, and how they can assert jurisdiction over a set of technologies and stakeholders that is intrinsically borderless and global.

Appendix 1 offers a background assessment for policy-makers and regulators looking to understand whether DeFi may be relevant to their entity.

Appendix 2 provides a stakeholder mapping tool for DeFi services. **Appendix 3** outlines the decentralization spectrum, while **Appendix 4** provides a DeFi policy-maker canvas.

1

What is DeFi?



“DeFi” is a general term for an evolving trend. Broadly, it is a category of blockchain-based decentralized applications (DApps) for financial services. DeFi encompasses a variety of technologies, business models and organizational structures,¹⁰ generally replacing traditional forms of intermediation. DeFi transactions involve digital assets and generally operate on top of base-layer settlement platforms.

- **DeFi protocols** define software specifications and interfaces to create, manage and convert digital assets, building on a blockchain settlement layer.

- **DeFi services** implement DeFi protocols to create financial services, and associated functions such as specification of risk parameters and interest rates.¹¹

- **DeFi users** access DeFi services to transact.

DeFi services may be made available to users through centralized web applications or permissionless interfaces such as programmable wallets or smart contracts. They may be provided by a traditional controlling entity, a community around a non-profit entity or a *decentralized autonomous organization (DAO)*, in which rights and obligations are specified in smart contracts.

1.1 Distinguishing characteristics

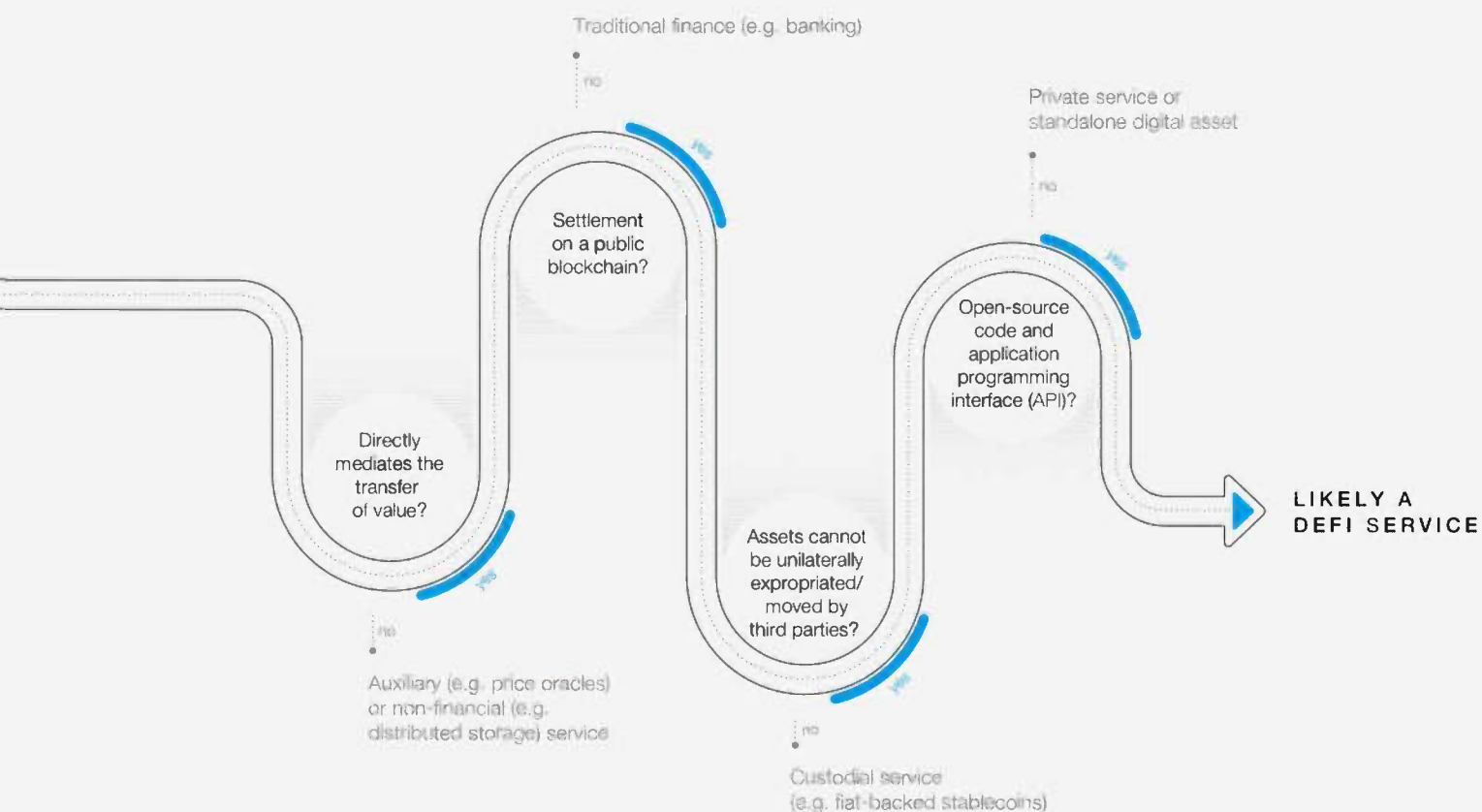
While the space is evolving quickly, we offer a functional description to distinguish DeFi from traditional financial services and auxiliary services. A DeFi protocol, service or business model has the following four characteristics:


1. **Financial services or products**
2. **Trust-minimized operation and settlement**
3. **Non-custodial design**
4. **Programmable, open and composable architecture**

Importantly, these characteristics represent the aspirations for DeFi. Businesses will exhibit each of these characteristics to varying degrees, and this may be fluid over projects' lifetimes.¹² Broadly speaking, the goal of DeFi solutions is to provide functions analogous to, and potentially beyond, those offered by traditional financial service providers, without reliance on central intermediaries or institutions.

Figure 1 provides a flow chart for evaluating whether an offering should be classified as DeFi.

FIGURE 1 DeFi classification flow chart



1.  **Financial services or products** means processing or directly enabling the transfer of value among parties. They are distinguished from information services, such as price feeds or storage, that only indirectly support value transfer.
2.  **Trust-minimized operation and settlement** means that transactions are executed and recorded according to the explicit logic of a DeFi protocol's predetermined rules, on a permissionless basis. That is, due to their availability through a decentralized settlement layer, transactions do not require trust in the counterparty or a third-party intermediary. While the platforms vary, DeFi projects generally build on public, permissionless blockchains.¹³ To date, most activity has been on the Ethereum blockchain, but activity is growing on other networks such as Algorand, Avalanche, Binance Smart Chain, Cosmos, EOS, NEAR, Polkadot, Solana and Tezos.¹⁴

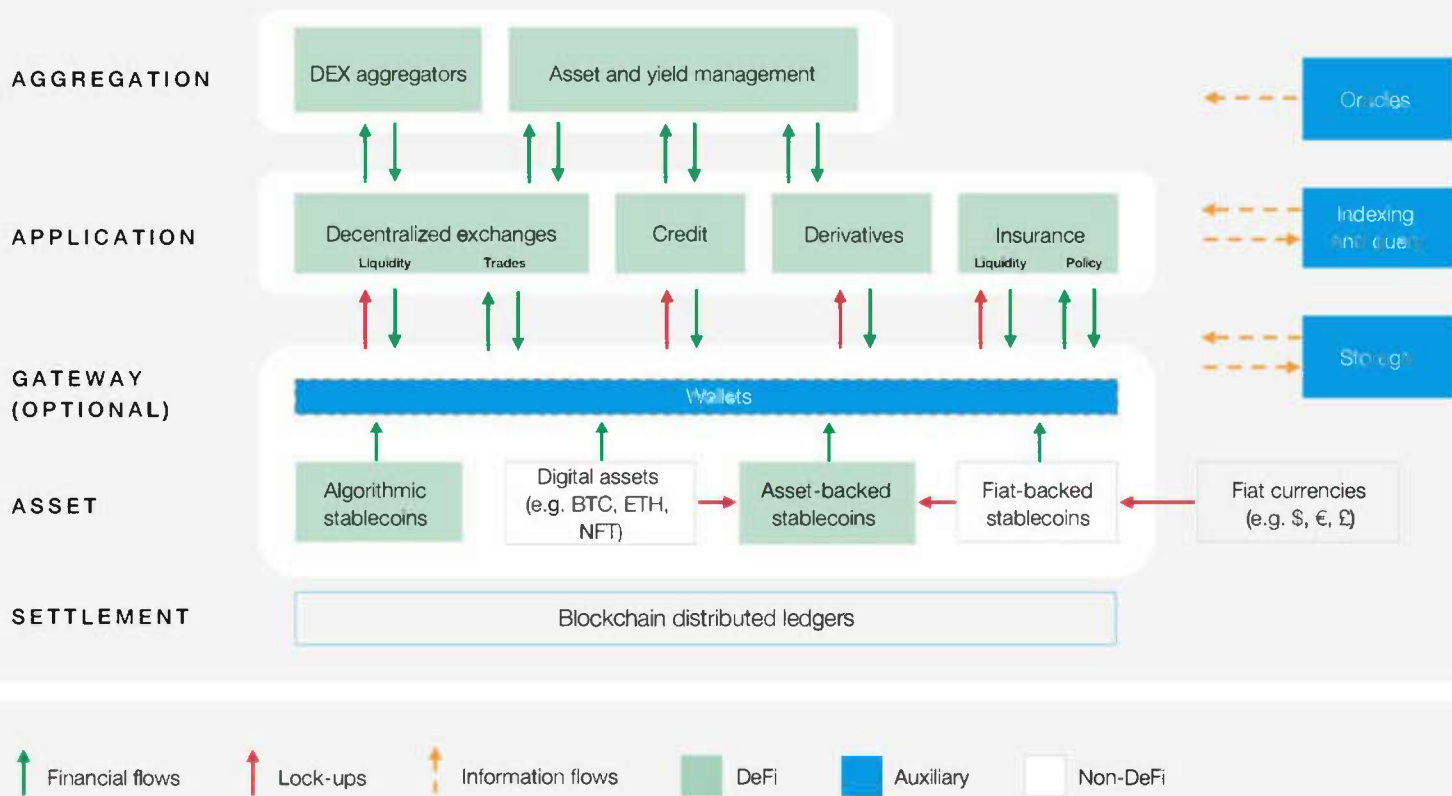
Service functionality is defined by a set of smart contracts. Both the settlement layer and the DeFi services have distinct governance structures – managed by one or more projects, communities or firms – that establish conditions for protocol changes. For example, a service may allow a volume of one token to be swapped for a corresponding volume of another token. This encompasses the price discovery, matching, execution and settlement functions of an exchange.
3.  **Non-custodial design** means that the assets issued or managed by DeFi services cannot be unilaterally expropriated or altered by parties other than the account owner, even those providing intermediation and other services.¹⁵ These tokens are subject only to the explicit logic of their smart contracts and the relevant DeFi protocols. Changes in those protocols, executed through the relevant governance structures, may affect the economic rights of digital asset holders.
4.  **Open, programmable and composable architecture** means that there is broad availability of the underlying source code for DeFi protocols and a public application programming interface (API) enabling service composability, similar to open banking¹⁶ for centralized financial services. The widespread use of *open-source code* allows participants to view and verify protocols directly, and to fork code – take source code and create an independent development – or to create derivative or competitive services. The use of *open interfaces* means that third parties can understand, extend and verify the integrity and security of the service. Together with the API, this enables access to functionality in an automated, permissionless way. It also allows for *programmability*: customizing and extending financial instruments dynamically. For example, the terms of a derivative may be specified at the time of its creation, and then enforced immutably through the decentralized settlement layer.

Composability means that these programmatic components can be combined to create financial instruments and services, including those incorporating multiple DeFi services and protocols. For example, a stablecoin may be used as the foundation for a derivative that is used as collateral on a loan and subject to an insurance contract. All of these services would be functionally interoperable, and the resulting instrument benefits from the common settlement layer of the underlying blockchain – but also faces common vulnerabilities.¹⁷ As the number of DeFi service providers and available protocols grows and competition increases, specialization, interoperability and composability can enable growth in the connection between these services, and the economic activity between them.

1.2 The DeFi architecture

Figure 2 is a conceptual overview of the DeFi “stack”.¹⁸ The base-layer blockchain system enables participants to securely store, exchange and modify asset ownership information, replacing the *execution and settlement* layer of conventional financial services. It also allows for the creation of digital assets in various forms, which are then incorporated into DeFi *applications*. Additional layers of applications may function as *aggregators*,

allowing users to shift among DeFi services, such as choosing an exchange based on real-time market factors. In this environment, digital assets may be transferred freely, based on contractual logic (financial flows) or they may be restricted from other uses to provide liquidity or collateral (lock-ups). There are also non-financial information flows that support the transaction activity.



Information and content external to the blockchain may also be incorporated into DeFi transaction flows through *oracle* services, which supply reliable data that is recorded outside the settlement layer. For example, a price feed may draw on external data and be delivered programmatically through a

smart contract. Such informational resources, as well as the wallet software and interfaces that help users store, transfer and manage assets interacting with DeFi services, are not themselves financial services and therefore we label them as *auxiliary* to DeFi.

Decentralized governance

Another dimension of the DeFi environment, not shown in Figure 2, is the implementation of decentralized governance mechanisms. Governance refers to the ways in which collective decisions are made, conflicts are resolved and changes to protocols are implemented. In DeFi, governance mediates activity between the applications and underlying settlement layer, including decisions such as altering interest rates or collateral requirements.

This new model raises several new questions for policy-makers and regulators, including:

- How are decisions made?
- How does accountability work?
- How does performance management work?

Many DeFi projects include a *governance token* that provides voting rights on certain governance decisions. Often these tokens are tradeable on exchanges, their value tied to scarcity and the activity level of the issuing DeFi service. Regulators will need to determine the appropriate classification of such tokens. It will be important to evaluate whether tokens are actually employed for governance or simply as a proxy for investment in the service.

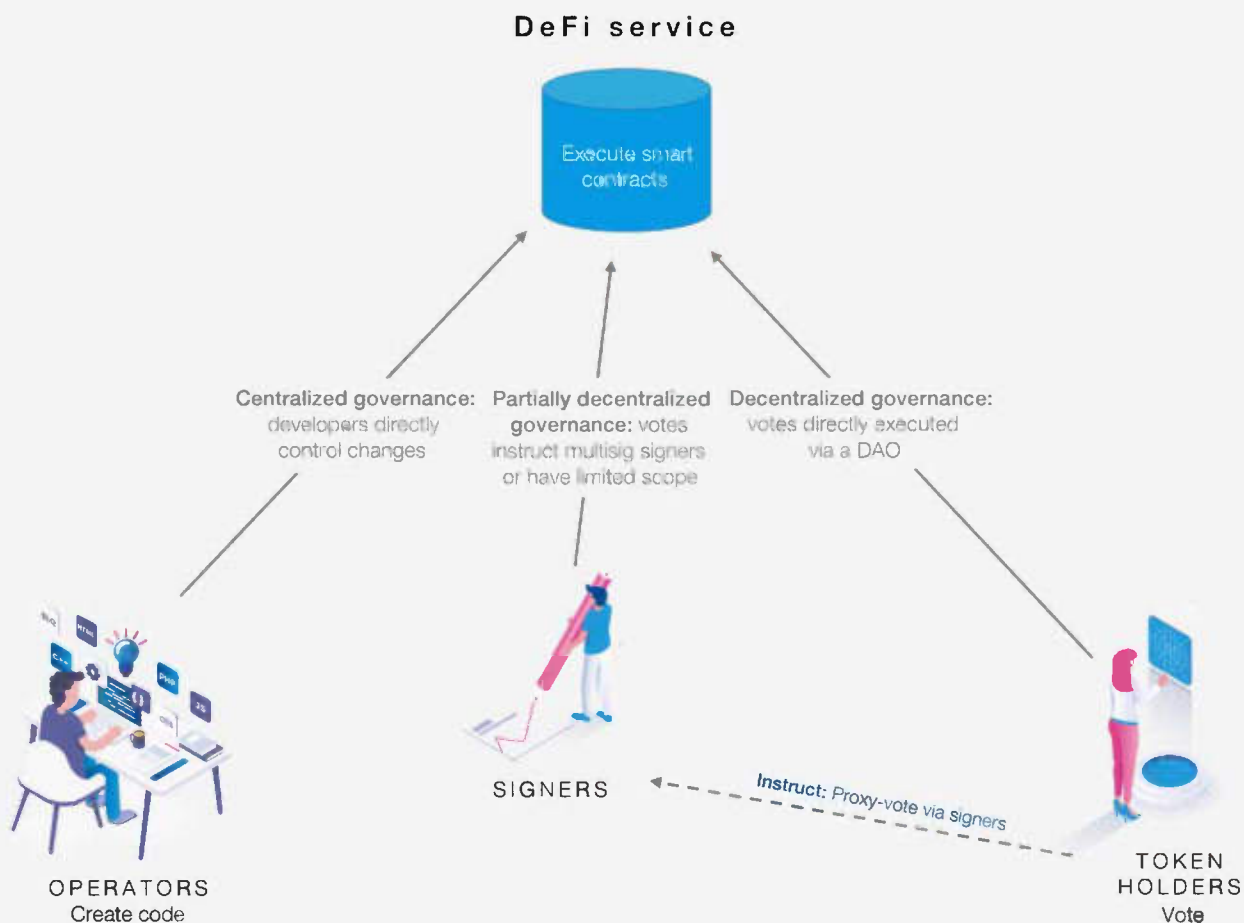


Figure 3 illustrates three forms of DeFi governance. The initial implementation is typically *centralized governance*, where the operator controls and implements changes directly.

Governance can be *partially decentralized* by giving token holders limited voting rights. They may have power over only a few parameters; developers may retain effective veto power through large token holdings or developers may have no formal obligation to implement proposed changes. In some instances of partial decentralization, individuals are designated to implement changes based on the instruction of token holder votes. They do so through *multisig keys*, wherein multiple signatures of delegates are needed to implement a change.

In *decentralized* governance, decisions move fully to a community of token holders through the establishment of a decentralized autonomous organization (DAO). DAO participants vote on

changes to the protocol and are aligned through token incentives and rules written into smart contracts. Governance decisions are executed as blockchain transactions, enforced through the consensus mechanisms of the settlement layer.

DeFi developers often describe a trajectory from centralized governance at the outset to partially and then fully decentralized governance as the service reaches maturity. At this early stage of the market, however, there are few if any examples of this process unfolding from start to finish. The token-based voting systems that have been implemented are immature, and governance votes of major services have failed due to insufficient turnout.¹⁹

Token-based mechanisms for liquidity and governance expand the scope of interested parties beyond those in traditional financial services. Policy-makers should consider the implications of decisions on all of these stakeholder groups, and

the incentives they create – especially considering: (1) who has control of the assets; and (2) who stands to benefit financially. **Appendix 2** provides a stakeholder mapping tool for DeFi services.

BOX 1 DeFi incentive systems

Many DeFi services incorporate explicit financial incentives to promote market development, including the creation of liquidity (for trading) and collateral (for credit):

- **Lock-up yields** pay interest or a share of trading fees for immobilizing digital assets to serve as liquidity or collateral for a service.
- **Liquidity mining** pays interest in the form of tokens issued by the service itself, typically governance tokens.
- **Airdrops** reward wallet addresses with tokens to promote awareness of new digital assets.

- **Yield farming** optimizes returns from liquidity mining and lock-up yields by automatically moving funds among services.

- **Liquidation fees** pay market-makers a percentage of the value of under-collateralized loans that they successfully liquidate (though not necessarily automatically).

These mechanisms are not necessary components of DeFi but have become widely identified with it. However, they may also distort investor expectations, generating unsustainably high returns as new capital is flowing in and token values are appreciating.

1.3 DeFi service categories

Due to their programmability and composability, the possible configurations of DeFi services are nearly endless. However, certain core functions, analogous to those in centralized finance, can be identified. These labels are generic and not intended as regulatory classifications for jurisdictions in which the terms used have legal import. A companion report, [DeFi Beyond the Hype](#), provides greater detail on each of these categories.

Stablecoins seek to maintain a constant value for tokens relative to some stable asset – most commonly the US dollar. The ability to avoid the volatility of non-stabilized cryptocurrency such as bitcoin and ether is one reason for the growth in DeFi.

Custodial stablecoins use holdings of fiat currency or high-quality liquid assets as a reserve. Though they may be used in DeFi, these stablecoins are not DeFi services themselves because they involve centralized trust and custody.

There are two forms of stablecoin that meet the DeFi requirements listed in **Figure 1**:

- *Asset-backed* stablecoins use smart contracts to aggregate and liquidate collateral in the form of digital assets.
- *Algorithmic* stablecoins attempt to maintain the peg through dynamic expansion and contraction of token supply.²⁰

Exchanges allow customers to trade one digital asset for another. The assets involved may be stablecoins or floating-value tokens. Unlike centralized exchanges such as Coinbase or Binance, *decentralized exchange* (DEX) protocols are DeFi services because they do not take custody of user funds and may not control other aspects of the process such as order book management and matching. An important category of DEX protocols for DeFi are *automated market-makers* (AMM), where an algorithm continuously prices transactions based on orders and available liquidity, rather than matching through an order book.

Credit²¹ involves the creation of interest-bearing instruments that must be repaid at maturity. It is based on a mutual relationship of borrowers and lenders, which can be either bilateral (peer-to-peer) or based on pooled capital. Credit terms can be quite complex, and these instruments can themselves be securitized and traded. DeFi borrowing and lending replaces the intermediating function of financial service providers with automated, decentralized, non-custodial protocols. While the lack of credit ratings and legal recourse means that digital asset loans are nearly always over-collateralized, DeFi also allows for uncollateralized *flash loans* in which assets are borrowed and repaid (with interest) within the span of a single block's time.

Derivatives create synthetic financial assets whose value is reliant upon or derived from an underlying asset or group of assets. Common financial derivatives include futures and options, which pay out based on the value of an asset at some time in the future or deliver the underlying asset. DeFi derivatives can be programmed and composed into virtually any configuration. For example, a derivative could create a synthetic asset that behaves as a stock, commodity, swap or another digital asset. It could involve a non-fungible token (NFT) uniquely associated with an art or real estate asset. It might be tied to the activity of a business, creating a *crowdfunding* service. Or the value could be tied to a future real-world event, such as the outcome of a sporting event or political campaign, turning the derivatives exchange into a *prediction market*. Prediction markets may also incentivize decentralized information generation or dispute resolution through the wisdom of crowds.

Insurance pools risk by trading the payment of a guaranteed small premium for the possibility of collecting a large payout in the event of a covered scenario. In DeFi insurance, decentralized

transactional and governance systems are used to manage and structure the insurance life cycle for certain types of risks such as smart contract hacks. Though technically insurance contracts are derivatives – they pay out based on some external event – insurance plays a distinctive risk-hedging function in markets by spreading risks across a common capital pool.²²

Asset management involves the oversight of financial assets for others and seeks to maximize the value of the whole portfolio based on risk preferences, time horizons or other conditions. DeFi asset management promises greater transparency and efficiency in constructing and executing investment strategies, by incorporating the asset management life cycle into a DApp.

In addition, there are **auxiliary services** that support DeFi activity but are not themselves financial services. The most prominent are *oracles* (outlined above). Other auxiliary services include wallets, data storage, data queries, identity verification and arbitration.



2 Risks



This section provides a risk-mapping framework as a basis for policy considerations. It contains two stages: (1) identification of relevant risks; and (2) assessment of how DeFi market participants and others are addressing such risks.

We categorize DeFi risks into five categories (explored in more detail below):

Category	Associated risks
Financial Depletion of funds due to the transactional behaviour of fellow users concerning the digital assets in the DeFi service	Market risk
	Counterparty risk
	Liquidity risk
Technical Failures of the software systems supporting transaction execution, pricing and integrity	Transaction risk
	Smart contract risk
	Miner risk
	Oracle risk
Operational Failures of the human systems for key management, protocol development or governance	Routine maintenance and upgrades
	Forks
	Key management
	Governance mechanisms
	Redress of disputes
Legal compliance Use of DeFi to engage in illicit activity or to evade regulatory obligations	Financial crime
	Fraud and market manipulation
	Regulatory arbitrage
Emergent Macro-scale crashes or undermining of the financial system due to the interaction, scaling and integration of DeFi components	Dynamic interactions
	Flash crashes or price cascades

These categories are not mutually exclusive; some failures may result from multiple risks. There are also concerns inherent in the use of blockchains for settlement. For example, proof-of-work blockchains such as Bitcoin and Ethereum version 1.0 require computationally intensive mining, which raises concerns about energy usage that contributes to climate change. Because these issues are not unique to DeFi, they are beyond the scope of this report.²³

Funds may be lost either unintentionally or due to deliberate attacks. Smart contracts do not distinguish intent and even undesired transactions may be effectively impossible to reverse. This problem was already evident in the 2016 draining of funds from the DAO,²⁴ the first DeFi service to accrue significant capital.²⁵ Finally, in some cases, the line between a legitimate trading strategy that takes advantage of an arbitrage opportunity and an improper exploit might be unclear.

2.1 Financial

Market risk is the possibility that asset value will decline over some time horizon due to market conditions, new information or traders' idiosyncratic behaviour. Though it may not be the role of governments to protect against market risk for well-informed and well-capitalized investors in a well-functioning market, it is appropriate for them to be concerned that those conditions are met. For DeFi, regulatory classifications will define whether requirements designed to prevent undue market risk – such as disclosure obligations and accredited investor standards – are applicable.

DeFi's novelty, as well as the ease of transferring funds and creating complex instruments, may increase the possibility of abuses, whether by the creators of DeFi protocols, the operators of exchanges or third-party manipulators. At the same time, policy-makers may want to consider the implications of potential increases in transparency as well as the retention of asset custody. There may also be a lack of observability and standardized price-discovery mechanisms found in digital asset markets. The inability to compare many of the current tokens to any fundamentals is a driver of big swings in valuation and overall volatility.

Counterparty risk is the possibility that a counterparty will default on its obligations to a financial instrument. This might involve failing to repay a loan (*credit risk*) or failing to settle a transaction by providing the specified asset (*settlement risk*). Though some credit risk is mitigated through interest rates for loans, it might be a particular problem in DeFi, where the volatility of underlying digital assets produces under-collateralization, the ease of credit creation leads to excessive leverage, or the algorithmic determination of interest produces inaccuracies. The lack of fixed identities in a pseudonymous network presents additional challenges in terms of determining creditworthiness. DeFi attempts to account for this through over-collateralization requirements.

Some traditional settlement risks are not present in DeFi because there is no separate settlement step; transactions are executed through transfer of the underlying value on the blockchain – but only if both sides of the transaction are operating on the same chain. Moreover, given the rapid inflow of capital, there are strong incentives and many opportunities for scams. Users may not receive the assets they anticipate due to fraud, especially when information asymmetries limit their understanding of investment decisions or the code that governs transaction execution.

Liquidity risk is the possibility that there will be insufficient funds or assets available to realize the value of a financial asset. Failure of liquidity for a borrower or trader (such as a short seller) means the position is involuntarily liquidated and the available assets allocated to owners or creditors. Insufficient liquidity also magnifies market inefficiencies, such as price movements resulting from trades.

DeFi liquidation processes differ from traditional instruments, where a centralized counterparty (a bank, the International Swaps and Derivates Association, a clearing house, etc.) executes the process. DeFi services often incentivize market-makers to liquidate under-collateralized loans, performing a function analogous to a foreclosure auction for real estate. If the liquidation incentive structures fail, however, original counterparties and liquidity providers hold unanticipated default risk. In DeFi markets where most transactions are automated and available continuously, the speed of liquidations may preclude rational decision-making. On centralized exchanges, cascades of automated liquidations have on several occasions produced "flash crashes", where prices dropped precipitously and trading was taken offline until the market settled. Such last-resort remedies may not be available for decentralized services.

DeFi liquidity risks may be mitigated through governance logic and the careful design of incentive structures. Game-theoretic analysis must anticipate not only expected behaviours, but other profitable strategies. For example, a market participant could deliberately skew liquidity in certain DeFi services and bet against the arbitrary results. Systems designed to incentivize stable liquidity could limit this risk. Because financial risks arise from profit-seeking, constant vigilance is needed to address new strategies.

Flash loans create a unique set of risks. They may effectively create artificial liquidity for a short period of time, seemingly addressing both counterparty and liquidity risk. If the loan cannot be paid back in time, the original transaction is never incorporated into the block and the loan is essentially rolled back before issuance. While flash loans may be used as near risk-free and low-cost capital for legitimate arbitrage transactions, they can also be employed in attacks. The temporary surge of funds can be used to manipulate prices and force artificial liquidation, often through the interaction of multiple DeFi services. Several million dollars have been stolen through several such high-profile, near-instantaneous attacks.²⁶

2.2 Technical

According to Ciphertrace, half of digital asset hacks in 2020 targeted DeFi services, up from a negligible number in 2019 – a trend likely to continue as the value of assets involved grows.²⁷ While the largest public blockchain networks, such as Bitcoin and Ethereum, have avoided significant breaches, blockchain-based DApps and the centralized exchanges or wallets handling funds have proven far less secure. The technical complexity and immaturity of the DeFi market increases the likelihood of significant vulnerabilities, with the vast majority created in the past few years. The degree of interconnection among DeFi protocols may also expand the attack surface available to malicious actors.

Services aim to police market abuses through radical transparency and trust minimization rather than centralized oversight. Some include sophisticated, multilayered incentive structures to discourage attacks, in addition to technical measures for security and market integrity. Some have used their decentralized governance mechanisms to implement changes in response to failures or potential scenarios identified by the community. These measures are not foolproof. If DeFi continues to grow and attract less sophisticated market participants, investor protection concerns may grow.

Transaction risks are limitations or failures of the underlying blockchain network. If the base-layer settlement network is successfully attacked, allows for double-spending, becomes too expensive for

transactions or lacks the necessary throughput, those failures will affect the application layer. The long-planned upgrade to Eth2 (Ethereum version 2.0), which aims for significant performance improvements, thus represents an important development for DeFi.²⁸ This upgrade will also shift Ethereum to proof-of-stake consensus, which does not require the intensive energy usage of proof-of-work mining.

Smart contract risks deal with code that does not execute as intended. All software has the potential for bugs. A programming flaw can cause a smart contract to fail to perform as desired, or attackers can exploit vulnerabilities to drain funds or engage in malicious activities. For example, where code has not been written properly, it can allow for exploits such as re-entrancy attacks. Complex software performing novel functions in a relatively untested environment, and often written by teams lacking the expertise or inclination to employ the most robust development practices, will tend to have more bugs than the norm.²⁹ Even without attacks, the smart contract might not accurately reflect the understanding of all parties. Because DeFi software is automated financial services, rather than a record-keeping mechanism subject to human override, coding errors can lead directly to financial losses, often without easy redress. Moreover, transparency of code has two sides – the visibility may make smart contracts more vulnerable to exploits or may offer opportunities for white hat hackers and bounty hunters to increase the robustness of the code.

CASE STUDY

The DAO exploit

The DAO, a decentralized crowdfunding platform, was arguably the first viable DeFi service. In 2016, ether then worth approximately \$150 million was locked up in its smart contracts, with the goal of funding decentralized application development.³⁰ Before it launched, however, an attacker exploited a re-entrancy bug to drain approximately 40%

of the funds into a “child DAO”. To prevent permanent loss, and the collapse of confidence in Ethereum, miners agreed to implement a hard fork that reversed the theft on the main Ethereum chain. A minority faction continued mining the deprecated chain, which became known as Ethereum Classic.

Mechanisms such as security audits and bug bounties can be employed to mitigate smart contract risks. Over time, common errors in smart contracts written in popular languages such as Ethereum’s Solidity become more familiar, and high-quality teams know to look for common attack vectors.

Miner risk deals with the possibility that transaction processing entities behave maliciously towards certain transactions. This depends on the correct ordering and execution of transactions sent to a DeFi smart contract. It operates at an analogous level to settlement risk in centralized finance, involving the finalization of transactions, although the nature of the threat is different. In blockchain systems, users typically send a transaction to the network along with a fee to the miner that successfully processes it into a block.

Miners take proposed transactions and decide the order in which to execute them. However, a miner need not execute transactions in fee order. A miner can choose to execute a lower-fee transaction ahead of a higher-fee transaction, if that transaction is particularly valuable to them, or in return for a side payment from the originator of the lower-fee transaction.

Such behaviour allows for a form of market manipulation like front-running in high-frequency trading. By manipulating the order of execution, a miner can effectively allow certain parties to compound returns faster than others. Some view “miner extractable value” as inevitable in any system based on public blockchains, which is legitimate if structured transparently and fairly. This is a topic of active debate in the DeFi community.³¹

CASE STUDY

DEX arbitrage bots

Researchers have documented and quantified the rising deployment of arbitrage bots in decentralized exchanges.³² Like high-frequency traders on Wall Street, these bots exploit inefficiencies, paying high transaction fees and optimizing network latency to front-run (anticipate and exploit) ordinary users' DEX trades. They

study the breadth of DEX arbitrage bots in a subset of transactions that yield quantifiable revenue to these bots by engaging in priority gas auctions (PGAs), competitively bidding up transaction fees in order to obtain priority ordering, i.e. early block position and execution, for their transactions.

Oracle risk involves the potential that data external to the blockchain on which a DeFi contract relies is inaccurate or has been manipulated. Oracle-dependent DeFi protocols are susceptible to attacks in which oracle providers can manipulate the price observed on-chain. If on-chain asset holders can do this, they can increase the value of their on-chain asset or decrease the value of other participants' assets. Re-marking below a liquidation threshold could lead to assets being sold to the highest or first bidder.

If an oracle uses a centralized data source, such as a feed from CoinMarketCap for prices, this represents a source of centralized trust and vulnerability. An oracle can be decentralized by using multiple data sources or by incentivizing providers to submit data. Decentralization makes it difficult for a small number of participants to manipulate prices. On the other hand, payments to data providers must be designed effectively for fairness and incentive compatibility to ensure accurate information. Poor mechanism design may make it profitable to manipulate oracle data feeds. There have already been several successful DeFi oracle attacks.

CASE STUDY

The Compound oracle exploit

In November 2020, the price of the DAI stablecoin was temporarily driven up 30% over its \$1 peg on the Coinbase exchange, which was used as the pricing oracle by the Compound DeFi credit platform.³³ When the DAI price spiked, it caused Compound's smart contracts to determine that many loans were under-collateralized. This triggered \$89 million of assets locked in Compound to be liquidated automatically. It is

unclear what caused the anomalous increase in the Coinbase price, but it could have been an intentional form of manipulation directed at Compound. This event illustrated the risks inherent in the interconnection among DeFi and other blockchain-based financial systems – and that some elements of the ecosystem may not be as decentralized, and therefore more vulnerable, than it initially appears.

2.3 Operational

Even though DeFi activity is highly automated, human operators still play a crucial role. The more decentralized a service, the less risk there is associated with any single point of failure. Auxiliary services may be centralized even when the DeFi service is highly decentralized. At the same time, greater decentralization can make it harder to respond effectively when something goes wrong. The fewer people who have unique power to break a service, the fewer who have the power to fix it.

Routine maintenance and upgrades may be more difficult to implement for decentralized services, or may create vulnerabilities, especially

given the composability of DeFi. This would also include ongoing network and node connectivity and considerations related to security and cyber risks.

Code **forks** are options for groups seeking to alter elements of DeFi services, providing an "exit" option for minorities that prefer a different set of parameters.³⁴ In some cases, a fork may become more popular than the original service. When there is already significant activity on a platform, however, forks can be costly and confusing for participants. They can also be employed for malicious purposes, including to mislead users.

CASE STUDY

SushiSwap vampire attack on Uniswap

In September 2020, a pseudonymous developer, Chef Nomi, forked Uniswap, an open-source decentralized exchange, to make SushiSwap, a nearly identical exchange with an added token (SUSHI) and token rewards for liquidity providers and token holders.³⁵ The incident, which became known as the first “vampire mining” event, was unique in that SushiSwap indirectly competed with Uniswap by providing the same service using identical code but with an additional incentive,

draining Uniswap's liquidity. Initial participants in SushiSwap earned SUSHI by depositing Uniswap's LP tokens, which represented user deposits in the Uniswap DEX. These Uniswap LP tokens were then swapped for the SUSHI, so that Uniswap liquidity would become SushiSwap liquidity. Ten days later, the pseudonymous developer sold all of his SUSHI tokens for \$13 million in Ether and handed over control of the protocol to the Chief Executive Officer of FTX, a centralized exchange.

Key management is a potential problem for all blockchain-based systems. Platforms identify users and their assets through cryptographic key pairs. Because DeFi services are non-custodial, they place the key management burden on their users in return for removing dependencies on centralized service providers. A variety of techniques including requiring multiple signatures (multisig), social recovery and custody arrangements have been developed to address key management risks for digital assets.

Governance mechanisms for DeFi and other blockchain-based services raise complex potential risks. “One-token, one-vote” may be exploited when participation rates are low, token control is concentrated or participants can bribe each other

to vote in their favour. Centralized exchanges may take advantage of the voting power of tokens in their custody to exert undue influence in governance. Specialized DeFi market participants may engage in activities analogous to activist investing, deliberately acquiring significant shares of governance tokens for a service. With enough voting power, these investors could change the parameters, allowing them to drain liquidity pools. Even though many of the mechanisms incorporated into DeFi governance systems have a history in academic literature, their behaviour with large numbers of participants and millions or billions of dollars at stake remains unproven. Moreover, a recent research paper presents evidence that DeFi token holdings are heavily concentrated, in ways that are not entirely transparent.³⁶

CASE STUDY

Flash loans and MakerDAO governance

Flash loans also pose challenges for governance systems. In late October 2020, an attacker used a flash loan to acquire \$7 million of the MKR governance token associated with the MakerDAO protocol and exercised its rights to

vote on a governance proposal. Concerned about the potential for abuse, MakerDAO adopted restrictions shortly thereafter to prevent this scenario from being repeated, but other DeFi services remain vulnerable to such attacks.

Redress of disputes is a final category of governance risks. Once a smart contract has executed, the output cannot be modified or reversed just because an individual actor, or a governmental authority, orders it to be. When participants believe they are entitled to redress for some failure of the system or malicious act, arbitration may be incorporated into the DeFi service through multisig arrangements or be decentralized through a prediction market or

crowdsourcing mechanism. However, these novel mechanisms have their own limitations, for instance, compared to judicial or administrative orders.

With a well-designed DeFi service, operational risks may be measured in real time and actively mitigated. DeFi transaction ledgers are public, so malicious activities may be tracked more easily than in analogous cases for centralized finance.



2.4 Legal compliance

DeFi may be used to bypass legal or regulatory obligations. The activities involved could occur with any service involving digital assets. Money laundering, for example, is a problem for established centralized cryptocurrency exchanges as well as DeFi DEXs. Because the focus of this report is on the distinctive challenges and opportunities of DeFi, we provide only a brief summary of risks in this category.

While a DeFi structure may not increase the likelihood of such violations *per se*, it could complicate enforcement. The decentralized, non-custodial, composable nature of DeFi services may make it difficult to identify a responsible party, for example. Regulatory regimes built around intermediaries as regulated processors of transaction information may fit poorly with a disintermediated market structure. We consider how regulators and policy-makers might address such challenges in Section 3, below.

Financial crime involves breach of anti-money laundering/countering the financing of terrorism (AML/CFT) restrictions, financial sanctions and similar legal regimes. DeFi transactions involving natively digital assets may be difficult to regulate through traditional AML/CFT controls because users are pseudonymous by default, transactions are resistant to blockage, assets are resistant to seizure and many transactions involve non-custodial wallets not directly tied to individuals. Although DeFi transactions are generally transparent and traceable, new privacy-enhancing protocols and/or tools may create additional regulatory challenges. Several approaches have been developed to comply with the 2019 anti-money

laundering guidance for digital asset service providers from the Financial Action Task Force (FATF), but further work remains and could be further affected by new guidance proposed in March 2021 that could require know-your-customer (KYC) compliance from DeFi services.³⁷ In particular, the use of non-custodial arrangements and self-hosted wallets in DeFi poses a challenge for requirements that identifying metadata be collected and passed for every transaction link.

Fraud and market manipulation involve deliberate scams, misappropriation and other efforts to take advantage of investors. Here we refer to activities conducted or enabled by DeFi developers themselves, rather than third-party attacks. For example, “rug pulls” or exit scams involve convincing users to place funds into a seemingly legitimate DeFi service, from which they are drained by the developers, who then disappear.

Regulatory evasion means failing to meet regulatory obligations by carrying out similar functions in a different technical manner. It may involve deliberately obfuscating activity or masking the jurisdictional attributes of transactions. On the other hand, the fact that a novel activity bears similarities to an established one does not automatically imply regulatory arbitrage. Poorly designed regulatory obligations could themselves be viewed as a risk factor for DeFi. All major categories of DeFi activity can be viewed as alternatives to regulated financial services. Whether they are subject to similar classifications goes beyond the scope of this report, and the answers will vary by jurisdiction.

2.5 Emergent risks

Emergent risks involve the interaction effects of multiple events, creating failure cases that are not reflected in a risk assessment of each service independently. Classic recent examples are banks that are “too big to fail” and scenarios in which ostensibly unrelated events, such as individual mortgage defaults, become highly correlated and produce cascading effects through chains of securitization. Other examples include system-wide liquidity failure due to bank runs or markets “freezing up” when parties are unwilling to transact due to perceived risk.

Dynamic interactions among a potentially endless number of interconnected DeFi components may produce risks that are not present in any individual service. Also, because DeFi operates in a global market, activities are not necessarily limited to countries or business segments as they are when transactions are based on a national sovereign currency. Unless regulators can effectively limit

cross-border DeFi activity, firebreaks to contagion of systemic defaults may be more limited than for traditional finance. Interaction risks will also grow as DeFi services begin to interoperate with traditional financial platforms.³⁸

Flash crashes or price cascades, exacerbated by leverage in the DeFi system, may occur in extremely volatile or rough market conditions. Unlike traditional markets, where primary dealers and brokers can manually intervene when defaults occur concurrently, the permissionless, algorithmic nature of DeFi means that it may not be possible to stop cascades. DeFi services that automatically liquidate collateral allow liquidators to compete to buy that collateral, sometimes offering a fixed discount as an incentive. However, when a flash crash occurs or market volatility is high, there may be so many liquidations and the drop in the price of the collateral may be so precipitous that liquidators or others will face significant losses.

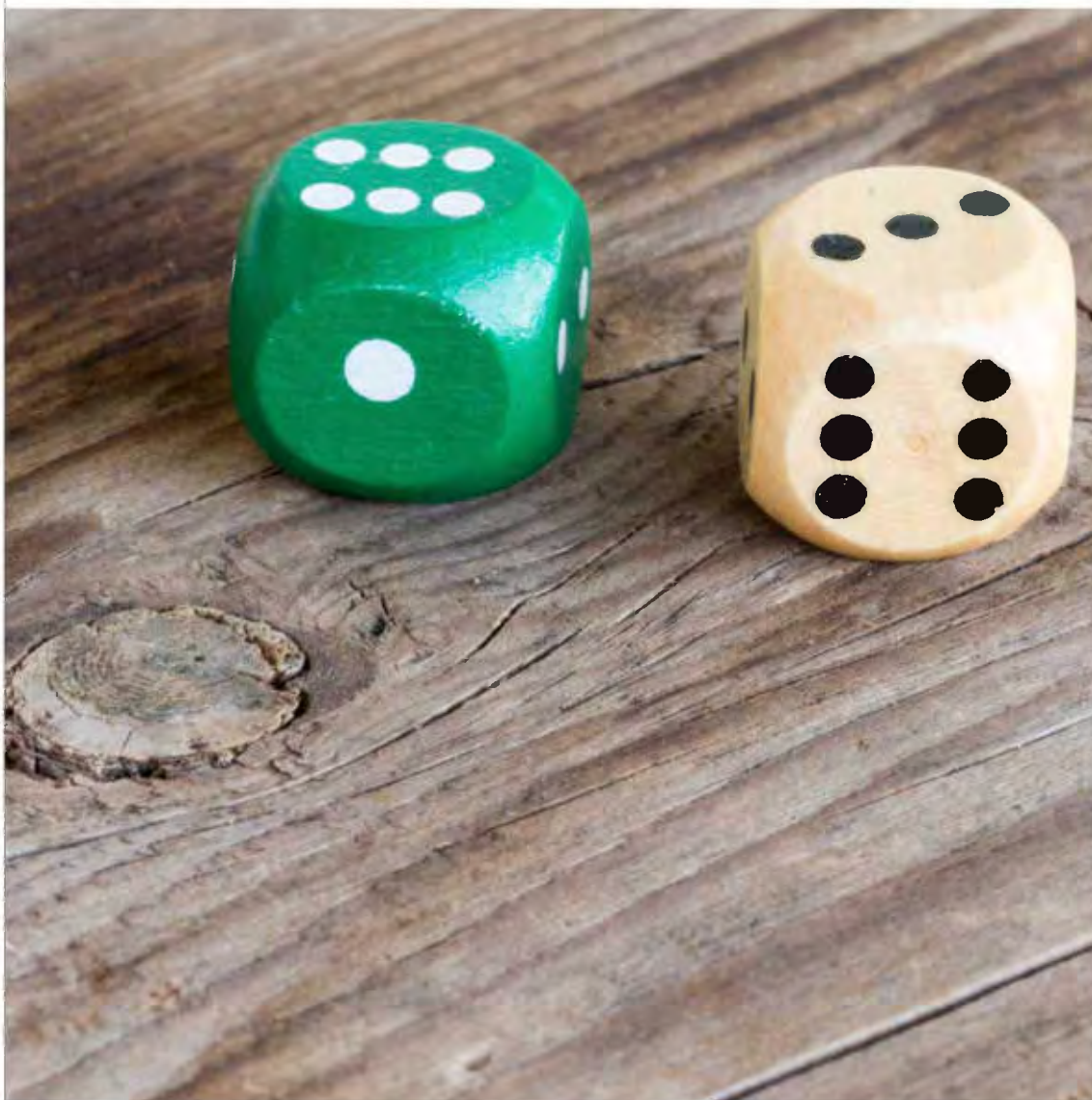
One of the largest systemic failures of a DeFi service took place on Thursday 12 March 2020, when Maker Protocol's liquidation system failed and more than \$8 million in user assets was lost.³⁹ This was exacerbated by network congestion on the Ethereum blockchain, which increased "gas" prices for validating transactions and slowed the flow of data updates to MakerDAO's oracle service.

A class-action lawsuit over the event, claiming that the Maker Foundation deceived collateral providers by failing to appropriately disclose such risks, was sent to arbitration in September 2020. The event exposed emergent risks faced by the DeFi protocols, including the availability and reliability of the underlying blockchain infrastructure.

Assessing such risk is difficult. Most traditional financial models assume that liquidations always occur successfully, as the trusted third party (exchange, broker, dealer) will close a position when unprofitable. In DeFi, this is true only when liquidators can achieve a profitable liquidation. If cascades persist for too long, liquidators stop liquidating and traditional value-at-risk (VaR) models break down. This failure is akin to what happened during the 2008 financial crisis, when centralized third parties that enforced liquidations, such as AIG, failed.

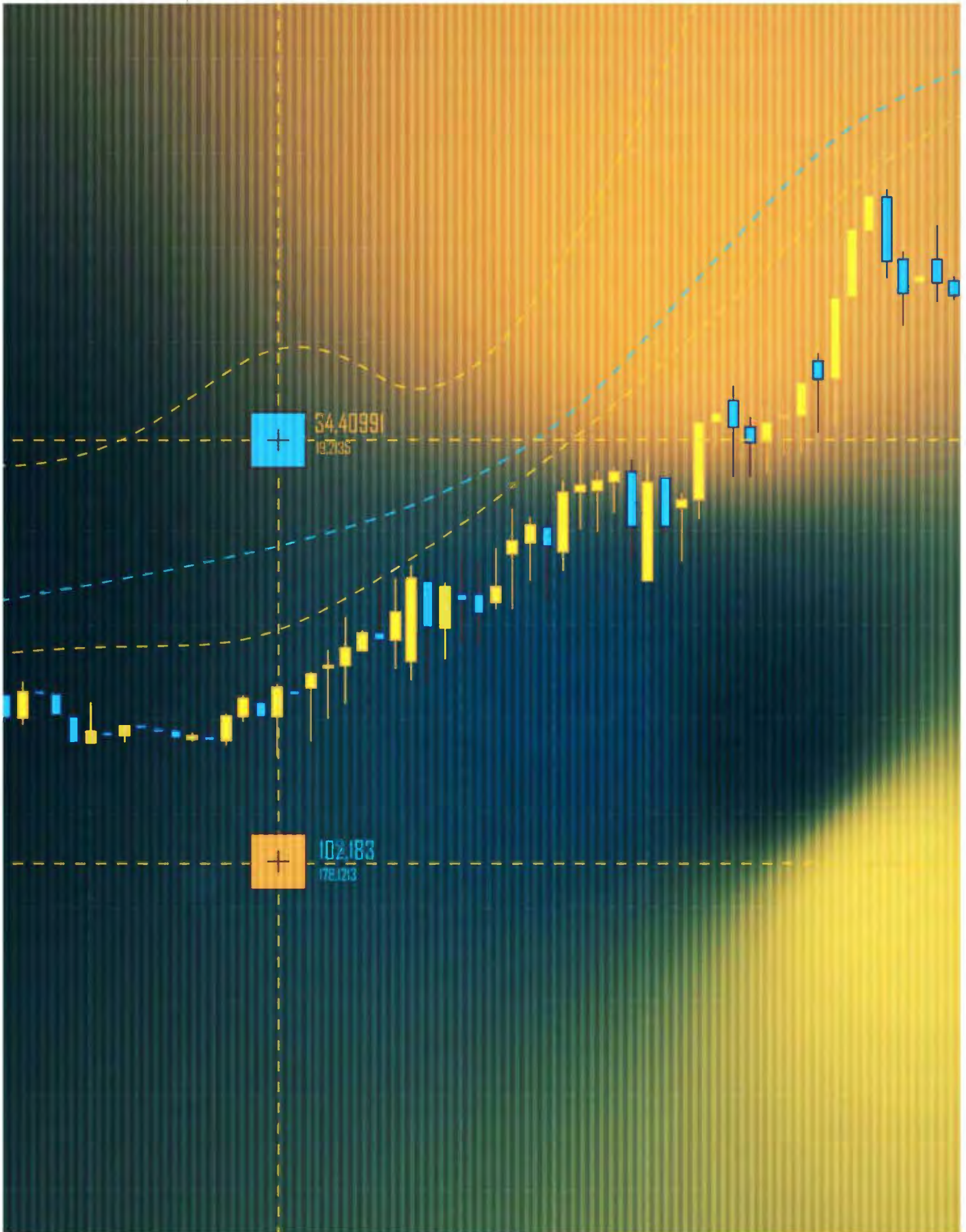
Risks of this form can be estimated using tools such as agent-based simulation, which model

rational behaviour for all principal parties (borrowers, lenders, traders and liquidators) and then run millions of event-based Monte Carlo simulations – models for predicting outcomes for situations subject to random variables – to estimate worst-case loss. Unlike traditional financial Monte Carlo simulations, these simulations explore conditions in which financial assumptions such as no-arbitrage and instant liquidation are invalid. Using such models, corrections to traditional value-at-risk (VAR) models can be estimated, leading to estimates of default probability as a function of parameters such as volatility.



3

Policy approaches



This section outlines the main areas in which DeFi may interact with policy and regulation. Importantly, it lays out key issues and options but does not offer prescriptive solutions, as jurisdictions vary in their objectives, regulatory regimes and market composition. The approaches described here are intended to be sufficiently generic to apply in the full range of contexts. The remainder of this section provides tools and resources.

Trust-minimized execution, non-custodial services and composable architectures may challenge the existing regulation. As described in Section 2, DeFi can both introduce new risks and may help mitigate known risks in financial services. Many of the key challenges for policy-makers – the way in which decentralization makes it difficult to identify regulatory subjects, new risks due to automation, and the way in which borderless software code

complicates the application of territorial rules – are extensions of issues for all digital assets. Others, such as the creation of building blocks with multiple potential use cases and integrations, or the incentive structures of tokenized governance, are less familiar. Given the cross-cutting nature of DeFi, an integrated strategy and vision is needed.

Generally, it may be wise to consider a **technologically neutral** approach to balance meeting the objectives of regulatory regimes with promoting innovation and market development. As with any regulatory initiatives, policy-makers should strive for DeFi rules that are fair, efficient, effective and enforceable.

A policy-maker canvas, included as **Appendix 4**, is designed to apply key components of this section in a structured manner.

3.1 DeFi and financial regulation

The first step is to identify the relevant objectives and associated categories of policy and regulation. Common goals for financial regulation include: protection of investors and other consumers; market efficiency and integrity; capital formation; financial inclusion; prevention of illicit activity; safety and soundness; and financial stability. Each provides a distinctive logic for certain kinds of rules. For example, regulators focused on investor protection are typically concerned that custodians are not able to abscond with funds. The non-custodial nature of DeFi may alleviate some of these worries, while creating new ones (as outlined in Section 2).

DeFi activity spans many domains of financial regulation, including securities, derivatives, exchanges, investment management, bank supervision, financial crime, consumer finance, insurance, risk management and macroprudential oversight. A coherent overarching strategy is important and could be delegated to a cross-entity taskforce or similar body. Some DeFi activity patterns will clearly match established legal categories; others will not.

A range of policy actions may be adopted for DeFi, including:

- **Forbearance:** decision that no new regulations are needed
- **Warnings:** issuance of warning to users/consumers
- **Enforcement:** determinations that existing rules already cover the relevant actors and activities and have not been complied with

- **Opt-in:** provide the option to become subject to regulations in return for certain protections, even though there is no legal requirement
- **Pruning regulations:** eliminate regulatory requirements that are no longer essential in a DeFi context
- **Limited licence frameworks:** the possibility of obtaining licences of limited scope or under size thresholds, with light-touch requirements
- **Prohibitive measures:** prohibit certain activities in the DeFi sector
- **New licence types:** address risks with new categories designed for DeFi
- **Issuing guidance or expectations:** craft new frameworks, often with a public comment or consultation included before its official release

An effective regulatory response to DeFi is likely to involve a combination of existing regulation, retrofitted regulation and new, bespoke regulation.⁴⁰ An emerging body of digital asset-specific law is growing, including the European Union's comprehensive Markets in Crypto Assets (MiCA) proposal.⁴¹ However, most jurisdictions are yet to adopt bespoke frameworks.

Most financial regulatory regimes focus on those "carrying on business" in a certain regulated activity, "dealing", "arranging" or "operating" some scheme or exchange or "issuing" an offer (or similar). Historically, the relevant government entity was relatively clear and focused on who is ultimately in control of an operation. Similarly, there are often

exemptions for service providers that merely provide infrastructure, data or other tools to enable others to layer on their financial services. Frameworks contemplate definable and centralized operators that are engaged in providing particular financial end products and services, but are not necessarily the underlying builders.

In the DeFi context, however, there may be no central entity performing the relevant activities. The software developers and token holders may be easily identifiable, but not those occupying roles that are the traditional regulatory touchpoints. And even when operators can be identified, they may lack the ability to modify DeFi services or stop transactions because of the decentralized nature of the protocols. Smart contracts can interact with assets held by other smart contracts that are not directly associated with a particular user. Regulators will need to assess who is *responsible* and when a locus of responsibility must be identified. It may

be possible to do so through careful analysis of services, even when they are nominally decentralized.⁴²

Legal regimes often include mechanisms for vicarious secondary “controlling person”, “responsible officer” or aiding-and-abetting liability based on requirements such as knowledge or foresight of harmful consequences.⁴³ If developers of a DeFi service or others associated with the DeFi business *could have* identified and mitigated legal compliance risks, policy-makers will need to consider whether it is appropriate to mandate that they should have. On the other hand, regulating the creation of software raises important concerns of freedom of speech and administrability, which should be considered carefully. The borderless nature of blockchain networks and digital assets also poses challenges for DeFi regulation at the national or subnational level.

3.2 Available policy tools

There are many ways for a policy-maker to approach new financial services or products. Below, we first identify some helpful steps that regulators

have taken in responding to the rise of digital assets and token offerings.

1. Transitional mechanisms

While not entirely analogous, policy approaches may be informed by how digital assets were initially addressed. In the 2017 initial coin offerings (ICOs) boom, few regulators had structures or expertise fit for purpose as – seemingly out of nowhere – significant capital was flowing into new platforms that claimed to be outside the regulatory perimeter. Some of the initial responses may prove useful in the context of DeFi.

Specialized regulatory units: A targeted desk with qualified staffing can serve as an initial gateway to gain experience in new technology, interact with the industry and provide guidance. This knowledge can be shared with policy-makers and actions may include issuing non-action letters under existing regulatory regimes. These groups may provide legal clarity to DeFi projects and encourage early-stage discussions with regulators. Regulators should also invest in technology and technical expertise to understand these markets more effectively. Many jurisdictions have used this approach. For example, the US Securities and Exchange Commission (SEC) created its FinHub unit (upgraded to a formal stand-alone office in late 2020), while Switzerland’s financial regulator, FINMA, created the FinTech Desk. Though initially small and limited in authority, they quickly became an important point of contact for both internal and external communities.

Incentivizing information flow: Disclosure is one of the most common tools of financial regulation. Even when the applicability of existing disclosure requirements on DeFi platforms is uncertain, efforts to encourage broad and consistent information disclosure may prove fruitful for regulatory analysis. The Monetary Authority of Singapore focused a significant portion of its regulation of ICOs on reviews of white papers.

Regulatory sandboxes: Policy-makers may decide to establish regulatory forbearance programmes such as sandboxes, where companies may test and operate their technology in a limited scope and therefore with limited regulatory risks. The scope of such regulatory “carve-outs” can be defined by activities, financial thresholds, territorial or customer limits and combined with reporting duties to ensure that the regulatory authority gains experience in new technology, interacts with the industry and reacts if new risks arise. However, a lack of transparency from the regulatory authority about the trajectory may inadvertently stifle innovation and there may be business risks involved for start-ups building in sandboxes without explicit safe harbours. The sandbox gives start-ups a chance to address regulatory compliance concerns and gives regulators a better understanding of the risks and benefits of a new space. A DeFi sandbox might go

beyond the prior models by establishing a means of monitoring the trajectory for projects looking to decentralize control over time in order to address some concerns without creating new ones. The UK Financial Conduct Authority (FCA) established a sandbox regime for fintech that included a substantial number of blockchain and digital asset services. However, it has had limited applicability for DeFi because stablecoins are considered to be outside the FCA's scope. Others, such as Colombia's "la Arenera" sandbox, have followed this approach as well. DeFi sandboxes will need to be designed carefully to avoid prematurely signalling approval from the regulator.

A variation of this approach is a *regulation-free zone*, as implemented in Busan, South Korea. Under this model, specific jurisdictions within a country may allow companies to operate under a limited set of regulations (often not fully "regulation-free") in order to allow for innovation and testing of services.

Clarifying easy cases. There will always be some new activities that clearly raise regulatory red flags, some that do not and others that are in grey areas. Sometimes by taking on the easier cases first, especially those where intervention is not warranted, policy-makers and regulators can narrow the zone of uncertainty and incentivize compliance activities. A more formal approach for

distinguishing easy cases is a safe harbour policy that explicitly excludes from regulation services that meet defined criteria. In the ICO case, the US SEC's first official statement was the 2017 investigative report on the DAO.⁴⁴ It clarified that bitcoin was not considered a security, but that a token created for investment purposes would be. Further, because the DAO had already shut down, there was no need for an enforcement action. Though it left many questions unanswered, the report clarified the SEC's approach and its concerns, facilitating further dialogue.

Coordinating government action. In some cases, it may be useful to bring together different government entities for a harmonized response. An example is the modification of the "Volcker Rule" in the US by five federal regulatory agencies (the SEC, the Commodity Futures Trading Commission [CFTC], the Federal Deposit Insurance Corporation [FDIC], the Office of the Comptroller of the Currency [OCC] and the Federal Reserve Board).

This list is not intended to be comprehensive. Nor does it presuppose the direction in which the policy-makers will eventually go. These techniques are equally relevant if DeFi services are ultimately found to be covered by existing requirements, outside the regulatory perimeter or subject to new, bespoke rules.

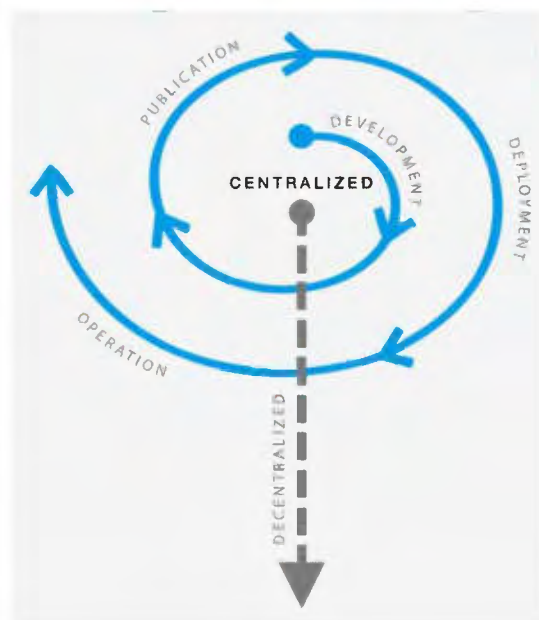
2. Regulation throughout the life cycle

Where there is no inherent distinctive risk, regulation typically occurs later in the life cycle of a product or service, when the harms that trigger liability or regulatory enforcement are more likely to occur. Early on, regulators are more likely to adopt a "do no harm" approach, given the relatively small scale and innovative potential of nascent technologies. For products with clearly known dangers or misuses, such as poppy flowers and weapons, the industry is strictly regulated and all stages are carefully supervised and controlled. Technological systems tend to fall somewhere in the middle.

In addition to maturing, DeFi services have the potential to become more decentralized across their life cycle, as detailed in **Appendix 3**. The degree of decentralization is also an important consideration for policy-makers and regulators. Rules to address the potential dangers of DeFi services can be adopted at four stages of the life cycle: (1) development; (2) publication; (3) deployment; and (4) operation, as shown in **Figure 4**.

There will typically be an identifiable group of protocol developers (although it might operate under the umbrella of an open-source development community, non-profit foundation or association or the DAO). Once the protocol is published, multiple teams might develop it into services and market

FIGURE 4 | DeFi service life cycle



it to users, representing a combined deployment stage. Those services might later be forked by different teams. The operation of the service will largely be automated by the protocol and smart contracts, perhaps moderated by decentralized governance processes.

Imposing regulatory obligations may be easier earlier in the life cycle, where there may be clearly identifiable access points and more room to influence the long-term trajectory. However, the earlier in the life cycle, the weaker the nexus to actual demonstrable harm and the greater the potential

implications for innovation – so it is important to determine at what point regulatory involvement is proportionate to the risks. Tools that incentivize rather than mandate action at early stages, including sandboxes, safe harbours and no-action letters, can be a valuable means of mediating this conflict.

3.3 Decision tree

This tool integrates frameworks presented in this toolkit to support internal policy and regulatory analysis of DeFi services. It is not intended to provide specific recommendations on when and how to act.

This may be used in conjunction with the other resources cited in this toolkit:

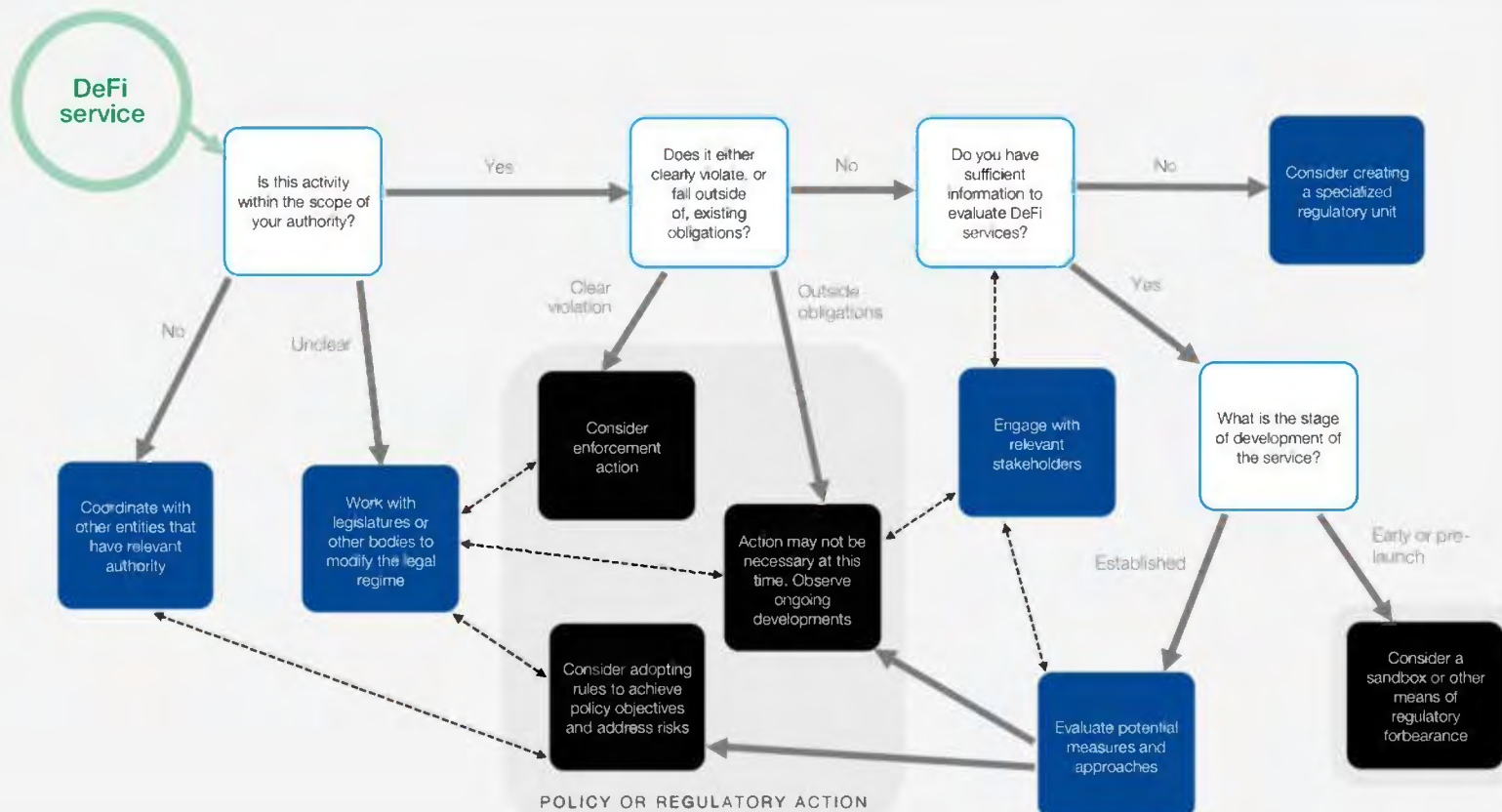
- **Appendix 1** offers a series of questions to identify relevant policy considerations and capabilities for DeFi generally.
- When considering a policy or protocol, the initial step, following **Figure 1**, is to determine whether the activity represents DeFi.
- **Figure 2** and the companion paper [DeFi Beyond the Hype](#) can be used to understand the relevant service categories and features.

If a service is considered DeFi:

- The questions shown below in **Figure 5** are designed to clarify the suggested courses of action.
- **Appendix 2** is a stakeholder mapping tool that can be used to identify relevant stakeholders for engagement.
- The decentralization spectrum in **Appendix 3** allows for a more precise picture of whether there are significant points of control in the service that might be relevant for decision-making.

Finally, when a determination to consider policy or regulatory action has been made, the policy-maker canvas in **Appendix 4** walks through a series of questions to assist in developing specific responses.

FIGURE 5 Decision tree for evaluating DeFi services



Conclusion

This toolkit is designed as a starting point for policy-makers seeking to understand the risks and opportunities posed by DeFi businesses and services, and to devise the best policy responses. The particular manifestations of DeFi, and the policy questions they pose, will change over time, as will activity levels and other aspects of the larger blockchain and digital asset world.

Policy-makers and regulators will take different approaches based on the unique context of their jurisdictions. Larger shifts in financial regulatory obligations, or implementation of cross-national standards, may alter the context for consideration of DeFi issues. There were no decentralized digital currency assets before 2009, and no general-purpose smart contract platforms before 2015, so

any recommendations about the proper treatment of an offshoot such as DeFi must consider potential and unpredictable developments in a space that is evolving rapidly.

What is clear is that DeFi represents a distinct and potentially significant development, both within the landscape of blockchain and of financial services more generally. As this report has documented, DeFi presents a host of opportunities and many challenges. Even when there are no clear answers, policy-makers are best served by considering the right questions to ask, appreciating the points of interaction and tension with their regulatory regimes, and estimating the costs and benefits of various courses of action.



Appendix 1:

Background assessment

The following questions are designed to help evaluate fundamental background questions before proceeding with policy or regulatory decisions.

Editable versions are available in [Word](#) and [Excel](#) form.

- Is DeFi, or a subset of DeFi services, within your entity's mandate? If so, what are the relevant policy or regulatory areas of focus? What are the top three risks you are focused on?

Top three risks:

1.

2.

3.

- Are there other entities that have relevant mandates? What are they? How do their jurisdictional scope and risk priorities compare to yours? What are your procedures, if any, for coordinating with those entities?

- Has DeFi been explored by your entity or others? What were the outcomes of those explorations?

- What is the in-house knowledge, experience and expertise related to DeFi? What about fundamentals such as digital assets, blockchain technology and decentralized governance?

- What is the process for getting up to speed on quickly evolving spaces and technologies? Are these relevant to DeFi or will they need to be adapted?

- Which parties in the public or private sector are required to provide input or consultation regarding potential changes in policies/regulations related to the financial system and financial technology?

- From which institutions or parties would it be beneficial to solicit input? Which additional stakeholders should be represented and involved in decision-making?

Appendix 2:

Stakeholder mapping tool

This tool is designed to help policy-makers map out the relevant environment of a given DeFi service. We group stakeholders into four categories, though in some cases stakeholders may span multiple categories:

- **Builders:** create, implement and support DeFi protocol
 - **Suppliers:** provide capital or a core service to the functioning of the protocol
 - **Users:** use protocol functionality for intended use case
 - **Governance:** make decisions on the development of the protocol
1. For each service, use the stakeholder mapping table to identify who or what the relevant actors are for each category. The more specific, the better. Every category may not be represented, or there may be multiple entries in a category.
 2. Review relevant materials, such as white papers, source code, etc. to identify:
 - a. The specific obligations on each actor
 - b. The specific rewards each actor hopes to receive (in the form of fees, value accrual, categories or other metrics as specified by the protocol).

Complete one stakeholder map per DeFi protocol or service. Blank rows are spaces to add additional stakeholders, where relevant.

Editable versions are available in [Word](#) and [Excel](#) form.

Protocol or
service name:Service category
(See Part IC)

Category	Stakeholders	Responsibility/impact	Economic incentives	Obligations	Rewards
Builders	Interface providers	Provide access to DeFi protocols, either directly or through aggregation	Receive transaction fees		
	Auxiliary service providers	Support external data feeds, or offer development tools for DeFi services	Receive transaction fees		
	Connected protocols	Other composable protocols integrated with the target service	Drive utility for their protocol, generate fees		
	Wallet providers	Protect user funds	Fees based on assets		
Builders and governance	Development teams	Drive development of a protocol and ecosystem	Receive inflationary rewards and transaction fees		
Governance	Multisig signatories	Shape governance to ensure long-term sustainability	Earn proportion of fees generated by the protocol		
	Governance token holders	Propose and vote on governance decisions	Earn proportion of fees generated by the protocol		
	Miners or stakers	Verify transactions on the underlying blockchain	Receive inflationary rewards and transaction fees		
Suppliers	Liquidity providers	Contribute collateral or other assets to facilitate DeFi activity	Receive inflationary rewards and transaction fees		
	Liquidators	Liquidate under-collateralized positions	Obtain collateral at discount		
Users	Protocol users	Use protocol functionality for intended use case	Low-cost, peer-to-peer, trust-minimized financial services		
	Protocol token holders	Use protocol functionality or purchase tokens on secondary markets	Profit from appreciation of token value, or receive inflationary rewards and transaction fees		

Appendix 3:

Decentralization spectrum

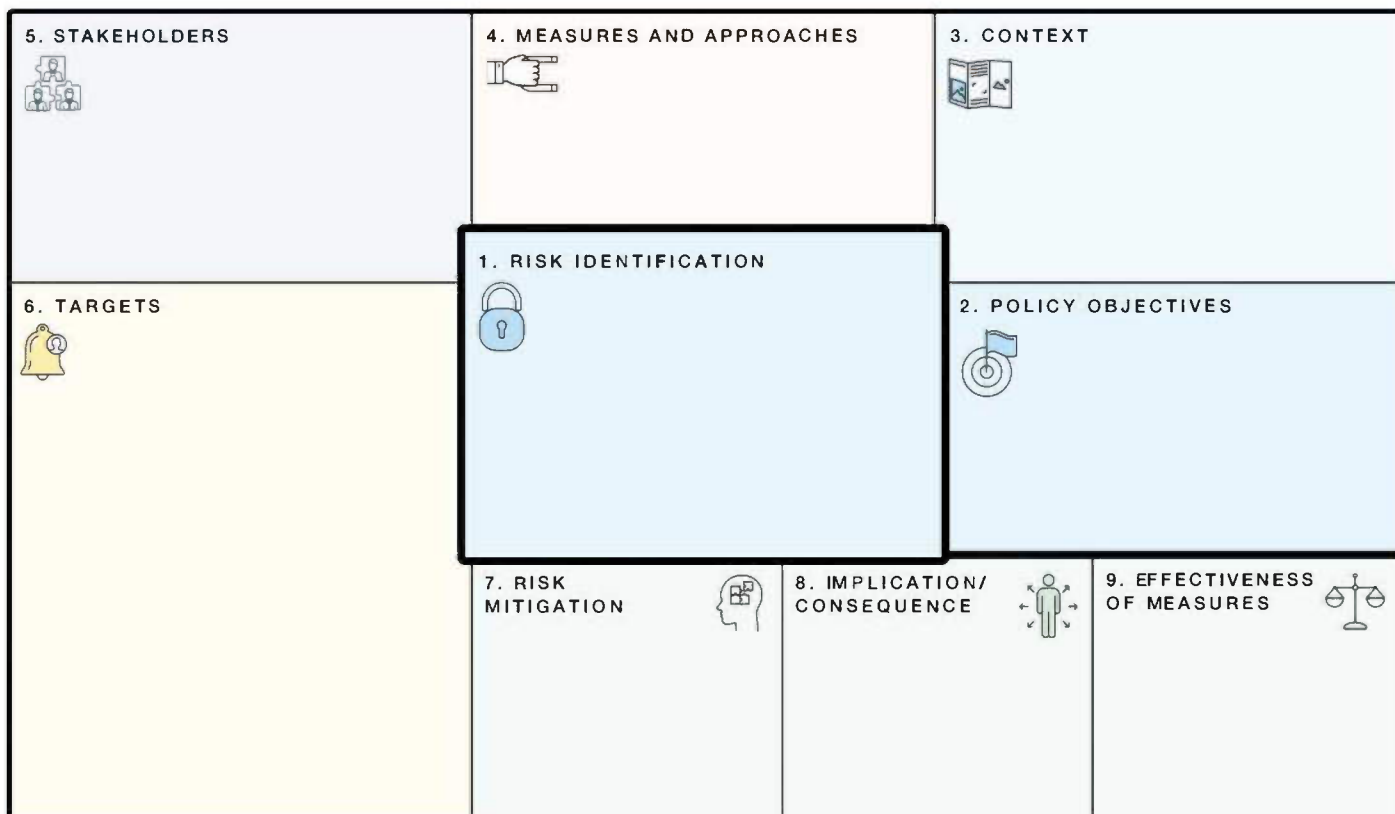
Several aspects of DeFi protocols or services may be more or less decentralized. Furthermore, decentralization can occur at the asset level, at the smart contract level and at the protocol level, to varying degrees.⁴⁵ The following tool maps out the relevant questions to evaluate the spectrum of decentralization in each major area.

Key questions		Potential spectrum		
Governance	Who decides which aspects of the system can be altered by governance token holders?	Completely centralized	Partially decentralized	Completely decentralized
	What is the threshold to propose governance change?	Only operators can change any aspects of the system	Only some aspects can be altered by governance token holders; threshold for proposing governance change is low	All aspects can be altered, any token holder can propose change
	What percentage of token holders needs to vote on proposal for vote to be valid?			
	Who can vote (all users, all token holders, only governance token holders)?			
	Are all governance tokens freely traded?			
Custody	Who is in charge of safely guarding the assets?	Fully custodial	Partially non-custodial	Completely non-custodial
	Does the user retain control over funds at all times?	Service retains full control of assets	Admin key, time-lock and/or multisig for updating parameters	Customer has full control of assets
	Who controls the multisignature wallet of the protocol?			
	Are admin keys controlled by a DAO?			
	Are admin keys held in cold storage?			
Protocol modification	Once a smart contract is deployed, can the code be changed by a party unilaterally?	Completely centralized	Partially decentralized	Completely decentralized
	Which parties can make changes to the protocol?	Operators alone can modify all parameters	Operators can change some parameters; users can change other parameters	User alone can modify all parameters
Verifiable security	Does the development team offer a public bug bounty programme?	No verifiable security	Some verifiable security	Fully verifiable security
	Has there been at least one audit of the code deployed on-chain?			
	Has the audit report been made public?			
	Have all of the serious issues listed in the report been fixed?			
	Have any vulnerabilities been exploited?			
Insurance coverage	Is there insurance coverage? For which risks? Up to what amount?	No coverage	Some coverage	Full coverage
	Is the insurer able to withstand a "black swan event" in DeFi (e.g., substantial coverage claims from different DeFi users simultaneously)?	Assets are uninsured	Limited or non-standardized coverage	Assets fully insured

Appendix 4:

DeFi policy-maker canvas

The following tool has been developed to help policy-makers frame their consideration of potential approaches to DeFi businesses.⁴⁶ It is designed to apply key components of this toolkit in a structured manner. Editable versions are available in [Word](#) and [Excel](#) form.



The canvas is intended to be used working out from the middle counterclockwise, and puts risk identification at its core. The canvas consists of nine questions divided into three stages:

(1) Identifying the necessity and conditions for policy-making

1. What specific risk are you aiming to address?
2. What policy objectives will be achieved by addressing such risk?
3. What is the context in which the policy measure will be implemented?

(2) Defining the approach

4. What policy measures or approaches are you considering?
5. Who are the stakeholders likely to be affected by these measures or approaches?
6. Who would be required to take action to implement the measures or approaches?

(3) Refining the approach

7. Is there already risk mitigation in place (either tech-based or of a self-regulatory nature) and is it sufficient?
8. What would be the implication of this measure, especially regarding innovation, the core business model and Sustainable Development Goals (SDGs)?
9. How effective are these measures, i.e. regarding enforcement?

**1. Risk identification**

The canvas puts the identified risks at the centre of the policy-making process. As outlined, DeFi may introduce a risk profile different from that presented by conventional financial activities.

As a basis for assessing harms, risks and responses in a structured way, the following questions may be relevant:

- What is the risk and who might suffer harm?
- How significant is the risk to a desired policy outcome?
- Who has a role in reducing/mitigating the risk? What can be done by that entity to mitigate potential harm?
- What legal mechanisms can address that harm?
- How might cross-border activity be addressed?

Example: Operational risks regarding custody (loss of funds)

**2. Policy objectives**

Before developing a specific approach, policy-makers should identify priorities for policy outcomes. These should serve as a basis for weighing the implications based on proportionality at a later stage (see Refining the approach, above).

Example: Investor protection and financial stability

**3. Context**

It will be important to understand where DeFi policies and regulations fit within broader regulatory schemes. There may also be existing market structure issues or areas of particular concern in the relevant jurisdiction that bear on decisions concerning DeFi.

Example: National initiatives to promote local development of innovative financial service platforms

**4. Measures and approaches**

Depending on the layer of the “DeFi stack” addressed, legal mechanisms to address the identified risk of harm will vary. Approaches should be crafted accordingly.

Example: [Gateway] – licensing regime for custodians

**5. Stakeholders**

This step identifies the groups or categories of individuals who might be affected, positively and negatively, by the proposed measures or approaches.

Example: Investors seeking to leverage their digital assets to increase potential returns; liquidity providers seeking predictable yields for digital assets they hold



6. Targets

This step analyses which actors need to implement the policy or would be encumbered by the measures involved. Activities could be grouped to identify roles, which would then inform specific obligations and controls.

Example: Someone who has control over private keys for others (custodian)



7. Risk mitigation

Policies and regulations should take into consideration existing risk mitigation, which may be tech-based or self-regulatory. It is likely that these will require supplementary measures, but this will give a more informed and nuanced picture of risk.

Example: Self-custody with multisignature wallet and smart contract-enabled governance features (threshold, white-listed addresses, etc.) and auditing of smart contracts



8. Implication/consequence

Desired policy outcomes will need to balance investor protection, innovation and many other considerations. Some measures and approaches will impose significant limitations on DeFi business models. Different levels of impact could be distinguished, for example:

- A low impact if the activity can be conducted without prior approval
- A medium impact if the operation cannot be performed without prior approval
- A high impact if such approval cannot be obtained at all due to the underlying decentralized business model

Example: Licensing regime for custodians = medium impact



9. Effectiveness of measures

As with all policies, the effectiveness of a measure – whether the measure can be enforced and how well it achieves the objective pursued – is an important consideration. Policy-makers and regulators should be clear about how they intend to measure the impact of the policy, weighing both the upsides and downsides, as defined by policy goals and objectives. Key metrics could explore the balance of areas such as consumer protection, privacy, innovation, etc. This also depends heavily on which layer of the tech stack a measure addresses. For instance, policies addressing the network infrastructure layer (blockchain protocol layer) will have more significant and far-reaching implications, and the effects should be measured and considered accordingly.

Example: High effectiveness where regulatory access point can be identified

Contributors

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Endnotes

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12. Projects might start out using a centralized implementation with a defined path towards a trust-minimized ecosystem.
13. Products and services offered through permissioned networks and/or blockchains provide additional layers of control and centralization with a distinct risk profile not covered in this report.
14. While Bitcoin is generally not a DeFi foundation because it offers limited smart contract functionality, bitcoin is widely used as a form of collateral for DeFi services, providing bitcoin holders with new options for returns on their holdings.
15. “Custodial” here refers to control over assets, not software code. There may or may not be an entity that has the ability to make unilateral changes to the DeFi protocols or services. Further, we use the term in the colloquial sense of having the ability to move or manipulate assets without the involvement of their owner, not based on any legal definition of “custody” in financial regulation. There are established legal and regulatory requirements governing how customer assets are controlled, such as SEC Rule 15c3-3, which differ from jurisdiction to jurisdiction.
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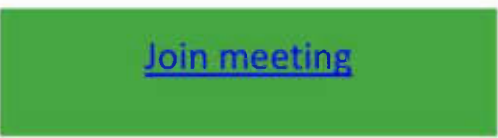
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2021 March

Bitcoin + Ether: An Investor's Perspective



Content

3	Introduction
5	The Value Proposition
	Why bitcoin?
	Why ether?
16	The Markets
	Exchanges
	Derivatives
22	The Assets
	Returns
	Volatility
	Correlation
26	On-chain Metrics
	Holdings
	Economic Activity
36	Risks
40	Conclusion

INTRODUCTION

Bitcoin (BTC) is often considered the gateway asset into crypto and it's not difficult to understand why.

As the crypto asset with the largest market capitalization, highest price and trade volume (excluding fiat-backed stablecoins), bitcoin can be likened to a blue chip. Blue chips in crypto are assets that are well-recognized, well-established and maintain a high value relative to other coins. In May last year, Coinbase - the largest U.S.-based crypto exchange - [reported that](#) 60% of customers start out by buying bitcoin. However, only 24% of these customers end up holding bitcoin alone.

Bitcoin's value as measured by its market capitalization already accounts for [close to two thirds](#) of the total market capitalization of all crypto assets combined. Over the last two years, fluctuations in the price of bitcoin have

been strongly correlated with the prices of other major crypto assets. This reinforces the idea that there's not much in the market for traders, investors and crypto assets holders to be exposed to beyond bitcoin.

But the crypto markets are evolving, becoming more diverse and mature. Other crypto assets have grown in liquidity and resilience, and investors are starting to more seriously consider crypto diversification. This is supported by a declining correlation between BTC and other assets, as different use cases and potential outcomes become better understood.

Ether, the native token for the Ethereum blockchain, is the industry's second largest crypto asset by market capitalization and trade volume (excluding fiat-backed stablecoins). This makes it an obvious candidate for institutional investors wishing to

Correlations Between BTC and Other Crypto Assets Are Declining



CMB10EX tracks the value of the nine largest non-bitcoin crypto assets; CMBIETH tracks the value of ether

diversify their crypto allocation, especially given its higher risk profile and higher year-to-date, 3-month and 12-month returns. The declining correlation between BTC and ETH reinforces the case for diversification, as do the divergent development paths and use cases for the two assets.

The differences between the two also underscore the benefits of considering each asset individually, rather than just as part of a “crypto basket.” Many institutional investors see bitcoin as a store-of-value play, a type of “digital gold.” Ether, on the other hand, tends to be seen more as a technology play, or as a consumable asset similar to “digital oil.” Both analogies only cover part of the picture, but represent the need to employ different mental models when considering the relative merits.

Indeed, according to industry insiders, some professional investors have chosen an ETH-first allocation, betting on relative

outperformance in terms of growth from the Ethereum blockchain and its native asset. In this report, we’ll look at the investment case

In this report, we’ll look at the investment case and some key metrics for both bitcoin and ether. This will not be a technical or academic paper - for more detail on how Bitcoin and Ethereum’s technologies work, see our reports on the [Bitcoin halving](#) and [Ethereum 2.0](#). Nor is it investment advice. Rather, we hope to present the various theses behind each asset’s value, as well as their risks, and show how their evolution can be tracked. Our hope is that readers will find this topic interesting enough to continue learning.

Note: Throughout, we capitalize the blockchain (Bitcoin, Ethereum) and use lower case or trading symbols (bitcoin/BTC, ether/ETH) for the asset. Dollars are U.S. dollars (USD). Nothing in this paper should be considered investment advice.

SIDEBAR: What is the double-spend problem?

Physical cash cannot be spent twice by the same owner. That certainty in the digital world is more complicated. How do you ensure that a digital copy of the coins has not been made, or that the coins were not sent to two addresses simultaneously? With digital currencies, there needs to be a way to know that once coins have been transferred by a user, he or she cannot use them again in a different transaction. This is the double-spend problem.

Bitcoin’s novel proof-of-work consensus uses long strings of alphanumeric characters known as hashes to ensure that data confirming certain transfers are difficult to reverse. These hashes are notoriously energy-intensive to calculate and require powerful and specialized machines. The process of validating transaction data on a proof-of-work (PoW) blockchain is known as “mining,” and the validators as “miners.” In exchange for their computation work, they are rewarded with a certain amount of BTC.

Ethereum and Bitcoin rely on PoW. However, the energy intensive nature of the protocol is one of the primary reasons why Ethereum is transitioning toward a different consensus protocol known as proof-of-stake (PoS), in which transactions are validated by a consensus of network stakeholders.

VALUE PROPOSITION:

Why are investors interested?

Identifying the potential value narrative behind traditional investments is relatively easy. This share is a bet on the airline industry, this bond has a high yield, this ETF gives exposure to emerging markets ... When it comes to as new a concept as cryptocurrencies, however, the question becomes much more complicated. How do you form an investment thesis when the assets don't fit into traditional mental buckets?

Cryptocurrencies are a novel type of asset in that they span more than one use case and more than one value driver. This can be confusing for investors, but it also enhances the potential of market leaders such as bitcoin and ether. With many potential narratives in play, success does not depend on one outcome.

What's more, the interplay between the various narratives lends strength to the overall investment case. Each narrative is stronger because of the existence of the other, whatever the dominant narrative ends up being.

Bitcoin is today mainly seen as a store of value. This is strengthened by its potential "intrinsic value" technology use as a decentralized payment rail or data transmission platform. Ether, on the other hand, is mainly seen as a technology play, but its upside potential also depends on its store-of-value properties. Below we look at the principal narrative drivers of the two assets, with the aim of clarifying some of the differences between them and highlighting the interplay between the value propositions.

Why bitcoin?

The value proposition for bitcoin has evolved over time as its market has become more sophisticated. In the early days, the purchase of bitcoin was a speculative bet on a new technology, and focus was on [getting people to use it](#) in transactions.

Now, as more professional investors have allocated bitcoin to their global portfolios, it is increasingly taking on a store of value role. The technology component of bitcoin as an investment is still significant, however.

Store of Value

The financial definition of a store of value is an asset capable of retaining its value over time. A key element of this is a supply that increases at a slower rate than demand.

Many issuers of financial assets succumb to the temptation of rapidly rising prices by issuing more of an in-demand asset. The issuer enjoys the additional funding, and the increased supply eventually satisfies demand and slows down or even reverses the price increase.

For this reason, assets that have a supply limit are generally seen as better stores of value. Examples of this are real estate (although buildings in cities are getting taller), gold (although the metal's supply is a function of its price) and bitcoin.

Bitcoin is the only asset currently traded on markets with a truly hard limit. Its cap of 21 million units is hard-coded into the Bitcoin protocol, and would be impossible to change without consensus from all network participants. Given the negative impact this would have on bitcoin's value proposition, and given Bitcoin's decentralization, such consensus would not be forthcoming.

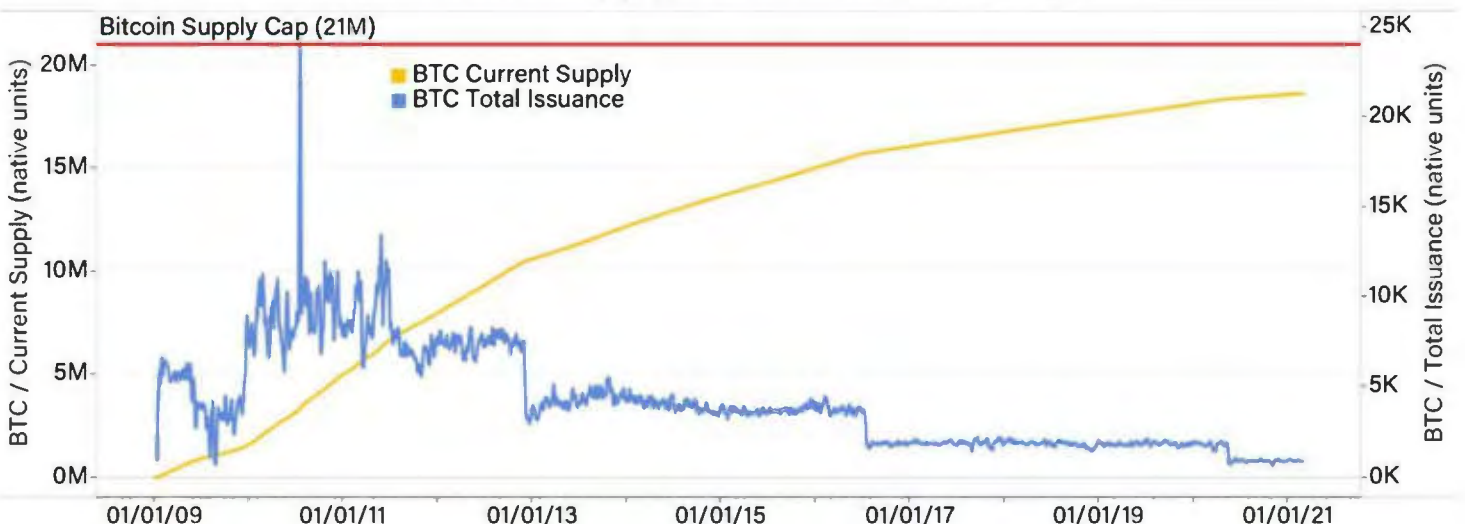
Other cryptocurrencies have hard caps, but are not as decentralized as the Bitcoin network, which means that consensus for a protocol change would be easier to achieve. Ether runs on a decentralized blockchain, and has no set supply limit.

This is the main reason many investors see bitcoin as a store of value, often referring to it as "digital gold." Its supply is fixed by the underlying protocol and cannot be influenced by the level of demand.

New issuance is also controlled and cannot be influenced by the price. Currently, the protocol releases 6.25 BTC in each new processed block. This amount reduces by 50% every four years. The [next "halving"](#) is expected in 2024, and will dwindle to 0 as the supply limit is reached, expected in around 2140.

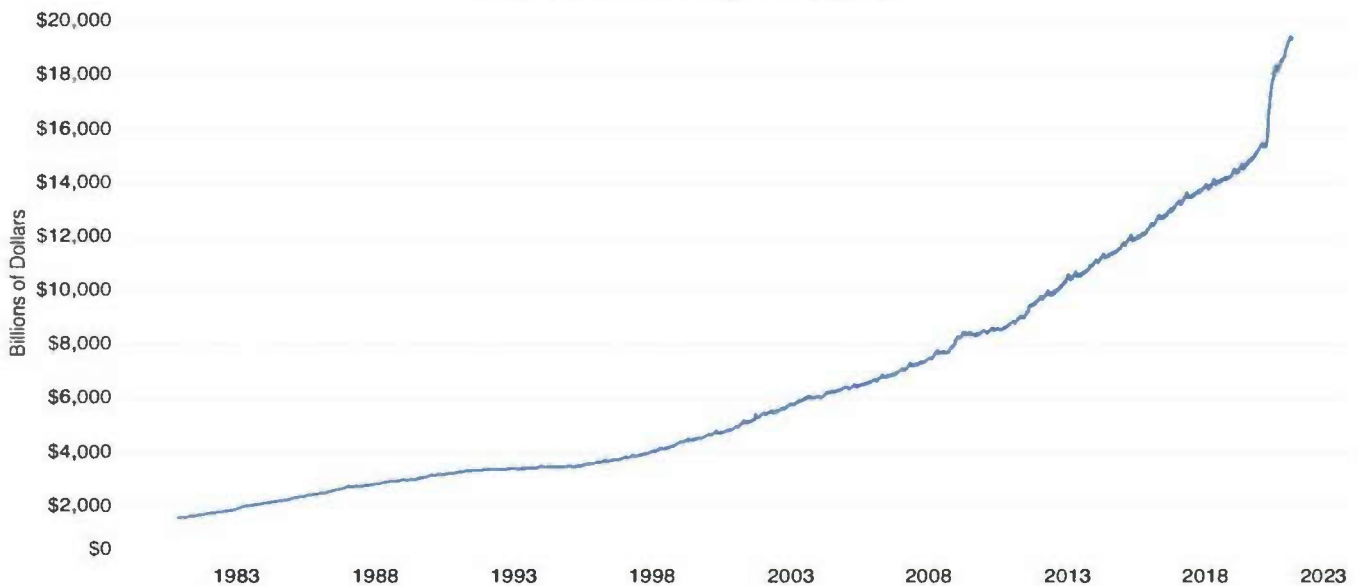
Some argue that bitcoin is too volatile to be a store of value. This takes a short-term view of the concept. It is possible that bitcoin will not hold its value relative to the U.S. dollar over the next few days. (More on bitcoin's volatility below.) Over the medium- to long-term, however, bitcoin's value against the dollar is expected to grow, as the increase in the number of dollars in circulation seems to have no limit.

BTC Fixed Supply and Issuance Schedule



Source: Coin Metrics

U.S. M2 Money Supply



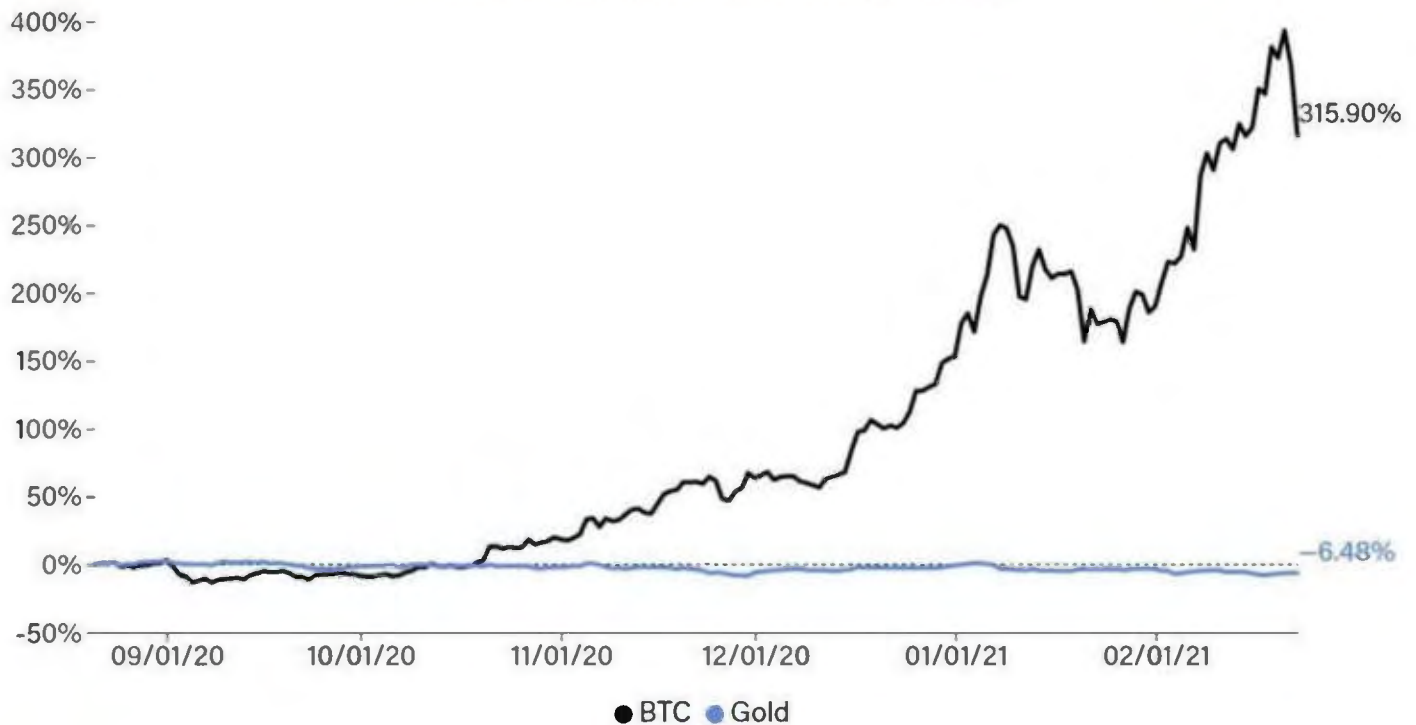
Source: [Federal Reserve Bank of St. Louis](#)

This is even more relevant in countries with a history of rampant inflation - for many in these regions, bitcoin represents an opportunity to maintain and perhaps even increase the purchasing power of savings.

Others argue that bitcoin makes a poor store of value because it has no intrinsic use. This overlooks bitcoin's innovative technology and its use as a payment token. It is true that BTC transactions are currently not ideal for payments, in that they are relatively slow and expensive compared to other electronic alternatives. However, many regions do not have access to payment facilities available in much of the developed world - for them, bitcoin is an ideal payment mechanism, in that it enables online transactions without the need for a bank account or centralized approval. And, as new bitcoin payment services and second layer solutions continue to expand their reach, Bitcoin could become a more attractive payment rail even to developed nations in the future.

Compared to gold, which has been a trusted store of value for over 5,000 years, bitcoin is young and relatively untested. While this adds risk, its relative youth is one of the aspects that makes it an appealing investment, for the higher potential upside as its wealth preservation role becomes more apparent and more valuable.

Bitcoin and Gold 6m Performance



Gold = London Bullion Market pm fixing price;
Source: CoinDesk Research, St. Louis Fed, Yahoo Finance

What's more, bitcoin has several advantages over gold as a store of value. For one, it's more portable. A store of value that you may have to leave behind has limited use. True, gold could be held by third parties on your behalf - but that makes it vulnerable to seizure.

Unlike even gold held in a personal safe, bitcoin is seizure-resistant, in that only holders of the private key to a wallet can move associated tokens. While brute force could encourage some to give up their private key, the perpetrators would first need to decipher and prove the existence of the holdings. This point is of less relevance to institutional investors, however, most of whom will use third-party custody service providers with identification and protection.

A further advantage that bitcoin has over gold and other stores of value such as art and real estate is that it is liquid. You can buy or sell millions of dollars worth of bitcoin 24 hours a day, seven days a week, within seconds. Or, you can transfer it to another holder, at any time, without going through a financial intermediary.

Also, as we mentioned above, we all assume gold's supply is limited, but in reality, we don't know how much gold there is in existence, and how much left to extract. Should gold's price increase, mining efforts would increase and the current supply would grow. The total potential supply would also grow with enough of a price jump, as new mining methods would become possible. Unlike gold, bitcoin's current and future supply cannot be influenced by its price, no matter how high it gets.

SIDEBAR: What is Taproot?

Given the wealth riding on the network, protocol upgrades are slow and painstaking - Taproot has been in the works for years, and although it has achieved network consensus and has been incorporated into the protocol code, it has not yet been activated.

The Bitcoin community is excited, however, as it will be the most significant upgrade to the network's potential since the activation of the block capacity enhancement of SegWit in 2017.

The upcoming adjustment to Bitcoin's protocol includes (but is not limited to) the following improvements:

- It will enhance privacy by making multi-signature transactions indistinguishable from normal, peer-to-peer transactions.
- It will increase the limit on the number of signers on multi-signature transactions.
- It will allow lighter and more complex "smart contracts" (encoded self-executing rules) on top of the Bitcoin blockchain, which could enhance Bitcoin's functionality.
- It will make the lightning network (which enables layer 2 payments) more flexible and private.

A Technology Play

Bitcoin is more than a scarce yet liquid store-of-value asset - it is also a technology play.

Bitcoin introduced a radically new way to transmit information, without risk of censorship or manipulation. Its code is relatively rigid and simple, which gives it extra security in that its attack surface is reduced. This also limits its flexibility, however.

Work is currently underway to improve Bitcoin's scripting potential. While it is possible to create conditional payments and to require a certain combination of distinct digital signatures, this is currently unwieldy.

The upcoming Taproot upgrade (see sidebar) will give Bitcoin a boost to transaction privacy and allow for more lightweight and complex "smart contracts" (encoded self-executing rules). Furthermore, projects such as Sovryn and languages such as Minsc hope to encourage more experimentation with the technology's functionality by making Bitcoin "smart contracts" (self-executing blockchain applications) easier and safer to work with.

This change poses little risk to the network itself, as any proposed upgrade to the actual code has to go through rigorous testing and approval processes, and even then has to still overcome the considerable barrier of achieving consensus from the majority of miners and users.

As the Bitcoin network continues to expand, more development will emerge on its periphery to enable more complex functions as well as to enhance connectivity with other blockchains.

Furthermore, it is often overlooked that Bitcoin can be used to transfer more than just value. It can also be used to [timestamp documents](#) and images without the risk of interference or manipulation. Anything that can be condensed into a cryptographic hash can be included in a Bitcoin transaction and [embedded on the blockchain](#).

This function is not often used as yet, but could become more popular should the integrity of records stored on centralized databases get called into question.

Why ether?

While many investors see bitcoin as primarily an emergent store of value and as a secondary consideration a technology play, the situation is reversed with ether. Investors tend to see ether as mainly a technology bet, and as a secondary consideration, a store of value.

Ether has the additional consideration of yield. Ethereum has begun its migration toward a new type of blockchain, known as Ethereum 2.0, on which committed stakeholders can earn relatively attractive returns just by holding the asset in a special type of account, effectively making ether a productive asset.

A technology bet

As we saw above, Bitcoin's technology is advancing, but incrementally and slowly. Its consensus mechanism was largely baked in at launch, and its relative simplicity is accepted as a trade-off for greater security.

Ethereum's technology is still nascent, however. It's not so much that the blockchain is younger (in its sixth year of operation vs. Bitcoin's 12 years); it's that Ethereum is radically changing its technology to what it sees as an improved consensus mechanism.

Up until December 2020, both BTC and ETH were issued solely through [proof-of-work \(PoW\) consensus](#) and the process of mining.

However, towards the end of last year, Ethereum began a planned migration to a new consensus mechanism known as [proof-of-stake](#) (PoS). Rather than miners, the responsibility for transaction processing and network consensus, as well as the reward of newly issued ether, falls to validators according to their committed asset holdings.

The first major step in this migration was the launch in December 2020 of the Beacon chain. For now, the new ether generated on the Beacon chain is locked up in validation accounts so as to not distort circulating supply. Transfers between validation accounts are not enabled. In Phase 1.5 of Eth 2.0 development, which could be as much as a few years away, developers expect to

SIDEBAR: The difference between “mining” and “validating”

The two main consensus algorithms for “approving” transactions and adding them to the blockchain are proof-of-work (PoW) and proof-of-stake (PoS).

Bitcoin and Ethereum run on PoW, which relies on “miners” to establish network consensus and ensure records of transactions are consistent across all users. Miners do this by grouping transactions into blocks and generating a hash for the block that satisfies the format established by the protocol. This consumes significant amounts of energy, but incentivizes miners to protect the integrity and security of the network by including new bitcoin in the block as a reward. The more miners a PoW network has, the higher its security.

Ethereum is moving to PoS, which relies on “validators” rather than miners. Network participants can become validators by “staking” coins, or locking up a certain amount as collateral, which gives them the right to “bet” on transactions getting approved by the consensus. If they go against the consensus, they lose some of their stake. Unlike with PoW, validators on PoS networks consume resources rather than energy.

The more validators staking resources on a PoS network, the higher the network’s security.

activate ETH transfers from Ethereum PoW blockchain to its PoS blockchain and vice versa.

When this merge is complete, the security model of Ethereum will differ starkly from that of Bitcoin. One will be secured primarily through the process of mining and the other through the process of validating. It is important to note that development for these two crypto assets are advancing two different systems for long-term blockchain security.

Ether represents a long-term bet on PoS becoming the most trusted and used protocol for securing public blockchains. Without the same energy consumption pitfalls as Bitcoin and yet aiming for higher levels of decentralization, security and efficiency, ether is the largest PoS experiment by market capitalization and trade volume in the crypto industry today. It has the potential to reshape how developers, companies and governments think about security for decentralized networks.

In this way, ether can be considered a type of venture capital play on a new technology, with a similar risk/reward profile. It has the added benefit of being a liquid asset, however - investors can enter and exit positions 24/7/365.

Bet on DeFi

Ether also represents the growth of interest in decentralized applications, known as “dapps.” As we saw above, Bitcoin’s code is relatively simple, which does not allow for great flexibility in the network’s functionality. It was built to do one thing exceptionally well.

Ethereum, on the other hand, was built to be flexible, which has generated a vast range of creative applications based on its blockchain. These benefit from the strong developer support for Ethereum’s technology, from the collective innovation on the network itself, and from being able to interact with other applications within the community.

In order to interact with dapps, users need to pay transaction fees on Ethereum denominated in ETH. Fees have been skyrocketing on the network since mid-2019 as a result of growing interest in decentralized finance (DeFi) dapps, which are applications that mimic and innovate upon some traditional finance industry services such as lending, borrowing and trading in crypto assets.

Activity in DeFi applications has seen strong

growth over the past year, as can be seen by the total amount of value locked in smart contracts (see chart below).

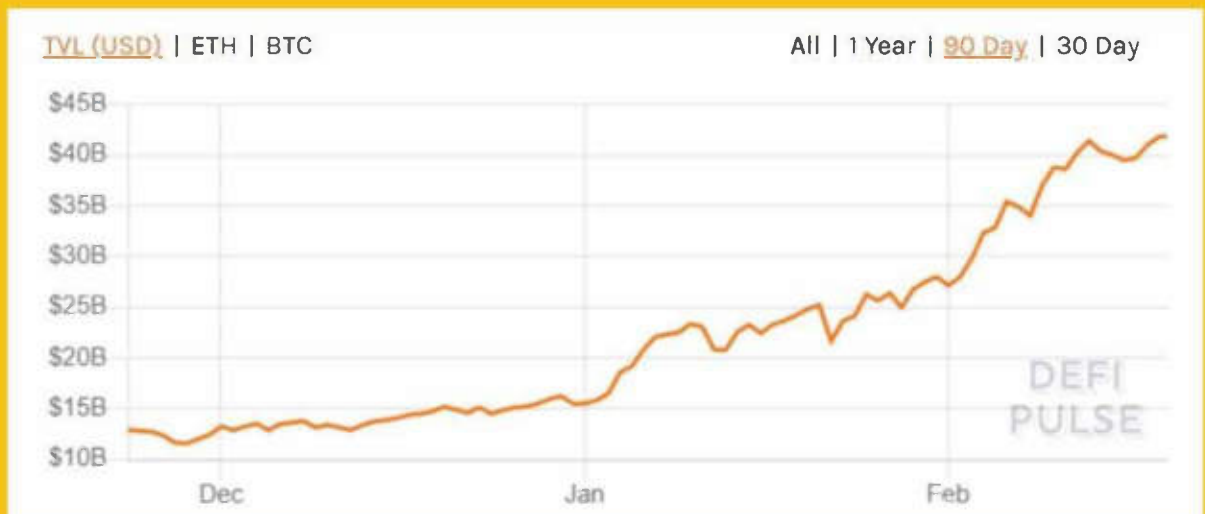
The growth has been fueled largely by the attractive yields available on some platforms, and by growing interest in the extraordinary innovation in the space.

This interest is getting a mainstream boost from the [increasingly apparent](#) vulnerabilities and inequities of current capital markets plumbing. In a world of automated crypto asset trading and lending facilitated by self-executing dapps, assets cannot be “lost,” trades cannot be frozen, loans can’t be called without validated reason, and all traders programmatically have equal priority.

Ether is an essential resource for users wanting to interact with decentralized applications built on Ethereum. As adoption for dapps on Ethereum continues to increase and become unbounded by the network’s own technical limitations through its PoS upgrade, value for ether is expected to rise in step with user demand for the crypto asset in order to pay for the diverse array of services hosted by the Ethereum blockchain.

Total Value Locked (USD) In DeFi

Source: defipulse.com

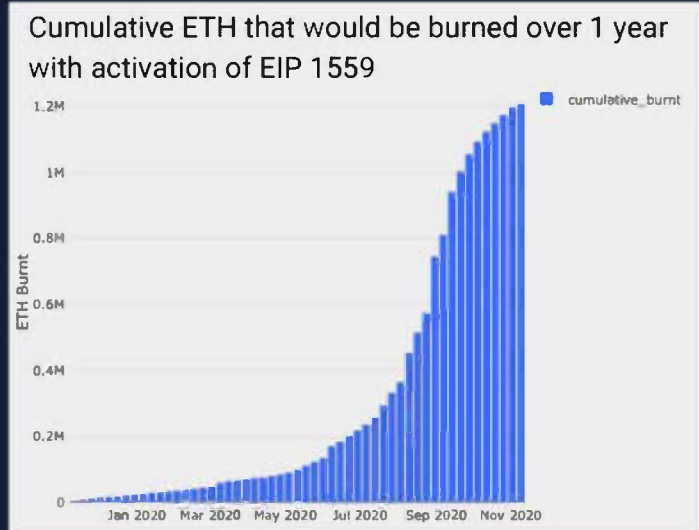


SIDEBAR: Ethereum Improvement Protocol (EIP) 1559: Could Ether One Day Become a Deflationary Currency?

While ether does not have a fixed supply cap, it does have an active community of developers and users that are regularly introducing changes to the core technology of Ethereum. One of those changes that is being debated for implementation is [EIP 1559: Fee Market Change for Eth 1.0 Chain](#).

If the change is approved, EIP 1559 would enable a large portion of fees paid by users to miners for transactions and smart contract deployments to be burned, effectively removing the corresponding amount of ether from circulation. The other portion of fees defined as transactions "tips" would go directly to miners as an incentive for their work.

The rationale for burning fees is to support an algorithmic model that prices the cost of using Ethereum instead of leaving it up to users and miners to decide. In times of high network traffic, this algorithmic model would automatically raise fees in order to taper user demand for Ethereum, and the opposite when network traffic is low. As a result, the amount

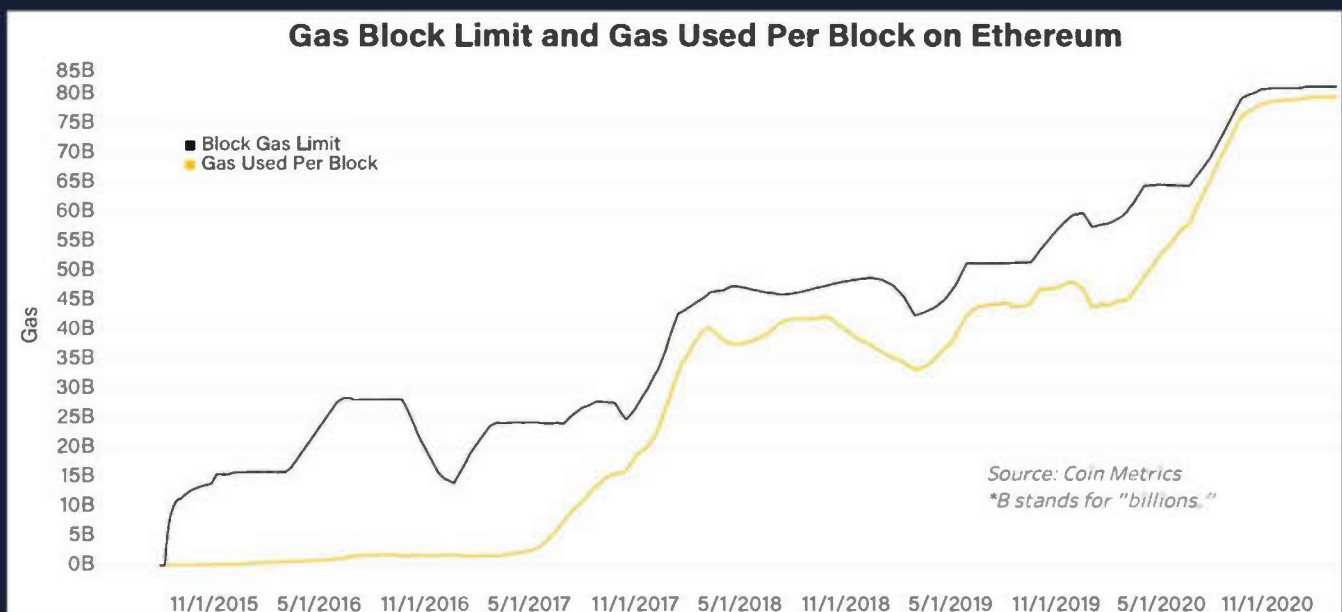


Source: @phabc/Dune Analytics

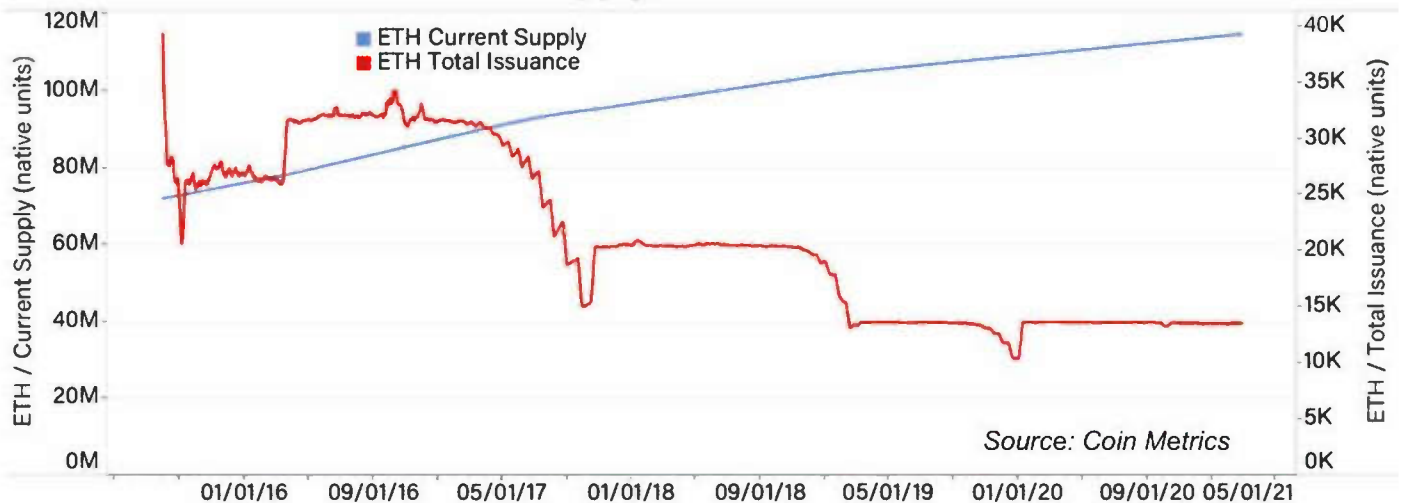
of ETH that would be destroyed may be greater at certain points in time than others.

When fees are high, the amount of ether burned could amount to more than the total ether created over the same time period. However, this is not guaranteed, as there is no certainty as to what user demand for Ethereum-based applications will look like in years to come.

Debate and discussion over the activation of EIP 1559 on the Ethereum network is [ongoing](#).



ETH Fixed Supply and Issuance Schedule



Store of Value

Another important difference between ether and bitcoin is total supply. Bitcoin has a hard supply cap of 21 million coins that is being issued and distributed gradually through block rewards. (Read our [free report on bitcoin issuance and supply](#) to learn more.) Ethereum also issues ether in gradual increments every block. However, the supply of ETH that can be generated is unlimited.

Ethereum chose to not have a supply limit as that would imply having a fixed security budget for the network. Instead, the protocol's monetary policy can be best described as "minimum issuance to secure the network." Ethereum's issuance pattern is more complicated than that of Bitcoin, with new Furthermore, the amount of new ETH issuance has declined over the years, and is expected to decline further once the migration to Eth 2.0 is completed.

One factor that will offset the supply increase is the amount of ETH locked up in staking accounts, which effectively removes ETH from circulation. To prevent circulating supply

from declining to a level that impacts Ethereum's use as an application network, the yield declines as more ETH is staked.

Ether's store of value narrative is likely to be enhanced by the implementation of EIP 1559 (see sidebar), which introduces "fee burning" in which a portion of ether used to pay for transaction fees is removed from the circulating supply.

This adds a further disinflationary or possibly even deflationary aspect to ETH's supply schedule. As with the current PoW Ethereum blockchain, Eth 2.0 will continue to issue new ETH as validation rewards. The amount of ETH burned as fees, should EIP 1559 be implemented, will partially or perhaps totally offset the supply increase.

The philosophy behind the ETH supply schedule is to maintain the "[minimum issuance to secure the network.](#)" This is what gives ETH a potential store-of-value quality, since many investors assume that growth in demand will continue to outstrip growth in supply.

Yield

On a proof-of-stake protocol, ether can function as a productive asset and generate yield for its holders in the form of annualized interest. Anyone with a minimum of 32 ETH can earn 7-8% APR on Ethereum 2.0 by locking up the coins into the network and becoming a validator. This does require some technical knowledge and dedicated hardware. However, compared to mining on PoW, it is comparatively less energy intensive and does not require specialized machinery outside of a general purpose computer.

Alternatively, ETH holders can also opt into using the services of staking providers which manage validator operations for clients in exchange for a small cut of earned rewards.

At time of writing, almost 3% of all ether in circulation has been locked into earning interest on Eth 2.0.

The interest earned by validators on Eth 2.0 is expected to decline over time to roughly 4-5% as more ETH is accumulated on the network. These rates will compete with the amount of rewards users are able to earn on various centralized and decentralized lending platforms that also allow ETH holders to earn an interest on their ETH.

It is possible to earn high yields on many of the DeFi protocols currently running on Ethereum, in many cases significantly higher than that offered by Ethereum staking. However, with Eth 2.0, investors can earn income on a base layer asset staked on the base blockchain, without any application risk and without the need to switch into other tokens.

	BTC	ETH
Current supply	18.64 million	114.80 million
Supply limit	21 million	None
Average new issuance/day	~880 BTC	~13,500 ETH
Daily inflation rate	1.74%	4.30%
Protocol	Proof-of-work	Proof-of-work, migrating to proof-of-stake

Source: CoinDesk, Coin Metrics

THE MARKETS

Exchanges

In traditional markets, stocks usually trade on just one exchange. They *can* trade on more than one, but each additional listing incurs significant costs in fees, paperwork and compliance.

Crypto markets are different. BTC and ETH currently list on hundreds of exchanges, and do not pay any fees or file any paperwork to do so (who would do the paying and filing?). The exchanges in crypto markets decide what assets they want to list.

Many of these exchanges have little oversight. Some, however, are based in jurisdictions with relatively strict rules about licensing and financial controls.

Spot crypto exchanges in the U.S. currently do not fall under the oversight of the U.S. Securities and Exchange Commission (SEC), since most of the traded assets have not yet

SIDEBAR: What do we mean by “clean” exchanges?

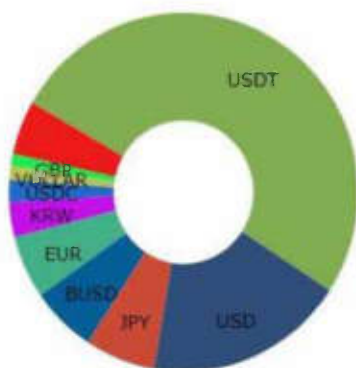
“Clean” exchanges are trading venues that have been examined and do not appear to be falsifying trading data.

In 2019, Bitwise [presented research](#) that showed some exchanges engaging in practices such as wash trading to artificially inflate volumes, in order to attract traders as well as projects willing to pay in order to list. Examining the rhythm, frequency and amounts of BTC trades can reveal whether an exchange is displaying authentic market data or not.

The Bitwise report listed 10 exchanges as having “clean” volume: Binance, Coinbase, Bitstamp, Kraken, Gemini, Bitfinex, Bitflyer, itBit, Bitstamp, Bittrex and Poloniex. To this list we would add LMAX Digital, the crypto asset arm of LMAX Group, an established institutional FX liquidity provider.

been classified as securities. In the case of BTC and ETH, it is increasingly unlikely they ever will.

BTC Volume by Currency



ETH Volume by Currency



Source: [Cryptocompare](#), taken Feb. 15, 2021

Those that have derivatives operations fall under the oversight of the U.S. Commodity Futures Trading Commission (CFTC), but only for the derivative products. For this purpose, the CFTC treats BTC and ETH as commodities.

Most BTC trading is done not in U.S. dollars, but in USDT, a stablecoin [in theory backed by dollars](#) which runs on the Ethereum blockchain. Stablecoins have the advantage of being able to move swiftly from one exchange to another, regardless of jurisdiction.

ETH trading is also largely denominated in USDT, but also has a sizeable proportion based in BTC. The reverse does not hold, the BTC/ETH pair is not a significant part of the BTC market.

The largest fiat BTC and ETH exchange is Coinbase, headquartered in San Francisco, and [about to go public](#).

One complication of crypto markets, not present in traditional markets, is the lack of reliable data on overall trading volumes. Some unregulated exchanges fake trading data in

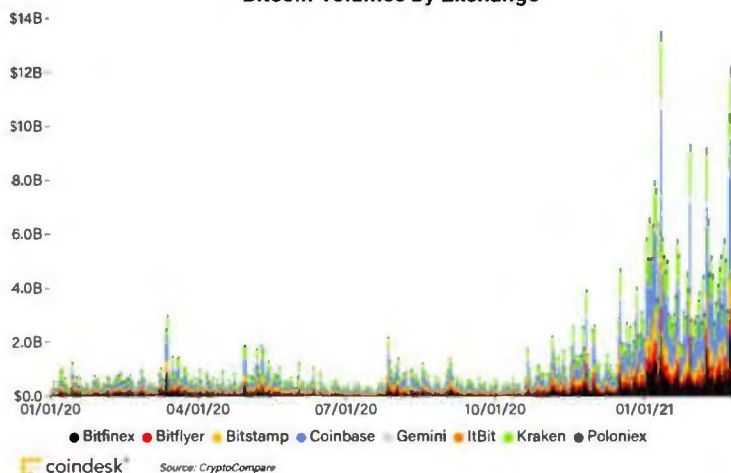
order to attract traders and assets willing to pay to list (see sidebar on previous page). Yet even some large trading venues that are left off the “clean” exchange lists may have significant real volume.

Another complication with crypto markets is the lack of an established and universally recognized asset price. Because BTC, for example, trades on so many exchanges, it can have many different prices at any given time, depending on the exchanges’ order books. This makes it complicated for BTC-based investment products to accurately price BTC-based investment products. To solve this problem, the industry relies on indexes, which calculate a price based on a range of inputs from various exchanges. This price is taken to represent the market’s position.

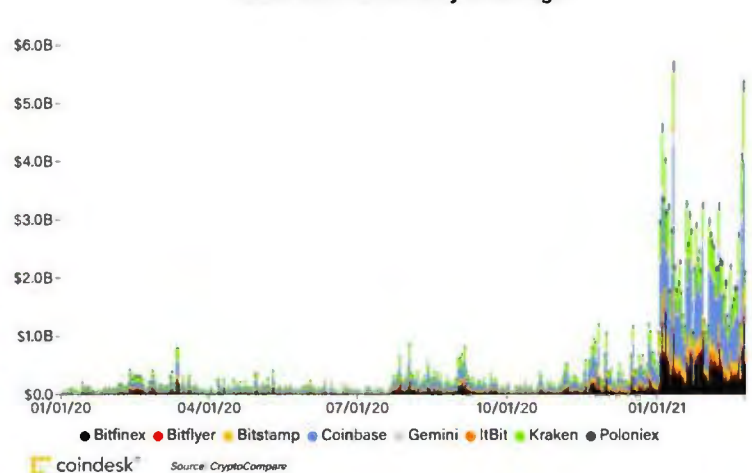
CoinDesk’s subsidiary Tradeblock operates one of the industry’s most widely used bitcoin price composites, [XBX](#), which is an amalgam of prices from the four largest licensed exchanges in the U.S. and Europe: Coinbase, Kraken, Bitstamp and LMAX Digital.

Both BTC and ETH have seen a surge in volumes on tracked exchanges since the beginning of the fourth quarter of 2020.

Bitcoin Volumes by Exchange

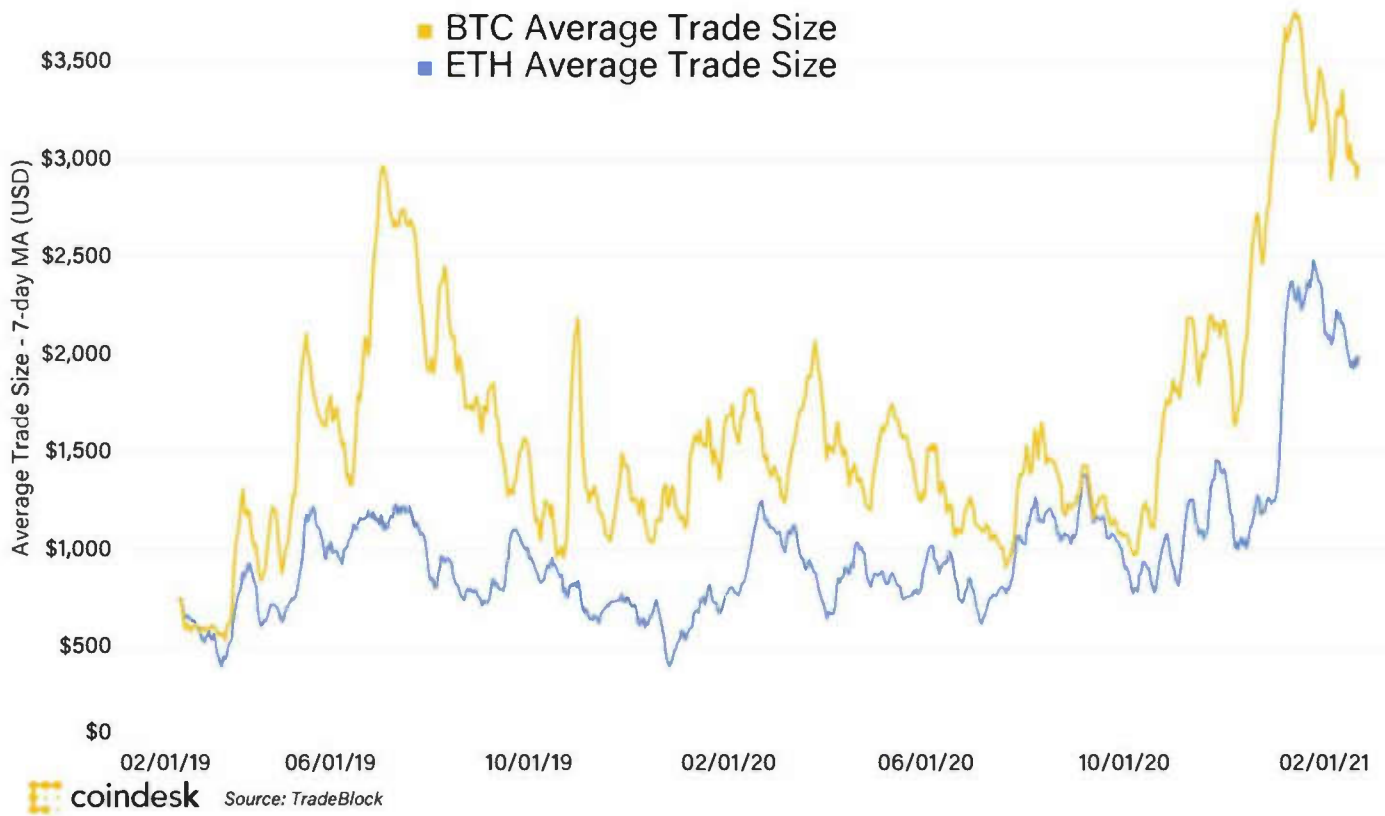


Ethereum Volumes by Exchange



The average trade size for BTC and ETH on Coinbase, the largest U.S.-based exchange, has been growing, indicating the entrance of investors with bigger pockets.

Trade Size of BTC/USD and ETH/USD on Coinbase



	BTC	ETH
Market cap	\$863.63 billion	\$165.94 billion
7-day average daily spot trade volume*	\$3.39 billion	\$1.18 billion
7-day average open interest - futures	\$14.64 billion	\$4.60 billion
7-day average open interest - options	\$9.20 billion	\$2.12 billion

coindesk *Data as of Feb. 26, 2021 Source: CoinDesk Research

Derivatives

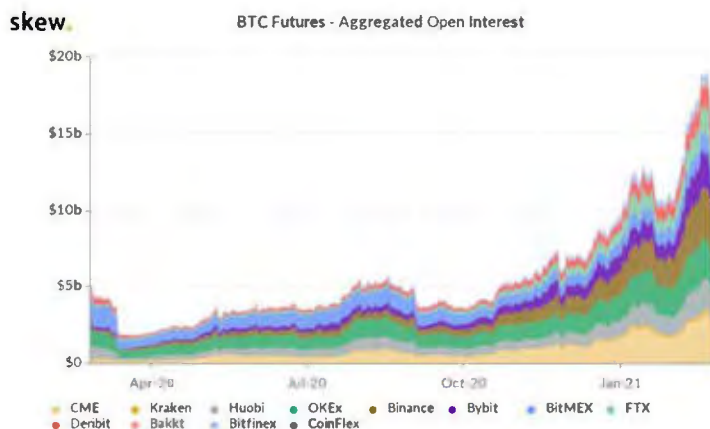
Futures

Derivatives markets tend to take time to mature, but bitcoin's derivative ecosystem has done so relatively quickly. This is largely due to its fragmented and unregulated nature - the first bitcoin derivatives sprang up on offshore venues focused on both retail and professional traders. The market's trading volume is currently dominated by large exchanges that operate mainly out of Asia, and which offer high leverage that [can exceed 100x](#).

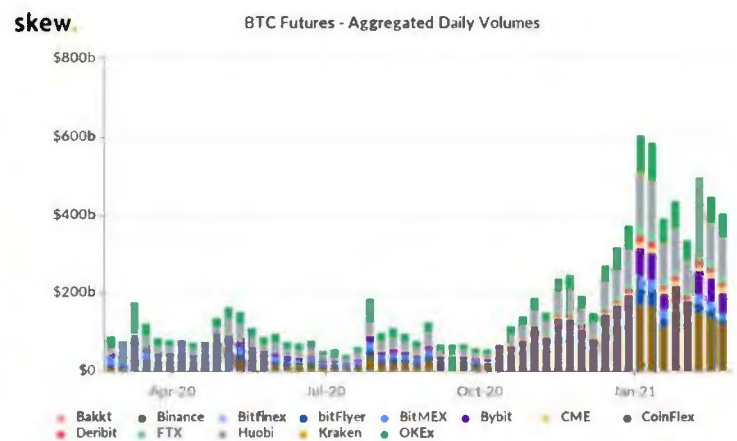
In December 2017, the Cboe Futures Exchanges started trading the first crypto derivative product accessible to regulated U.S. institutions. The CME, the world's largest futures trading venue, followed suit a few days later. In March 2019, the Cboe [retired its](#)

[bitcoin futures](#) contracts, while the CME has recently risen to become one of the top three bitcoin futures exchanges in terms of open interest. Since the CME is currently the only futures exchange that many regulated funds can trade on, this signals growing institutional interest in bitcoin derivatives, either as hedging tools or speculative instruments.

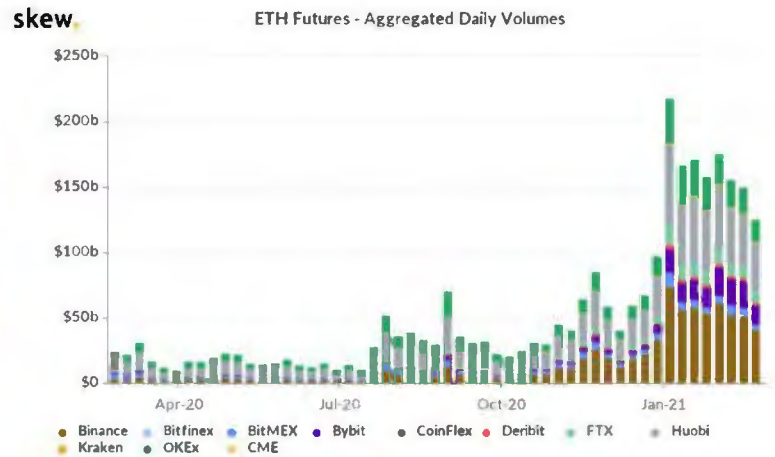
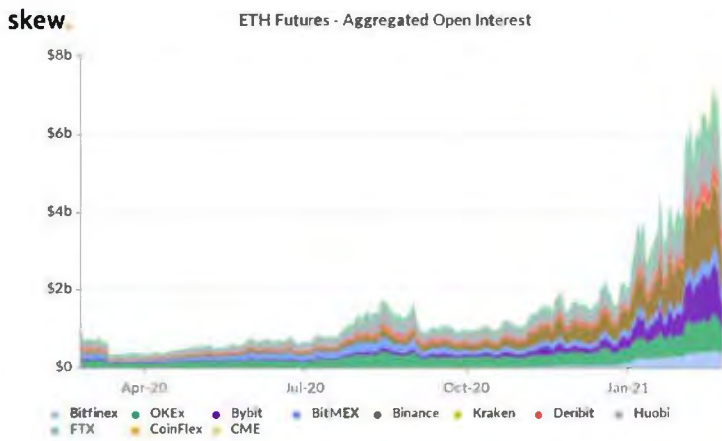
The fourth quarter of 2020 saw a strong rise in futures open interest across most derivatives platforms, indicating growing market participation from a wide range of investors. In a virtuous circle, more liquidity in bitcoin futures will bring in more traders which will provide greater liquidity, and so on. This makes taking [directional positions](#) much easier for investors and supports the growth of the bitcoin options market, which in turn will make hedging easier for investors, miners and other industry participants.



Source: [skew.com](https://www.skew.com), taken Feb. 25, 2021

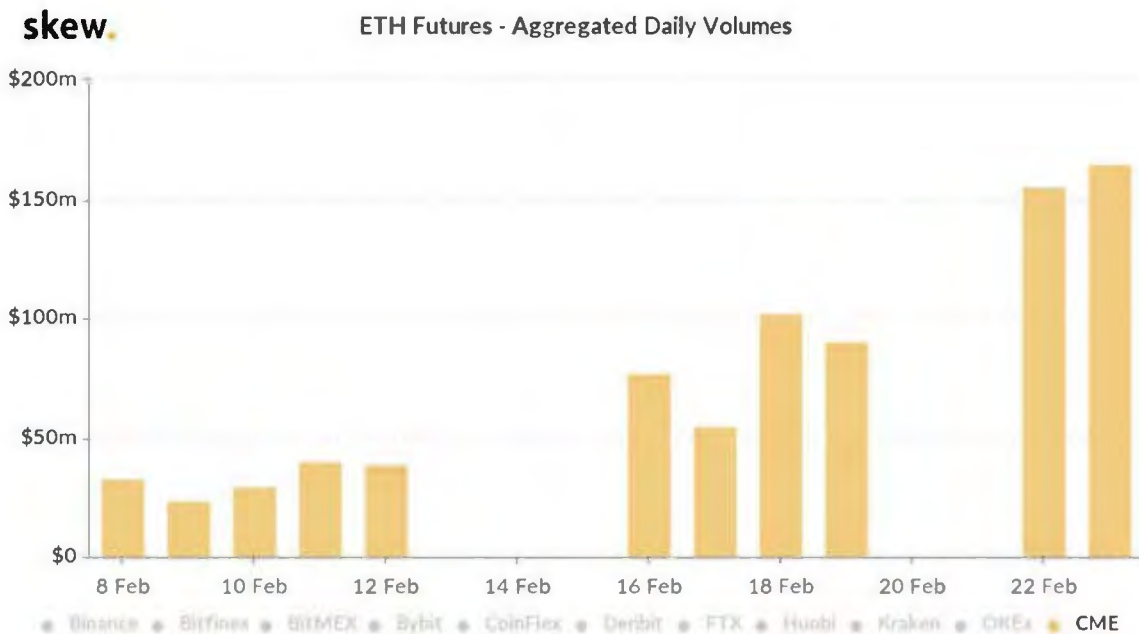


Ether’s derivatives markets are younger and thinner than those of bitcoin, but have seen a similar surge in both trading volumes and open interest.



Source: [skew.com](https://www.skew.com), taken Feb. 25, 2021

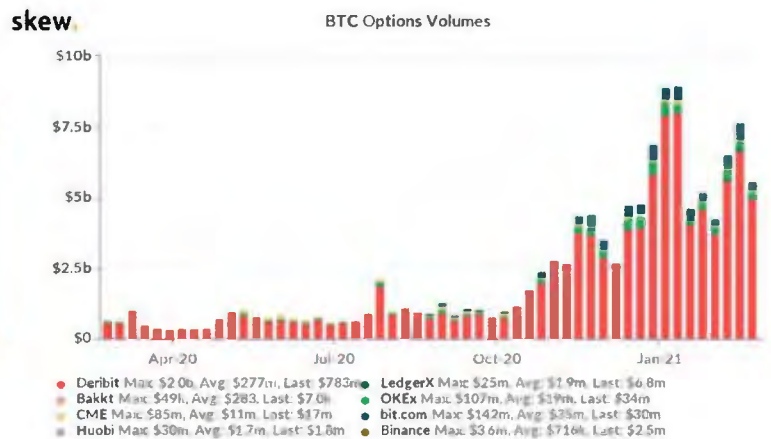
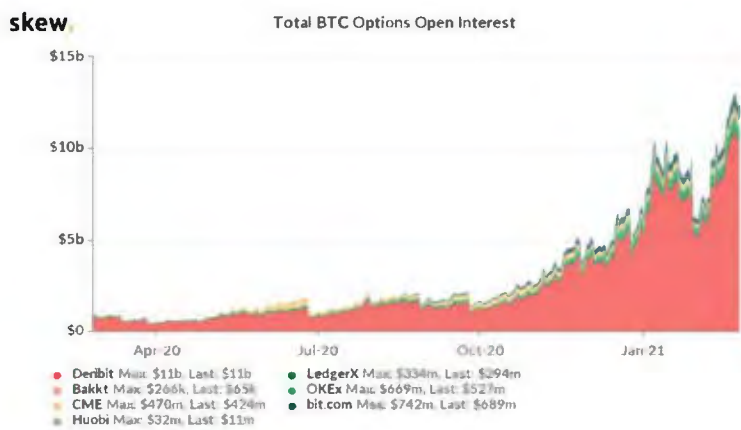
The market did not have [CME-listed ether futures](#) until early February 2021. They were launched on Feb. 8, trading over \$30 million worth of contracts on the first day. Since then, the volume has headed upwards.



Source: [skew.com](https://www.skew.com), taken Feb. 23, 2021

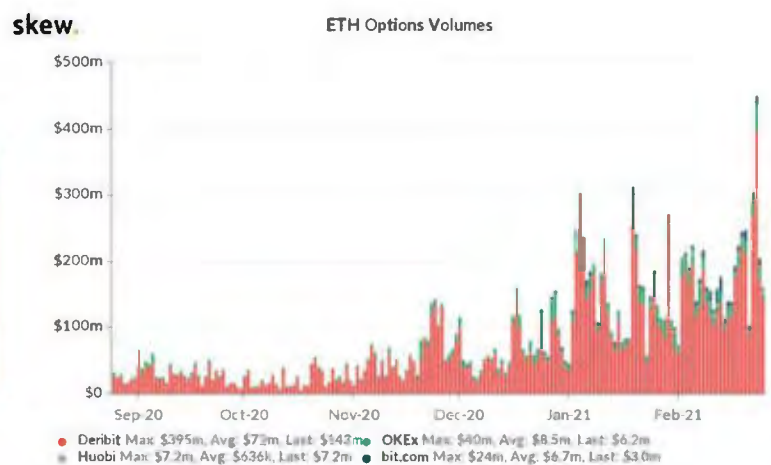
Options

Bitcoin’s options market started to develop well after the futures market, but it also saw strong growth in volumes and open interest in the fourth quarter of 2020. The bitcoin options market is still relatively immature, although BTC options do trade (in relatively low volumes) on the CME and on Bakkt, a U.S.-based crypto exchange backed by NYSE parent ICE. Most crypto options activity currently takes place on Deribit, a platform based in Panama.



Source: [skew.com](https://www.skew.com), taken Feb. 25, 2021

The ether options market is even more immature - its options open interest is less than half that of open interest on ether futures (vs. almost 75% for bitcoin, at time of writing). As with bitcoin, most volume is transacted on Deribit, and neither the CME nor Bakkt, two U.S.-based exchanges that trade bitcoin options, have as yet listed options on ether.



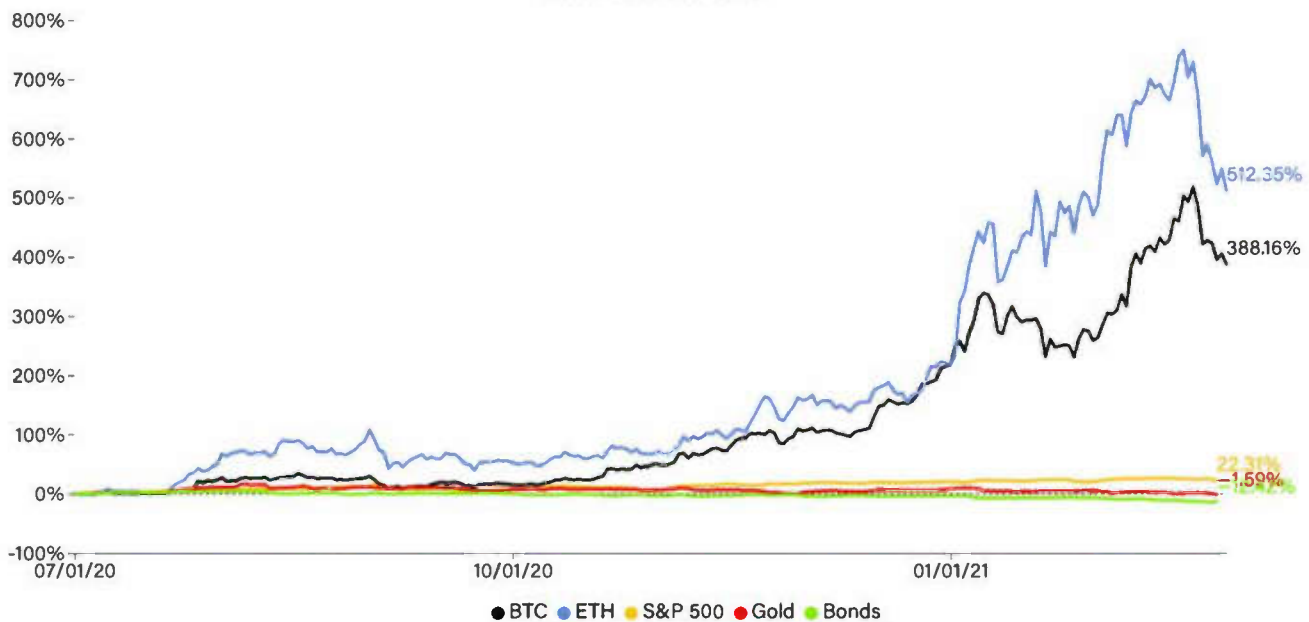
Source: [skew.com](https://www.skew.com), taken Feb. 25, 2021


THE ASSETS

Returns

The below charts show the performance of BTC and ETH relative to traditional assets such as stocks (represented by the S&P 500), gold and bonds (represented by the TLT long bond index).

6m Performance



 Bonds = iShares 20+ Year Treasury Bond ETF; Gold = London Bullion Market pm fixing price; Source: CoinDesk Research, St. Louis Fed, Yahoo Finance

Asset	Return					Risk	
	YTD	3-months	6-months	1-year	3-year	Sharpe Ratio (1yr)	Avg. Intraday Move (1yr)
BTC	69.42%	111.45%	283.48%	423.84%	395.14%	0.15	0.51%
ETH	117.73%	174.50%	310.22%	595.15%	96.04%	0.14	0.58%
S&P 500	4.54%	10.26%	14.34%	26.00%	42.85%	0.04	0.10%
Russell 2,000	15.67%	27.95%	45.64%	47.12%	53.35%	0.06	0.16%
Nasdaq 100	3.21%	11.72%	14.42%	49.90%	86.75%	0.08	0.18%
Gold	-5.37%	-3.93%	-6.75%	9.62%	35.35%	0.03	0.20%
Silver	5.31%	15.05%	5.18%	55.13%	67.72%	0.07	0.04%
Bonds*	-2.57%	-2.78%	-3.10%	-0.19%	16.91%	0.03	0.02%

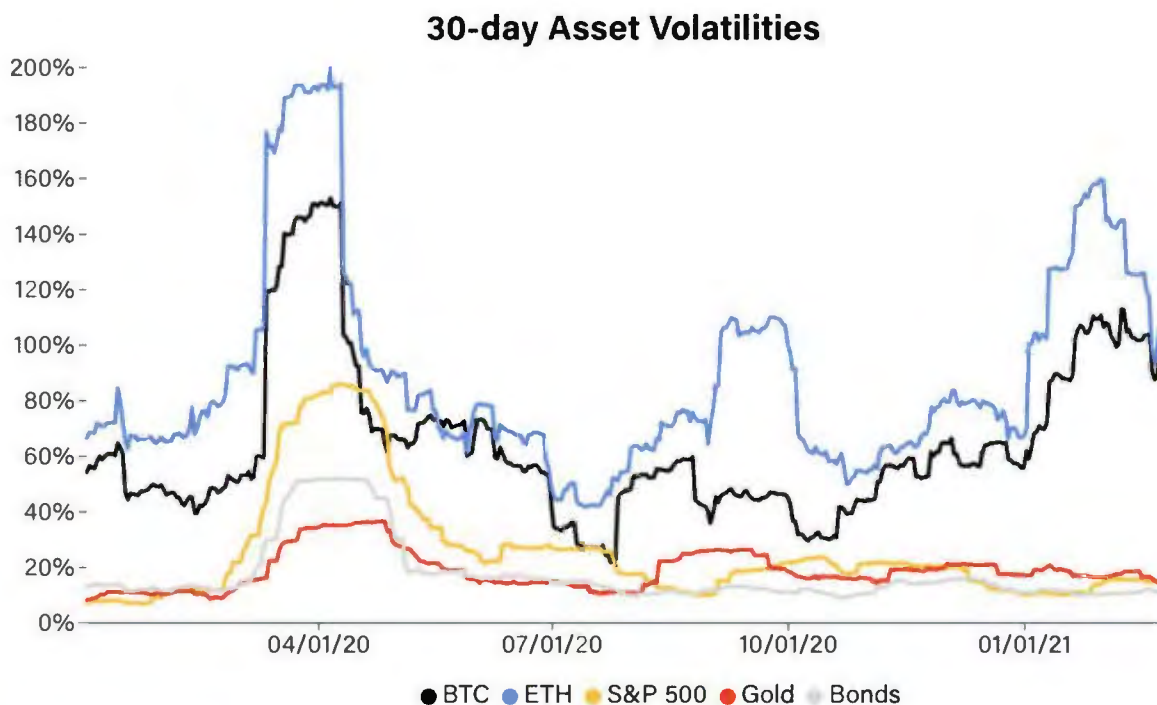
*Vanguard Total Bond Market

Source: CoinDesk; TradingView; [IntoTheBlock](#); As of Feb. 24, 2021

Volatility

The high returns of BTC and ETH are a byproduct of their volatility, which is itself a byproduct of the assets' relative youth and value proposition. Note that ETH's volatility is significantly higher than that of BTC - this reflects its five-year trading record, vs. BTC's 12 years. It also reflects ETH's greater exposure to technological progress and impact, as the potential outcome of the migration to a new type of blockchain, and the potential growth of applications on that blockchain, have yet to be fully understood.

Crypto Assets are More Volatile



*Bonds = iShares 20+ Year Treasury Bond ETF; Gold = London Bullion Market pm fixing price;
Source: CoinDesk Research, St. Louis Fed, Yahoo Finance*

Volatility is seen as a negative by many investors. It is also, however, an engine of growth. It can be a barrier for some, but a magnet for others attracted by the potential upside and who understand the role of volatility in early innovations.

While the volatilities of BTC and ETH are high, they have both trended down over the years. This is likely to continue, although there is a strong chance the asset volatilities will always remain higher than traditional assets given their inelastic supply and narrative-driven demand.

(For more on crypto volatilities, see our report [“Volatility: What It Means In Crypto Markets”](#))

Correlation

Up until 2020, the 60-day correlation of BTC and ETH with the S&P 500 was relatively low, hovering between 0.2 and -0.2 for BTC and 0.3 and -0.3 for ETH. This changed with the March 2020 crash, when BTC and ETH joined other assets in the turmoil. The 60-day correlations with the S&P 500 shot past 0.5, and remained relatively high for most of the rest of the year.

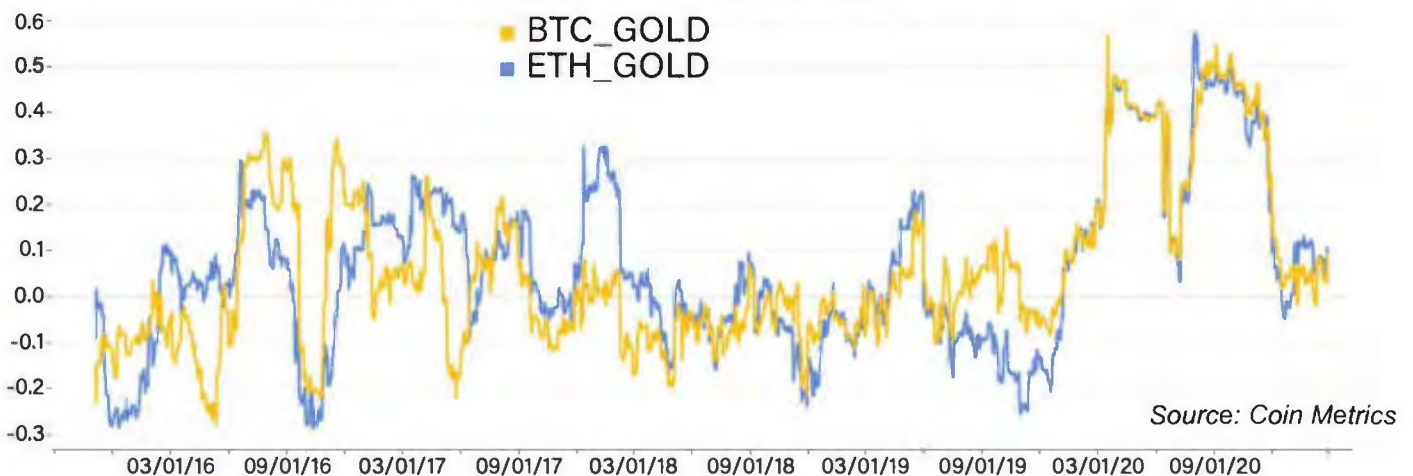
Correlations with Stocks Resume Low Levels



Towards the end of 2020, the correlation with stocks started to normalize, heading back below 0.2, as the unique value propositions of BTC and ETH have become more apparent to a wider range of investors.

A similar story has played out in the 60-day correlations with gold. From 2017-2019 they hovered around 0, breaking that trend in the market ructions of early 2020. Recently, however, the 60-day gold correlations are back around 0.

Almost No Correlation With Gold



This is potentially confusing for those that see bitcoin as “digital gold.” If the two are similar in investment properties, why isn’t the correlation higher? Part of the explanation is that BTC is still a young asset, which largely explains its higher volatility and outperformance, which in turn lower the correlation between the two.

The correlation between BTC and ETH has been above 0.8 for most of the past three years. As we saw in the chart shared in the introduction, this was representative of BTC’s

market influence as the crypto asset with the longest history, deepest understanding and most developed market infrastructure.

Since then, the influence of BTC on the market as a whole has been declining, as other types of blockchains and assets become better understood, and as market infrastructure has evolved to support a broader range of assets.

(For more on this topic, see our report [“Correlation: Crypto’s Most Enigmatic Metric”](#))

BTC-ETH 60-day Correlation Heading Down



	BTC	ETH
YTD returns	61.50%	100.12%
3m returns	89.86%	136.21%
12m returns	401.23%	545.69%
30-day volatility	99.86%	105.99%
60-day correlation to each other	0.71	0.71
60-day correlation to S&P 500	0.38	0.35
60-day correlation to GOLD	0.09	0.11

*Data as of Feb. 26, 2021

coindesk Source: CoinDesk Research

ON-CHAIN METRICS

SIDEBAR: What do we mean by “on-chain metrics”?

Crypto assets are a unique asset group in many aspects, not least because of the amount of data their blockchain-based activity reveals. Blockchain transactions are transparent - they are visible to anyone - and detailed, with granular information on amounts transferred, timing, etc.

The open and transparent nature of blockchains also gives valuable insight into the state of the network as a whole, as information on all addresses can be aggregated and analyzed.

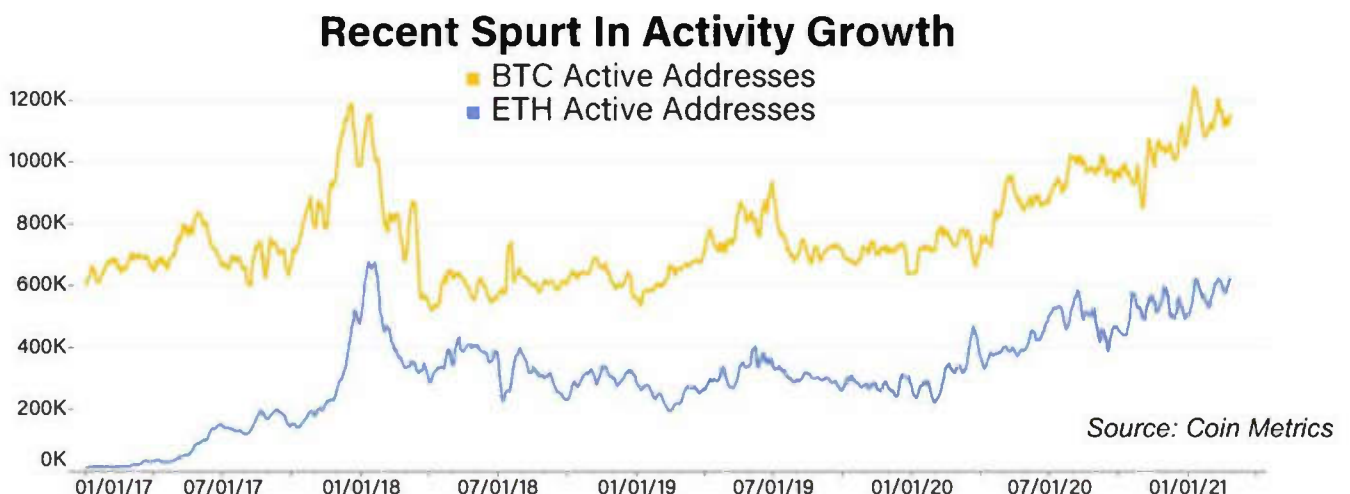
The same can be said of transaction history. With assets based on public blockchains, we can analyze all transactions going back to the launch of the network. This gives us insight into how long coins have been held, at what price they were acquired at, what is the transaction profile of the addresses that hold them, and much more.

The available data also gives rise to unique ratios and other analytical tools that hint at investor sentiment and market behavior. For more information on these and others, [see our in-depth explainers](#).

Holdings

We’re familiar with the use of the term “address” to identify a place. An “address” in cryptography is a similar concept - a unique series of characters that specify a destination.

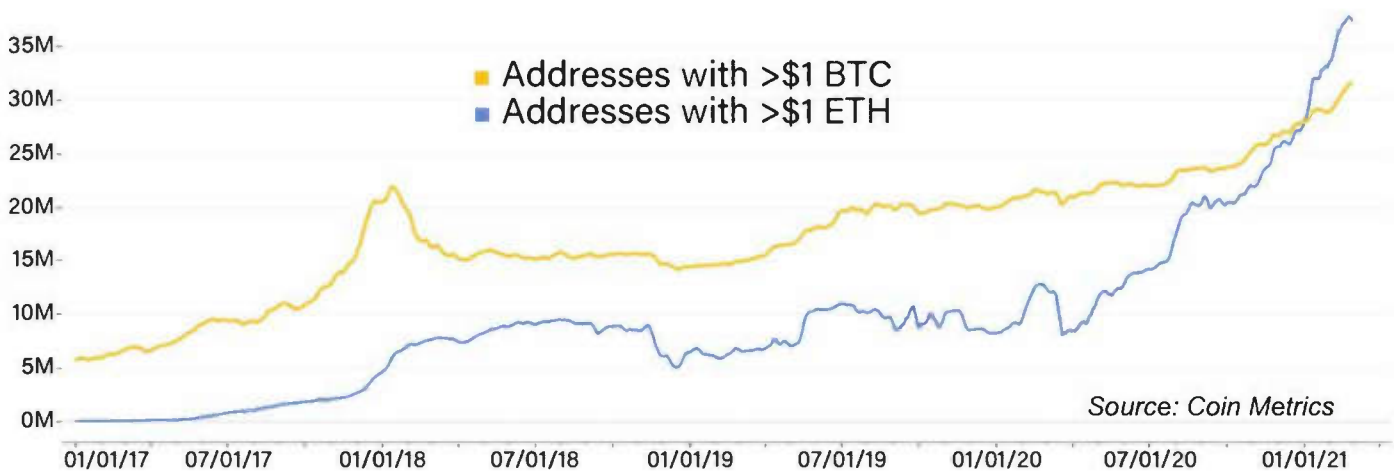
Bitcoin and Ethereum treat address accounting differently (see sidebar), but in both cases, given the transparency of the blockchain, the dispersion and contents of the addresses can be analyzed to reveal insights about network growth and market behavior.



For instance, by looking at the growth in the number of active addresses (those that have either sent or received coins on a given day, chart on previous page), we can see the evolution of network economic activity. Note the strong growth since the beginning of 2020.

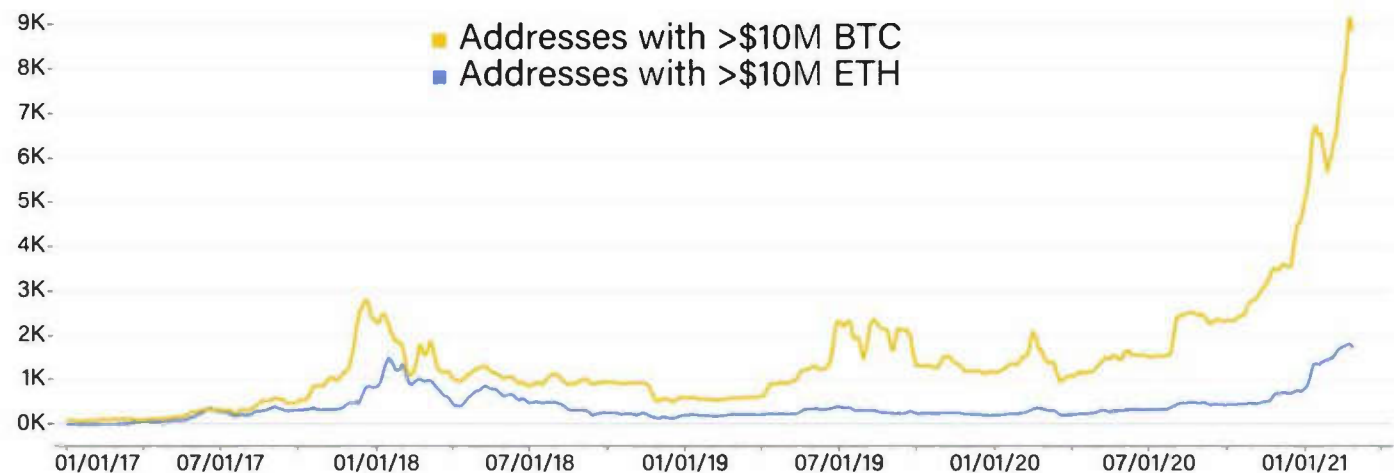
By looking at the growth in the number of addresses that hold more than \$1 worth of BTC, we can see the almost exponential growth in the size of both networks. The number of non-dust addresses on Ethereum has now exceeded those on the Bitcoin blockchain.

The Network Effect



If we look at the number of addresses that hold over \$10 million worth of value, we can see the growth in deep-pocketed participants, many of whom will be institutional investors. The chart below shows that BTC is at this stage more of an institutional asset than is ETH.

Institutional Assets



SIDEBAR: Why Ethereum accounts are not comparable to Bitcoin addresses

As you may have noticed, there is a difference in terminology for the storage of coins on Ethereum versus on Bitcoin. On Bitcoin, coins are held in addresses while on Ethereum, they are [held in accounts](#). The reason for this comes down to the differing transaction models of these two crypto assets.

Bitcoin is based on an unspent transaction output (UTXO) model for recording transfers of value on-chain. UTXOs are the receipts held in Bitcoin addresses that affirm the owner of the address has a balance of coins they can transfer and spend on the network.

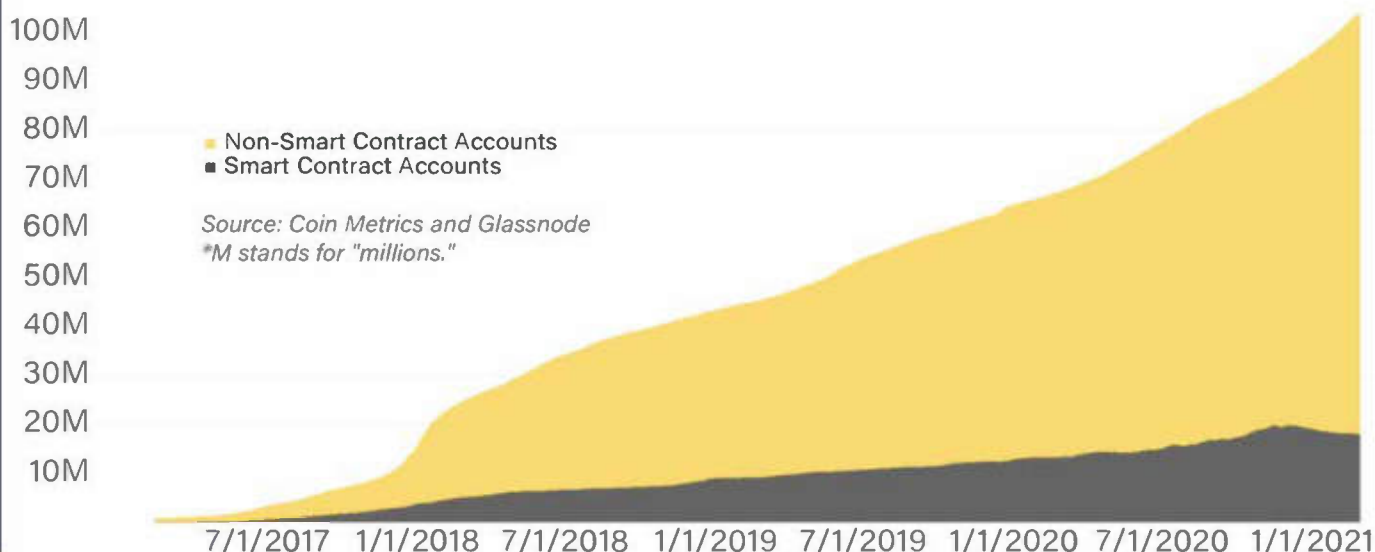
Ethereum is based on an account model which is analogous to how funds are held within traditional bank accounts. Each Ethereum account has a single balance of ether that gets debited and credited at the creation of a new block. The data stored in each block on the network containing

updated records of all account balances is known as Ethereum's "global state."

The main advantage of an account-based model for on-chain transactions is its simplicity. Rather than spending UTXOs like paper bills in order to transfer coins through the network, spending coins from a blockchain account is comparatively easier to initiate automatically through smart contracts. Smart contracts don't need to handle change in the form of new UTXOs created each time ether is transferred. They also don't need to verify and differentiate unspent coins from spent ones on the network.

The total number of unique accounts on Ethereum can be a misleading metric. This is because the vast majority are not actively used to send transactions on the network. What's more, over one fifth of Ethereum accounts are controlled by code and not by users.

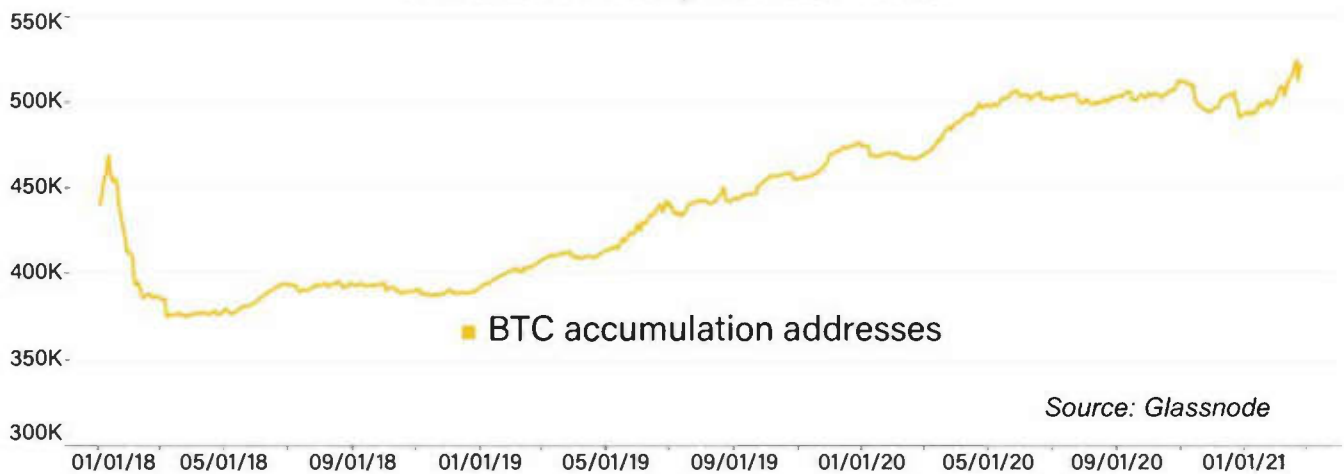
Total Number of Accounts on Ethereum



Bitcoin's accounting mechanism permits a metric not available for Ethereum: the number of accumulation addresses (those which have had at least two incoming non-dust transfers and have never spent funds). This also reveals significant growth in investment (as opposed to trading) activity since early 2018. Note the spurt to all-time-highs since the beginning of 2021.

The crypto community has a special name for this kind of investment behavior: [HODL](#), which is an intentional mis-spell of the word "hold."

HODL Activity on the Rise

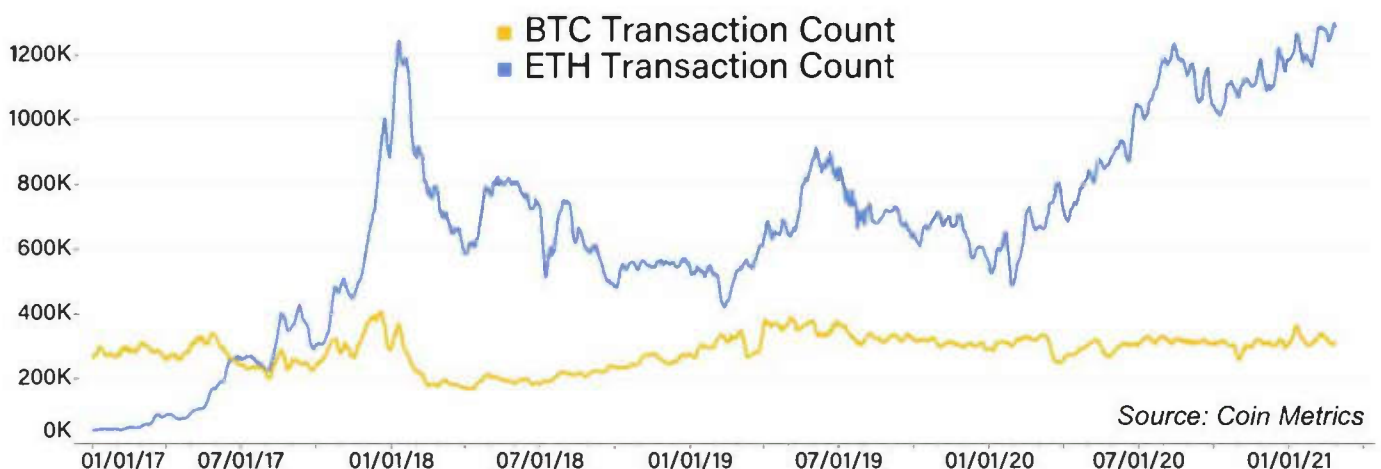


Economic activity

Transactions

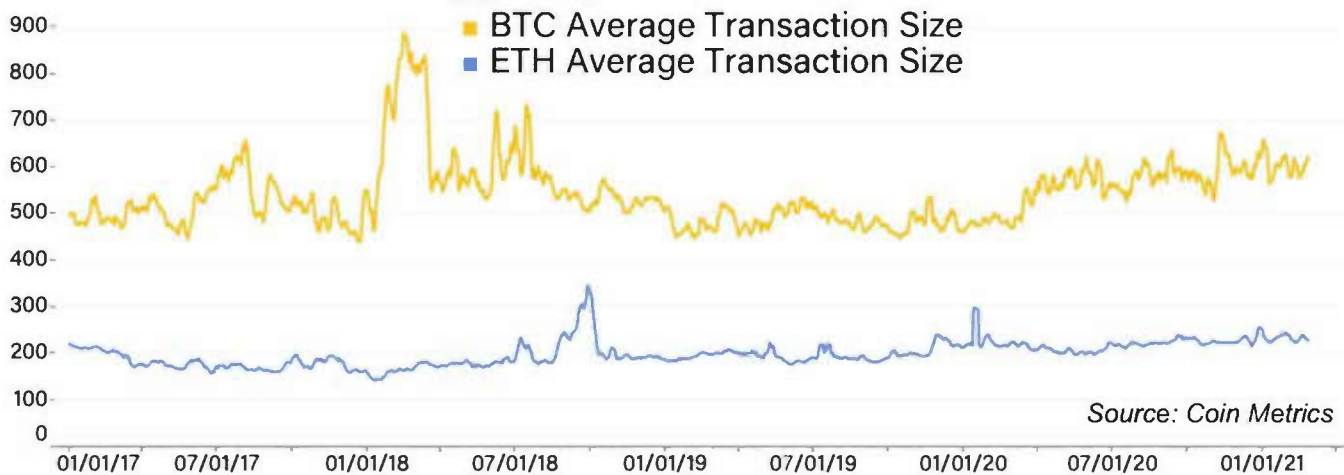
One indicator of growing adoption and use for any blockchain is the number of transactions executed on the platform. The chart below shows the different levels of economic activity on Bitcoin and Ethereum in terms of number of transactions.

Blockchains At Work



It's obvious that the Ethereum blockchain is much more active in terms of transactions. However, the average size of transfers in U.S. dollar terms on Bitcoin is notably larger.

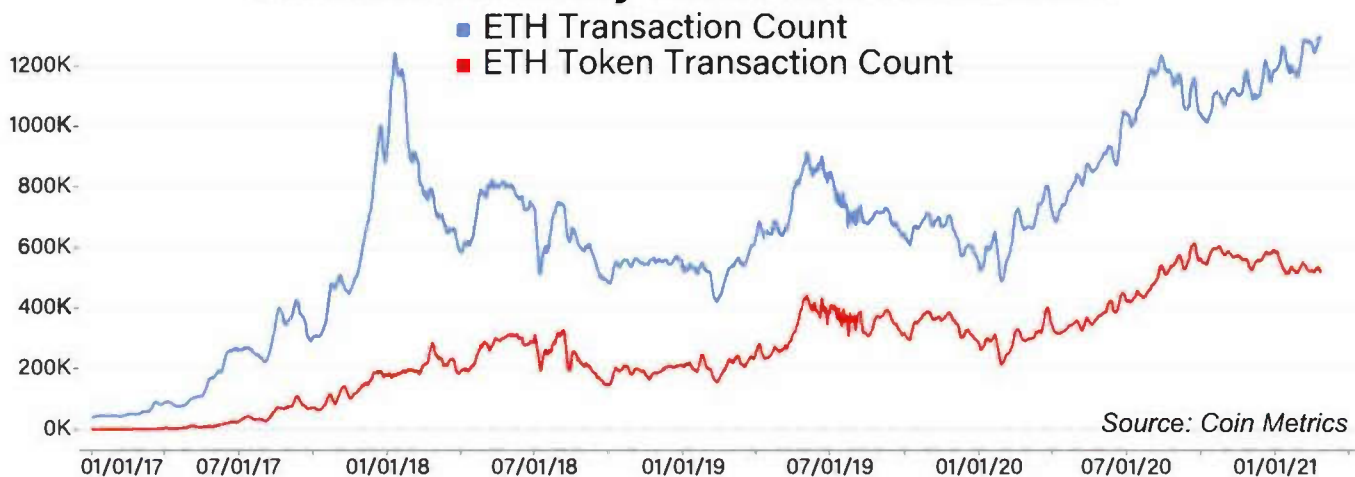
Bigger Spends on Bitcoin



On the Ethereum blockchain, not all transactions involve transfers of ETH.

A closer look at the type of transactions being executed on Ethereum shows that close to 30% of all transactions are transfers of ERC-20 or ERC-721 tokens. These are fungible and non-fungible crypto assets created on Ethereum through smart contracts, for a wide range of decentralized applications, or dapps.

Ethereum Activity Gets More Diversified



The growing percentage of transactions on Ethereum for ERC-20 and ERC-721 tokens also suggests ether's value proposition as a form of payment for engaging with dapps is getting stronger. As Ethereum's dapp ecosystem broadens and attracts more users, the share of transactions involving transfers of tokens is likely to increase. However, as of February 2021, the majority of transactions on Ethereum remain peer-to-peer transfers of ETH.

DeFi

Diving deeper into the topic of DeFi, the latest surge of on-chain activity on Ethereum has largely been as a result of user activity on popular DeFi apps.

The collective value of DeFi apps make up over 20% of Ethereum total market capitalization. As of February 2021, close to 8 million ETH, worth roughly \$15.3 billion, has been locked up in DeFi accounts either as collateral for loans or liquidity for decentralized exchanges, among other financial use cases. This equates to almost 7% of total ether supply.

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Source: [IntoTheBlock](#), taken Feb. 18

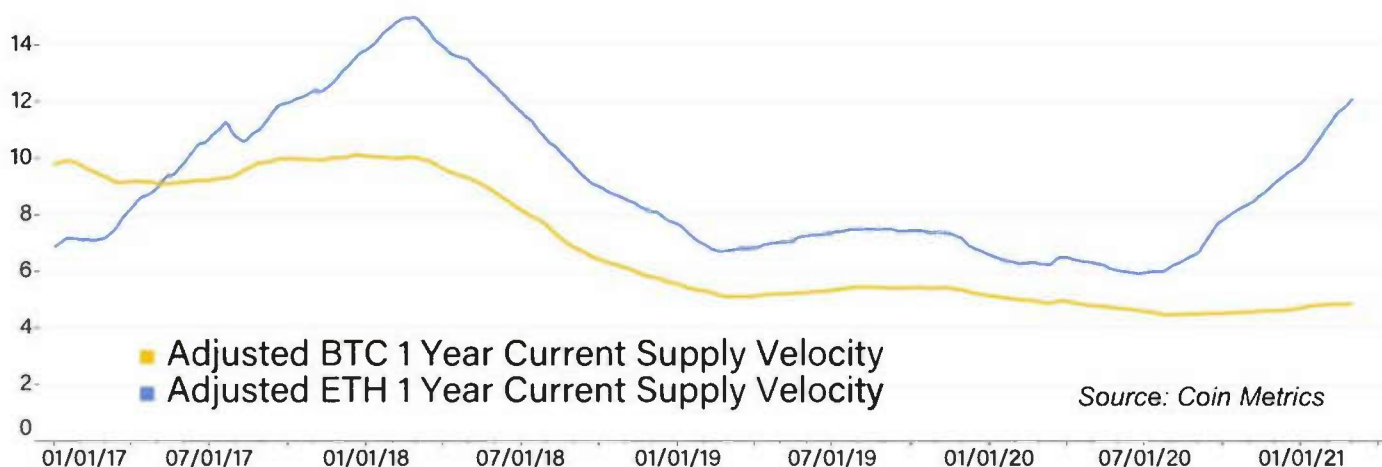
Velocity

Velocity as applied to crypto assets is a measure of how many times a coin gets transferred between addresses or accounts over the course of a year. It is calculated by dividing the value transferred adjusted for non-economic transactions (such as transfers between addresses held by the same entity) by the current supply.

An asset's velocity can be taken as a representation of its utility. A coin with high circulation is "used" more often than one with low circulation, and a declining velocity can show that a coin is increasingly being used as a store of value.

The chart below shows that bitcoin's gradually declining volatility supports the current consolidation of the store-of-value narrative. An interesting development is the jump in ETH velocity, which highlights the growing utility of the Ethereum blockchain.

ETH Velocity Is Picking Up



The spike in ETH velocity in 2018 was largely fueled by the crypto market bull run of 2017, during which ether was the most popular asset through which to support and give funds to crypto projects that were hosting [initial coin offerings \(ICOs\)](#). The recent rise in ETH velocity is likely fueled by the ongoing popularity of DeFi applications.

ETH is not the only token that can be used for DeFi applications, however, which is why the velocity jump is not higher. Other types of tokens based on Ethereum, known as ERC20 tokens, have significantly higher velocity. For example, a "wrapped" Ethereum-based version of BTC known as "wrapped BTC," which creates a token backed by BTC that could be used in DeFi applications, has a velocity of over 25 vs ETH's 12.

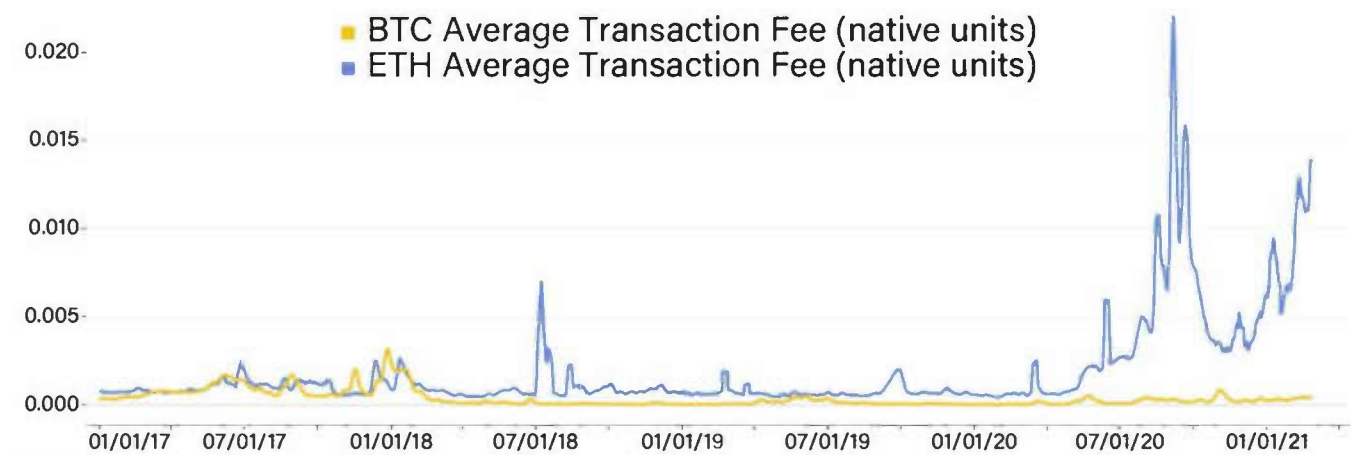
This underscores ETH's mixed narrative: it is not purely a utility token, nor is it mainly a store of value.

Fees

With growing economic activity and scarce space within transaction blocks, fees increase. This is especially acute in Ethereum, given the rising popularity of and experimentation in decentralized applications.

Looking at the network fees in terms of native units (amounts paid in BTC and ETH), we can see the relative congestion issues in each.

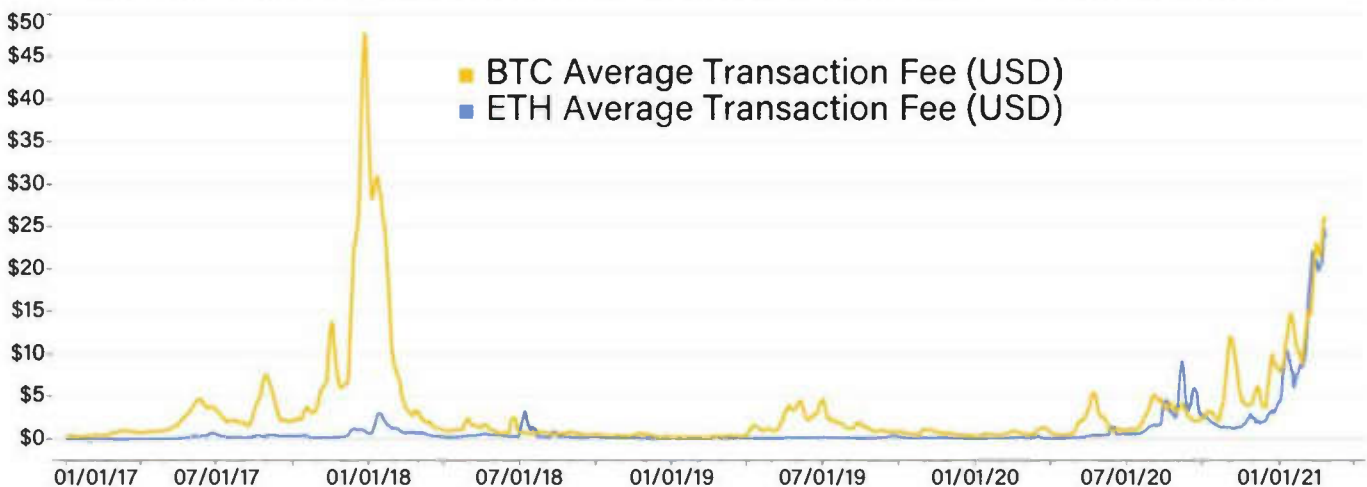
Transaction Fees Can Surge With Congestion



Source: Coin Metrics

Looking at average transaction fees in dollar terms, fee surges are even more problematic, as the U.S. dollar value of the assets in which fees are paid has surged. Average transaction fees in U.S. dollar terms for BTC are currently higher than those for ETH, but since ETH transactions are generally smaller, this is starting to crowd out some Ethereum activity.

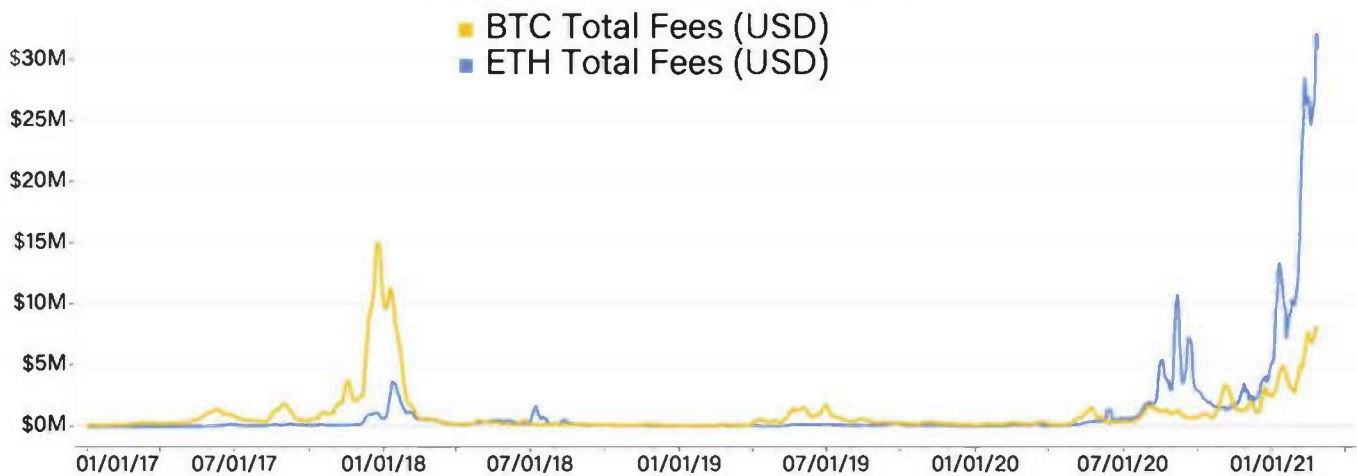
Transaction Fees Can Get Problematic in Dollar Terms



Source: Coin Metrics

Looking at the total transaction fees generated by a blockchain gives us an idea of the network's "revenue." From this chart we can see that the total value generated by those that maintain the Bitcoin and Ethereum blockchains, which can be taken as a measure of the network's direct economic footprint. Note that this does not reflect the value riding on the blockchains; rather, it measures the income accruing to those doing the maintenance work, and can be considered the blockchain's GDP.

Public Blockchain GDP



Source: Coin Metrics

	BTC	ETH
Active addresses	1.22 million	619.0 thousand
Addresses with > \$1	31.71 million	36.43 million
Addresses with > \$10m	8040	1606
Daily transactions	328.85 thousand	1.23 million
Average tx fee in USD	\$22.61	\$15.89
Total tx fees in USD	\$7.43 million	\$19.59 million

RISKS

Regulatory

Crypto asset regulation is still a complicated topic for everyone affected, even 12 years in. And as more crypto assets appear, each with distinct use cases and histories, the situation is getting more complicated still. There is still no global agreement on how crypto assets should be regulated, who should do the regulating, or even what they are. Are they financial assets? Commodities? Property?

Regulators around the world have been grappling with this problem for some time, however, and are becoming better informed. President Biden has nominated cryptocurrency experts to the top posts at the two main securities regulators. [Some members](#) of the U.S. government [have spoken publicly](#) about Bitcoin's potential. And some local officials are even [promoting their regions](#) as crypto-friendly destinations.

There is, nevertheless, still a risk that governments could impose onerous restrictions on crypto asset activity. India is [preparing a bill](#) that will ban the use of non-government-issued cryptocurrencies. Nigeria's central bank is [attempting to stamp out](#) cryptocurrency trading.

And some [investors believe that](#), if Bitcoin becomes too powerful, governments will retaliate harshly.

It can be argued that the more embedded Bitcoin becomes in the established financial

system, and the more it is held in investment portfolios by private and corporate citizens, the less likely governments will have the stomach to attempt to repress a tool designed to financially empower users. It is wise, however, to bear all potential risks in mind.

When it comes to Ethereum, it is less likely that governments will fear its monetary competition, as its market size is still smaller and potential role as a store of value has not yet consolidated. Governments could go after Ethereum for its potential to support tax evasion, however. Most of the activity on dapps is as yet untraceable, and the ease of moving value around in a pseudonymous manner could be flagged as a threat to public revenue.

Payments

One aspect of crypto markets that is most likely to attract the attention of regulators is payments. Payments are one of the more regulated aspects of financial markets, as they not only represent economic activity and the movement of wealth, but are also the conduit for illegal activities.

The U.S. Financial Crimes Enforcement Network (FinCEN) [has proposed a rule](#) that will impose stringent data collection requirements on all crypto exchanges. The counterparty identification requirement has triggered some backlash as it would [prevent the transfer](#) of cryptocurrencies to smart contract wallets, impacting the growth and utility of the decentralized finance industry.

The proposed rule has drawn widespread industry backlash. It has also raised concerns about implications for Ethereum 2.0. In order to earn rewards on the new Ethereum network, users must send a minimum balance of 32 ETH to a smart contract which does not require any counterparty information other than a valid blockchain account address.

At the heart of the regulatory difficulty is the role of intermediaries in collecting identifying information for an industry built to circumvent the need for intermediaries.

This is [also seen in](#) discussions around the rules suggested by global anti-money laundering watchdog FATF, which [has recommended that](#) G-20 regulators graft the so-called Travel Rule requirements onto digital assets. This would require intermediaries such as crypto exchanges and payment platforms to share personally identifiable information about crypto transactions.

The pressing need to mitigate money laundering and terrorism financing will not go away, and could give rise to regulation that stunts the potential growth of bitcoin transactions and investment. On the other hand, regulatory clarity around cryptocurrency payments could end up solidifying bitcoin's role as a currency, further cementing its legitimacy.

Taxes

The fiscal situation of crypto assets in most jurisdictions is still unclear. When is tax payable on a crypto transaction? Part of the

issue rests on what crypto assets such as bitcoin and ether are. Are they a currency? We don't pay tax when we use fiat to buy a sandwich. Or are they a capital asset? If so, every transaction would require the calculation of capital gains.

For now, the IRS in the U.S. [considers bitcoin and ether](#) to be property, and expects capital gains to be declared upon "sale or other exchange," which presumably includes the use of crypto assets to purchase goods or services, and activate smart contracts. (Note: this is not tax advice!)

As the economic activity on the networks grows, this question will become more pressing as governments worry about lost revenue and intent to evade taxes. It could even, as mentioned above, become a choke point should the authorities wish to dampen the blockchains' success.

Technological

The risk of a bug in the bitcoin software is low, given that its relatively simple structure has been working effectively for over 12 years.

The introduction of upgrades such as [Taproot](#) could add an element of technology risk in that they introduce new code to the protocol. But the transparency of the Bitcoin network makes bugs easy to catch, and the focus of the developer community will enable fast fixes should any problems arise. Furthermore, the slow roll-out of any Bitcoin change gives ample time for rigorous testing.

One of the main risks to Ethereum's ambitious upgrade to [a new proof-of-stake consensus protocol](#) is a delay in the transition. The roadmap has already undergone several revisions and setbacks. Another significant one would have a negative impact on economic expectations of the network and potentially on ether's value. There is also a non-zero probability of Ethereum 2.0 being cancelled altogether.

Also, the upgrade plan has undergone some modifications, with the addition of new complexities. These may result in bugs and unforeseen network vulnerabilities. This is one of the main reasons the new network will run in parallel to the original one for some time, to allow for real-world testing and troubleshooting. As new features are rolled out and the Eth 2.0 network stands the test of time, the technological risks to Ethereum will subside.

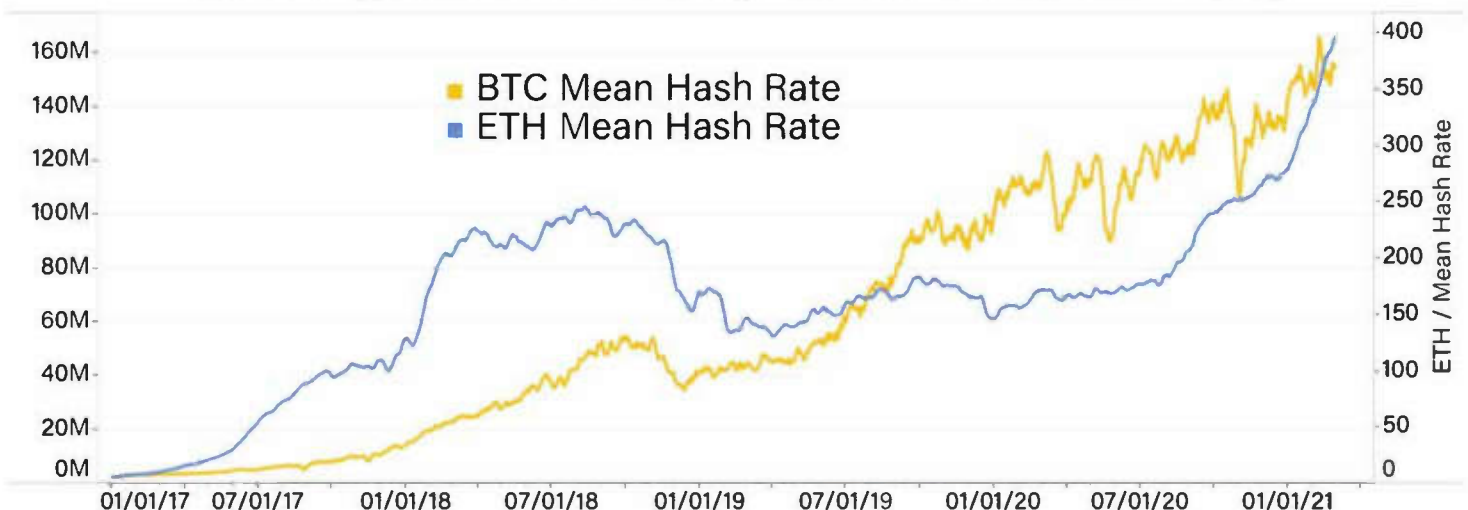
51% attack

A different type of technology risk is that of a 51% attack on the network, in which a hostile actor takes over enough mining power to be able to censor some transactions and possibly cancel some approved blocks.

An attack becomes increasingly expensive as the aggregate mining computing power increases - this is one of the reasons the industry celebrates an ever-higher hashrate index.

Given the current size and spread of the industry's mining power, the cost of a hostile 51% attack on Bitcoin, and to a lesser extent on Ethereum, is prohibitively expensive, but could foreseeably be within reach of a state actor.

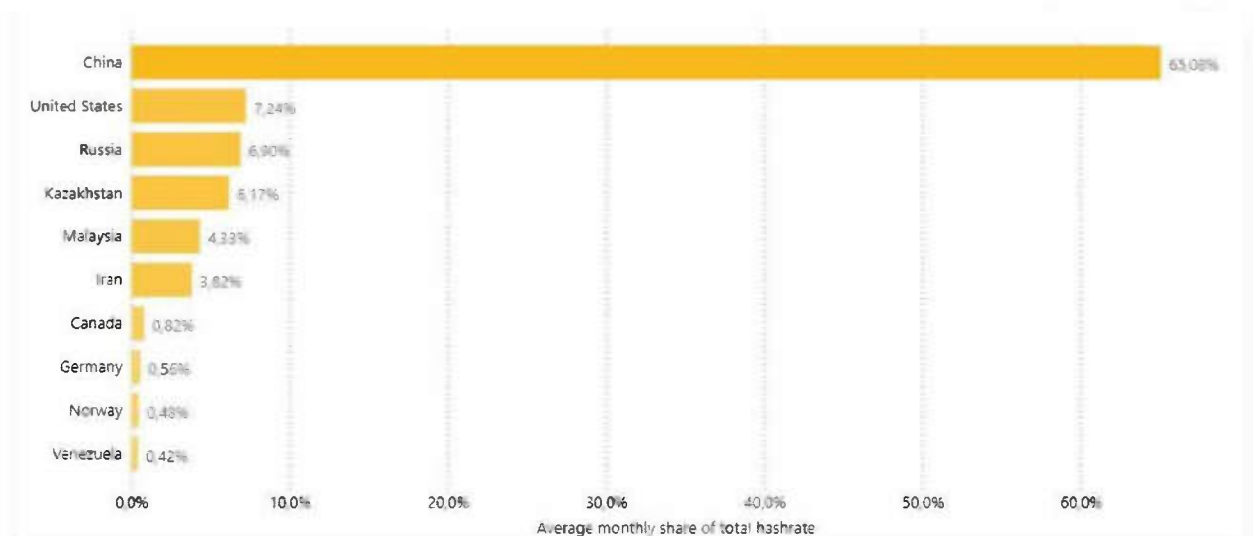
Growing Hash Rates Improve Network Security



Such a move would be relatively obvious, however, and while confidence in the network would no doubt be temporarily dented, the community would most likely find the consensus for a workaround to boot out the attackers.

What's more, the widening dispersion of mining power weakens the possibility that existing miners could be bribed to attack the network. According to the [Cambridge Center for Alternative Finance](#), as of the middle of 2020, 35% of Bitcoin mining power was outside of China, up from 25% the previous year. Given the recent push to develop a Bitcoin mining industry in the U.S., that percentage is most likely even higher today.

When Ethereum migrates to Ethereum 2.0, its security will improve even further, as proof-of-stake disincentivizes a malicious attack by entrusting security to stakeholders. A stakeholder attempting to take over the network would not only have an increasingly expensive barrier as the network grows; the entity would also decimate the value of its own holdings.



Source: [Cambridge Center for Alternative Finance](#), data as of end Q2 2020

Malleability

Another risk to Ethereum, as well as one of its strengths, is the relative malleability of the underlying code compared to Bitcoin. While significant changes to the Bitcoin blockchain have been few and far between (the only other one comparable in impact to the upcoming Taproot upgrade was the implementation of SegWit in 2018, to enhance the transaction block capacity).

Ethereum has undergone several meaningful changes to its functionality, such as adjusting the monetary policy (block rewards were reduced in [2017](#) and [2019](#)) and shortening the time between blocks. In 2016, the Ethereum community went as far as deciding to undo a sequence of transactions in response to a large hack (this would be much harder to do today given the growth in the network, but with enough incentive, would not be impossible). Those who were against the idea stuck with the original chain, which became

Ethereum Classic, and which was [not able to overcome](#) the security weaknesses inherent in smaller blockchains.

While we can assume that the community is incentivized to implement improvements that help the network, the technological uncertainty could act as a brake on the incorporation of Ethereum-based decentralized functions into traditional finance, which could impact the asset's outlook. It could also [dissuade financial institutions](#) from supporting ether in custody or trading services.

Competitive

Could Bitcoin be replaced by a more efficient, secure competitor?

It is possible, but increasingly unlikely. While it is true that in tech and in finance, the first is not always the one that succeeds, the size of Bitcoin's network is becoming an insurmountably high barrier.

In Bitcoin's case, the strength in the network is not just from the number of active addresses, which is at all-time highs. It is also from the number of participants in the network's security: the miners. A competitor would have to convince the majority of Bitcoin's miners to switch their mining machines (possibly incurring significant capital expenditure) over to a different protocol, which they would only be incentivized to do if the bulk of transactions were on that protocol.

But transactions would only move to a different protocol if all features were an improvement, *including* the security - which is determined by the miners.

This balance between security and size of network, where one supports the growth of the other, is a resilient balance that ensures Bitcoin's position as the dominant secure payments network.

It is possible that many users will choose to sacrifice security for convenience, should regulations make Bitcoin more cumbersome to use. In this case, users could migrate to less secure and less private but faster and cheaper networks. There will always be a demand for security and monetary resilience, however. Bitcoin is unlikely to be the only cryptocurrency in active circulation going forward. But its position as the most secure will be extremely difficult to assail.

Ethereum is in a similar position. Its relatively high transaction fees are pushing some applications off onto rival blockchains, and these applications may see some volume move with them. Network effects matter, however, even if blockchain interconnectivity becomes seamless, if only because of the strength of the developer network and the sprawling web of complementary dapps.

Replicating Ethereum's developer community and level of decentralization will be extremely difficult for newer blockchains. This does not mean that they won't also do well - we may be heading into a scenario of multiple blockchains each with a unique functionality. And the technology's open source ethos encourages innovation and iteration. The possibility of competition also acts as an incentive for Ethereum's continued progress, and highlights the need to increase capacity in order to keep fees down.

CONCLUSION

In this report, we aimed to present Bitcoin and Ethereum through an investor's lens. What's more, we wanted to present them side by side, to help investors understand the main differences between the two.

Bitcoin and Ethereum are not in competition. They both have different reasons for existing, and while there may be increasing overlap in the future, we expect them to each occupy fundamental roles in the emerging financial landscape.

We have not attempted to place a target value on either asset - at the moment there are too many variables in play, both within the crypto industry and without, for that to be a useful exercise. What we hope is that the outlooks for each are now a bit more clear in investors' minds - or at least, investors have a better understanding of the variables that can be part of an investment thesis. We also hope that readers now have a better understanding of the developments to keep an eye on. Crypto markets, and the assets that trade on them, are evolving rapidly; even as interested bystanders, investors will learn much about the evolution of new financial systems and the behavior of a new type of investor by watching them closely.

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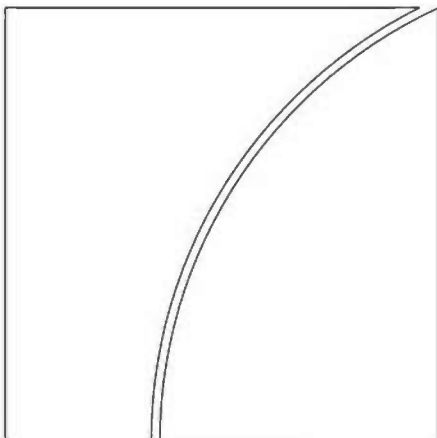
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Distrust or speculation? The socioeconomic drivers of US cryptocurrency investments

by Raphael Auer and David Tercero-Lucas

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Keywords: digital currencies, cryptocurrencies, distributed ledger technology, blockchain, payments, digitalisation, banking, household finance, money, bitcoin, ether, xrp, bitcoin cash, litecoin, xlm, eos.

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Distrust or Speculation? The Socioeconomic Drivers of U.S. Cryptocurrency Investments*

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Abstract

Employing representative data from the U.S. Survey of Consumer Payment Choice, we disprove the hypothesis that cryptocurrency investors are motivated by distrust in fiat currencies or regulated finance. Compared with the general population, investors show no differences in their level of security concerns with either cash or commercial banking services. We find that cryptocurrency investors tend to be educated, young and digital natives. In recent years, a gap in ownership of cryptocurrencies across genders has emerged. We examine how investor characteristics vary across cryptocurrencies and show that owners of cryptocurrencies increasingly tend to hold their investment for longer periods.

JEL Classification: D14 D91 E42 G11 G12 G28 O33

Keywords: digital currencies, cryptocurrencies, distributed ledger technology, blockchain, payments, digitalisation, banking, household finance, money, bitcoin, ether, xrp, bitcoin cash, litecoin, stellar, eos

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1 Introduction

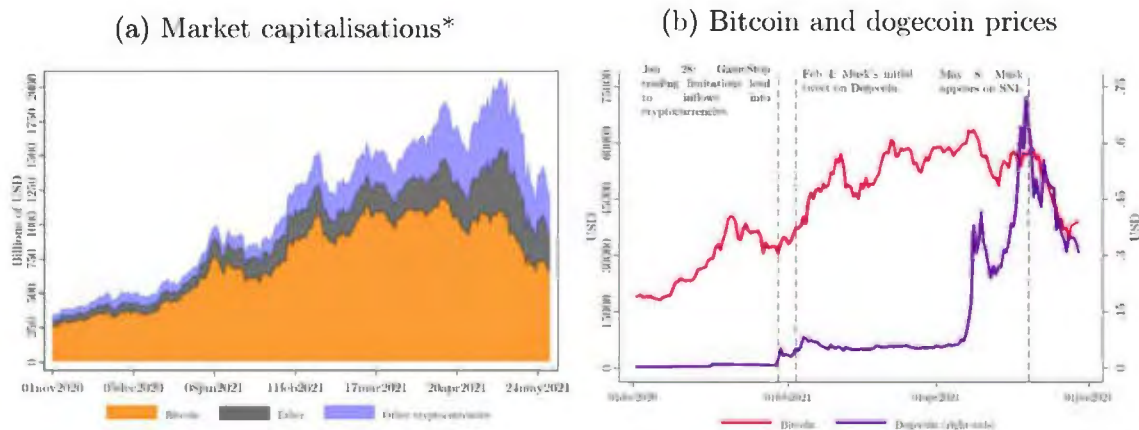
The rise and fall of bitcoin, ether, and related cryptocurrencies – with market capitalisations (see Figure 1a) at times rivalling that of silver, the world’s major financial companies, and even the stock markets of large advanced economies¹ – warrants a close examination of investor motivations and levels of sophistication.

One aspect of particular relevance is that the purported motivation for the creation of these cryptocurrencies has been to design an alternative to fiat money and commercial banking, with the goal of creating a new form of exchange that is resistant to debasement and censorship by governments and financial institutions. As put by Nakamoto (2008, p.1):²

"What is needed is an electronic payment system based on cryptographic proof instead of trust, allowing any two willing parties to transact directly with each other without the need for a trusted third party".

This narrative is also relied upon frequently by the proponents of this asset class. One noteworthy episode is the trading suspension of GameStop shares on the app Robinhood that occurred in early 2021. The suspension was – incorrectly – interpreted as censorship and market manipulation in favour of large hedge funds (see Ossinger and Hunter (2021) and Appendix A). Due to ensuing media coverage, a substantial inflow of funds into cryptocurrencies resulted.

Figure 1: Market valuations have reached new records.



Source: CoinMarketCap (Panel (a)) and Coindesk.com (Panel (b)). **Other cryptocurrencies* include the sum of the market capitalization of the biggest cryptocurrencies (excluding stablecoins) after bitcoin and ether.

¹As of 26 May 2021, silver had a market capitalization of around \$1.51 trillion, gold’s market capitalization was \$12.04, JPMorgan Chase was \$497.38 billion and Bank of America was \$365.75 billion (CompaniesMarketCap, 2021). In comparison, at that day, total market capitalisation of cryptocurrencies was \$1.72 trillion. As of 8 May 2021, total market capitalisation of cryptocurrencies (including stablecoins) reached its peak at \$2.42 trillion, doubling the combined market capitalisation of all companies included in the German DAX 30 index (CoinMarketCap, 2021).

²For example, Vitalik Buterin, considered “non-discrimination and non-censorship” one of the key principles behind the design of Ethereum (Buterin, 2013)

In the subsequent hype, the price of bitcoin continued surging, exceeding \$50,000 soon after the trading suspension, and peaking at over \$63,000 several weeks later (see Figure 1b). Brought to the attention of many via widely read tweets by Elon Musk, the cryptocurrency Dogecoin saw an almost ten-fold price increase during this episode (Ossinger and Hunter, 2021). However, cryptocurrency prices collapsed during mid-May 2021, after renewed statements by Mr Musk and the announcement of a ban for financial institutions and payment companies from providing cryptocurrency services in China.³

As the end of the GameStop episode exemplifies, the narrative of cryptocurrencies as a censorship-resistant asset class does not always square with reality.⁴ Cryptocurrencies are rife with fraud and theft (Auer and Claessens, 2019; Foley et al., 2019; Twomey and Mann, 2020),⁵ mostly due to the fact that coins are held in the custody of unregulated middlemen (Kharif, 2020). Cryptocurrencies such as bitcoin that are sustained by costly computing (“proof-of-work”) tend to be centralised (Huang, 2020) and their basic security model might not be sustainable (Auer, 2019a).⁶ There is ample debate on the censorship-resistance, decentralisation, and legal nature of other cryptocurrencies, as well (Fröwis and Böhme, 2017; Walch, 2019; SEC, 2020).⁷

Amidst a discrepancy between sociological narrative and factual evidence, it is important to understand who the retail investors in cryptocurrencies are, what their level of trust and knowledge is, and how they interact with the mainstream financial system. The objective of this paper is hence threefold. We start by examining the hypothesis that cryptocurrencies are sought out of distrust in fiat currencies or regulated finance. Second, we study the broader socioeconomic characteristics of U.S. retail consumers and disentangle the role of knowledge acquisition and investment decisions conditional on knowledge. Third, we examine the evolution of patterns of cryptocurrency investments across time and cryptocurrencies.

³See BBC (2021). Dogecoin has been subject to even higher volatility during May. Its price dropped by around 30% on May 9, the day of the appearance of Elon Musk on the TV show “Saturday Night Live”.

⁴The emergence of cryptocurrencies has also led to the development of stablecoins, such as the Facebook’s Diem project. For an analysis of this and other global stablecoins, see Arner et al. (2020), Frost et al. (2020), Melachrinou and Pfister (2020) and Tercero-Lucas (2020).

⁵There have been many cases of fraud in the industry. One example is the project PlusToken, which turned out to be a cryptocurrency Ponzi scheme that attracted millions of people with promises of high returns on investment. The operators were taken to court and found guilty of defrauding investors of almost \$2.3 billion (Akhtar, 2021). Investors are also subject to cyber attacks that have affected both open source distributed ledgers (e.g., in February, 2020, the IOTA Foundation had to temporarily shut down the IOTA network after suffering an attack on its wallet app (Pan, 2020)) and cryptocurrencies exchange markets (e.g., in the first quarter of 2020, Altsbit, an Italian cryptocurrency exchange, had to close because the majority of user funds were stolen in a cyber attack (Partz, 2020)).

⁶Also, the environmental impact must not be forgotten. Bitcoin’s energy consumption is exceeding that of entire countries (see Carstens (2018a) and De Vries (2018)).

⁷They are further used for illegal activities, including money laundering and the financing of terrorism. See e.g., Fanusie and Robinson (2018). Foley et al. (2019) estimate that around one quarter of bitcoin users were involved in illegal activity in the pre-2018 period, which translated to \$76 billion per year.

We employ the Survey of Consumer Payment Choice (SCPC), a representative micro-level dataset provided by the Federal Reserve Bank of Atlanta. The survey covers the 2014-19 period and is representative of the US population. Using a variety of econometric specifications, we first disprove the hypothesis that cryptocurrencies are sought as an alternative to fiat currencies or regulated finance in the US. Compared with the general population, cryptocurrency investors show no differences in their level of security concerns with either cash or commercial banking services. We do, however, find that those who are concerned with the security of cash or bank accounts tend to acquire information about cryptocurrencies.⁸

Our second set of results regards the broader sociodemographics of cryptocurrency investors. Higher educational attainment is associated with more knowledge about and likelihood of owning a cryptocurrency. Male gender is associated with a 2 to 2.2 percentage points higher likelihood of owning at least one cryptocurrency. The probability of knowing at least one cryptocurrency is higher for men and for those individuals with higher levels of both income and an education.

We provide some evidence that the impact of gender and age on cryptocurrency investment is unrelated to differences in knowledge about the underlying technology. Despite converging knowledge levels about cryptocurrencies, a gender gap in terms of ownership has emerged.⁹ In the same vein, although age has no effect on knowledge about cryptocurrencies, it does have a strong effect on investment decisions.

Our last set of results regards the evolution of these patterns of cryptocurrency investments across time and cryptocurrencies. Owners of ether and xrp are the most educated in our sample, followed by bitcoin cash and bitcoin users. Conversely, those owning litecoin are the least educated. We document trends in knowledge and ownership, and develop an empirical test for so called “hodling”- a term in the cryptocurrency community that refers to buying and holding a cryptocurrency over the long-term.¹⁰ Specifically, we estimate that owning a cryptocurrency in one year increases the probability, on average, of owning a cryptocurrency in the following year by 50%.

Overall, our paper contributes to several literatures spanning the fields of sociology, economics, financial stability, and computer science. Our focus on the sophistication of retail cryptocurrency investors and on whether the demand for cryptocurrencies is driven by distrust in fiat money and/or the commercial financial industry contributes to the literature of the sociology of financial markets (Pixley, 2004; Knorr Cetina and Preda, 2005; Preda, 2007; Knorr Cetina and Preda, 2012). Lack of trust has been shown to be a main driver of investment decisions and limited stock market participation (see Guiso et al. (2008); Georgarakos and Pasini (2011); Balloch et al. (2015)).¹¹ Given the paramount importance of trust for the monetary and

⁸Our findings also suggest that experience with digital finance, captured through having a debit card, and using a mobile payment app, increases the probability of investing in cryptocurrencies.

⁹This is in contrast to the finding of a survey discussed in Baker (2019), which found that “67 percent of women felt their lack of familiarity with bitcoin stopped them from investing in it, compared to 48 percent of men”.

¹⁰For a further explanation of the origin of the term, see StormGain (2020).

¹¹Employing data from all Bitnodes operating worldwide between 2014 and 2018, (Saiedi

financial system (see [Carstens \(2018b, 2019\)](#); [Borio \(2019\)](#)), the persistent rise of cryptocurrencies could potentially evidence rising distrust in today's arrangements.¹² In that light, our key finding alleviates these concerns: cryptocurrency investors do not present differences in their level of security concerns with mainstream payment options, i.e., trust in cash or the banking deposits.

From a policy angle, one of the main takeaways is that as the goals of investors are the same as those for other asset classes, so should be the regulation. A clarifying regulatory and supervisory framework for cryptocurrency markets may be useful for the industry. In fact, regulatory announcements have had a strong impact on cryptocurrency prices and transaction volumes ([Auer and Claessens, 2019, 2020](#)), and those pointing to the establishment of specific regulations tailored to cryptocurrencies and initial coin offerings are strongly correlated with relevant market gains. Here, one important consideration regards how one could apply technology-neutral regulation, while at the same time harnessing the potential of the technology itself in the supervision process. One option for such a framework is "embedded supervision", developed in [Auer \(2019b\)](#). This means implementing a supervisory framework for cryptocurrencies that allows for compliance to be automatically monitored by reading the market's ledger. The goal is low-cost supervision of decentralised markets, which may be particularly relevant amidst recent deliberations of the need for adequate prudential oversight of the cryptocurrency industry ([Basel Committee, 2019, 2021](#)).

We are also interested in the prevention of consumer fraud in the cryptocurrency industry, and in particular, whether cryptocurrencies in general, or specific projects, target poor and uneducated or rather the sophisticated and wealthy investor class who can afford to experiment. Several consumer agencies have warned against cryptocurrency scams. Policymakers have also shown their concern about the increasing adoption of cryptocurrencies.¹³ Our results – which show that cryptocurrency investors tend to be educated – to some extent imply that a majority of cryptocurrency investors are aware of the inherent risks. Our findings also suggest that being young increases the likelihood of owning cryptocurrencies. Since older people are at greater risk of both consumer and financial fraud ([Temple, 2007](#); [DeLiema et al., 2020](#)), young people stand a better chance of avoiding them. This part of the analysis is closely related to recent literature analysing the profile and behaviour of cryptocurrency users.¹⁴

et al., 2020) argue that low trust in the financial system has contributed to the spread of Bitcoin infrastructure. In addition, they show that Bitcoin's support is higher in cities with well-developed banking services. Beyond trust, ([De Bondt, 2005](#)) finds that self-confidence and financial sophistication are important determinants of the perceived attractiveness of different asset classes and investment strategies. Analysing a survey of more than 3,100 European investors, he also documents differences in values and beliefs by age, health status, religious affiliation, and gender. As he highlights, people's values and beliefs are highly correlated with investment behaviour.

¹²The level of trust is also determined by other factors such as differences in educational attainment ([Guiso et al., 2004](#)) or in religious upbringing ([Guiso et al., 2003](#)).

¹³For instance, a member of the US Federal Reserve Board, Lael Brainard, stated that "cryptocurrencies may raise important investor and consumer protection issues. The lack of strong governance and questions about the applicable legal framework for some cryptocurrencies may make consumers vulnerable to mistakes, thefts, and security breaches without much, or any, recourse" ([Brainard, 2018](#)).

¹⁴Almost all previous studies focus solely on Bitcoin and do not tackle the security and convenience

Our analysis is also related to the literature examining gender gaps in finance.¹⁵ Women tend to be more risk-averse than men when it comes to holding risky assets (Jianakoplos and Bernasek, 1998; Borghans et al., 2009; Arano et al., 2010), and there are significant differences across genders in the use of FinTech (Chen et al., 2021).

Further, understanding the concerns and sociodemographic characteristics of cryptocurrency owners is crucial to those wanting to gauge the potential of cryptocurrency markets and estimate how large this asset class could eventually become. We find that cryptocurrencies, at least at current, remain niche markets dominated by young male investors, while other parts of the population acquire information about this asset class, but ultimately do not invest in it. However, a feature pertinent to analysing the potential of the cryptocurrency market is the phenomenon of *hodling*. Our results suggest that it is a persistent trait among cryptocurrency investors.

In addition, our findings may be informative for the likely user sophistication of future digital currencies,¹⁶ including stablecoins or central bank digital currencies. Understanding the socioeconomic characteristics of cryptocurrency investors can be a first step in forecasting who the initial adopters of such future digital currencies may be.¹⁷

The remainder of this paper is structured as follows. Section 2 describes the data used. Section 3 outlines the empirical strategy used to identify the effects of interest. Section 4 provides an overview of the main results and presents some robustness checks. Section 5 documents some trends. Section 6 concludes.

aspects of cryptocurrencies. In this respect, Bohr and Bashir (2014) show that age, mining status, time of initial use, engaging in online discourse, geographical location, and political orientation are relevant factors to use bitcoin. Henry et al. (2018) estimate that being a man and having a higher level of education increases the probability of knowing bitcoin in Canada. Moreover, bitcoin awareness is more common among unemployed individuals. Using a survey among Austrian households, Stix (2019) argues that potential adopters of cryptocurrencies are younger and are more willing to accept financial risk. Fujiki (2020) finds that Japanese crypto-asset owners are more likely to be men, young, have a high pre-tax income, hold graduate degrees, and have a high level of financial literacy.

¹⁵Employing U.S. data, Bannier et al. (2019) find that men have greater knowledge regarding the features of bitcoin than women.

¹⁶Voskobojnikov et al. (2020) find that the type of cryptocurrency and its area of application are critical to determining which risks and mitigation strategies the user employs.

¹⁷In particular, the degree of user sophistication may be key to the adoption of a token-based CBDC that requires the handling of digital signatures and allows for anonymity. Auer and Böhme (2020) analyse the technical design choices for retail CBDCs and their trade-offs, while Auer et al. (2020) take stock of approaches around the world.

2 Data

In this paper, we use data from the Survey of Consumer Payment Choice (SCPC). The SCPC is a representative micro-level data set provided by the Federal Reserve Bank of Atlanta since 2009. It provides an overview of the payment behaviour of US consumers. The SCPC¹⁸ comprises information from the Diary of Consumer Payment Choice (DCPC). In the DCPC, consumers record details of specific payment transactions and choices (Foster et al., 2009). The SCPC does not have a perfect longitudinal design, meaning that if a person is selected in a given wave, that person does not always continue as a sample member in the subsequent editions.¹⁹

Each annual wave contains information about US consumers' payment behaviour regarding the use of cash, electronic payments and cryptocurrencies, as well as the number of transactions made via these means of payment. A crucial feature of the SCPC for this analysis is that it makes information for every respondent on whether that person is aware of one or more cryptocurrencies and whether that person owns any cryptocurrencies. In addition, the data include such socioeconomic characteristics as age, gender, race, region, education level, marital status, household income level and the number of people living in the same household.

2.1 The Estimation sample

The main analysis uses the 2019 wave, completed by a total of 3,372 individuals.²⁰ As an additional analysis, we use the 2014-19 waves. In Figure 2a, it is shown that the 2014, 2015, 2016, 2017 and 2018 samples contain 1,238, 1,429, 3,404, 3,099 and 3,153 individuals respectively. From the data, 1,264 individuals participated in just one wave and 3,876 participated in more than one wave. From them, 470 participated in the six waves of the survey (Figure 2b).

2.2 Descriptive statistics

Table 1 presents the main descriptive statistics for the 2019 wave.²¹ We use four main outcome variables: ownership; ownership number; knowledge; and knowledge number. Ownership (knowledge) captures whether an individual owns (recognises or knows of) at least one of the following cryptocurrencies: bitcoin, xrp, litecoin, ether, bitcoin cash, stellar, eos, or any other cryptocurrency. Ownership number (knowledge number) stands for the number of different cryptocurrencies that a person owns (recognises or knows of). Of the people who responded to the survey, 73% knew of at least one cryptocurrency. However, only 1.4% owned a cryptocurrency in 2019.²²

¹⁸For detailed analysis on each version of the SCPC, see Foster et al. (2009, 2011, 2013), Schuh and Stavins (2014, 2015), Greene et al. (2017), Greene and Schuh (2017), and Foster et al. (2020).

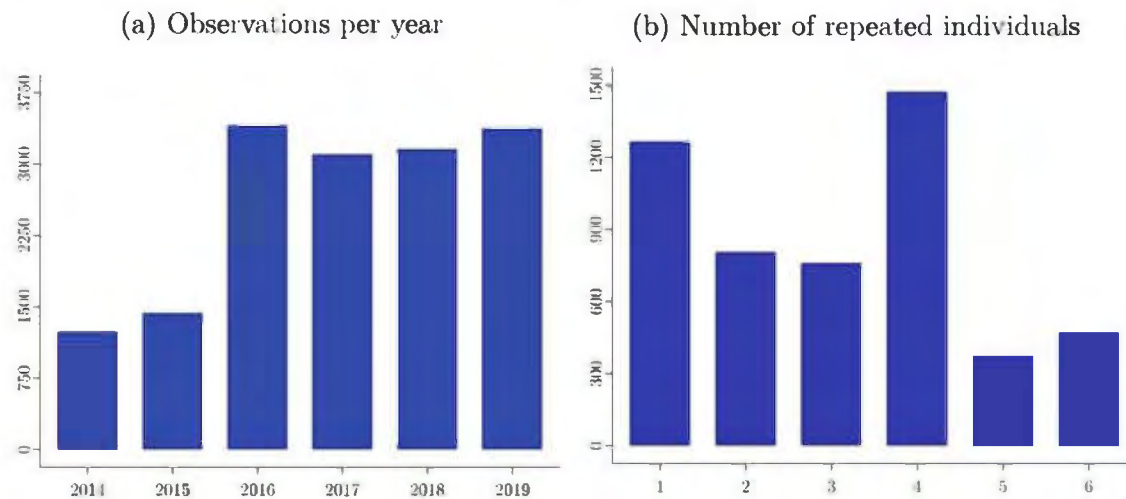
¹⁹For instance, since 2014 (N=1238), only 470 individuals have remained in the sample in the subsequent editions until 2019 (Figure 2b).

²⁰In the 2019 survey, respondents participate in September (SCPC) and October (DCPC) (Foster et al., 2020).

²¹Table B1, in the Appendix, presents the main descriptive statistics with weights.

²²There are no cryptocurrency owners who state that they do not know about cryptocurrencies.

Figure 2: Observations and repeated individuals.



Source: 2014-19 SCPC.

It is likely that those individuals with a higher level of digital skills know and own more cryptocurrencies rather than those with a lower level. The level of digitalisation is captured through three different variables: i) whether a person has a debit card, ii) whether a person has used a mobile app to pay in the past 12 months, iii) and whether a person has used PayPal to make a purchase or pay another person.²³ In 2019, more than 81% of the survey respondents have a debit card, 25.4% have used a mobile app to pay and almost 40% have used at least once PayPal to make an online purchase in the past 12 months.

Digitalisation has led to a proliferation of cashless or contactless payment methods driven by consumers and companies, both of whom want to be able to make payments quickly and safely and transfer funds around the world at no cost. Hence, the decision to invest in cryptocurrencies may be driven by consumer perception of other means of payments. These variables allow us to test whether the demand for cryptocurrencies is indeed driven by distrust in cash or the financial industry. In the SCPC, respondents classify the security and convenience of cash, bank account number payments and online banking bill payments into five categories: 1 – very inconvenient/risky, 2 – inconvenient/risky, 3 – neither inconvenient nor convenient/risky nor secure, 4 – convenient/secure, 5 – very convenient/secure. In all cases, the average ranges from around 2.7 to 4.

Regarding the socioeconomic indicators included in the analysis, the average income category is 11.3. Household income is divided into sixteen categories (see Table C1 in the Appendix). Category 11 corresponds to a level of household income between \$40,000 and \$49,999. The average educational attainment of the 2019 sample is 3.4. Educational attainment was divided into 16 categories in the 2018 and 2019 survey waves. However, since it was divided into just five categories in the 2014–17 waves, we transform the 16 categories into five (see Table C2). The variable “married”

²³PayPal launched its own cryptocurrency service, allowing people to buy, hold and sell cryptocurrencies on its site and applications (BBC, 2020).

Table 1: Descriptive statistics (2019 wave)

Variable	Mean	Std. Dev.	Min.	Max.
Main outcome variables				
Ownership	0.014	0.118	0	1
Ownership-number	0.031	0.315	0	7
Knowledge	0.730	0.444	0	1
Knowledge-number	1.281	1.250	0	8
Digitalisation variables				
Having a debit card	0.815	0.388	0	1
Mobile app for payments	0.254	0.435	0	1
Usage of PayPal	0.391	0.488	0	1
Secur. and conv. variables				
Convenience of cash	3.994	1.140	1	5
Security of cash	2.685	1.551	1	5
Conv. of bank acc. number paym.	3.234	1.183	1	5
Sec. of bank acc. number paym.	2.828	1.283	1	5
Conv. of on. bank. bill payments	3.926	1.074	1	5
Security of on. bank. bill paym.	3.260	1.211	1	5
Sociodemographic variables				
Income	11.320	3.929	1	16
Education	3.407	1.119	1	5
Married	0.695	0.461	0	1
Age	52.981	15.298	18	109
Retired	0.255	0.436	0	1
Male	0.436	0.496	0	1
White	0.839	0.368	0	1

The final sample includes 3235 observations. Descriptive statistics are computed without using weights. Ownership (knowledge) captures whether an individual owns (recognises or knows) at least one of the following cryptocurrencies: Bitcoin, xrp, litecoin, ether, bitcoin cash, stellar, eos, or any other different cryptocurrency. Ownership-number (knowledge-number) stands for the number of different cryptocurrencies that a person owns (recognises or knows).

represents current marital status. It takes a value of 1 if the respondent is married and a value of 0 if the respondent is separated, divorced or widowed or never married. In the sample, 43.6% of individuals are men; the average age is close to 53; 25.6% are retired; and 83.8% are white.

3 Methodology

In order to corroborate or disprove the hypothesis that cryptocurrencies are sought after as an alternative to fiat currencies or regulated finance, as well as to study the socioeconomic characteristics of US retail cryptocurrency investors, we employ the standard linear probability model (LPM):

$$Y_{i,t} = \beta_0 + \beta_1 D_{i,t} + \beta_2 S_{i,t} + \beta_3 X_{i,t} + \epsilon_{i,t} \quad (1)$$

where $Y_{i,t}$ is a categorical variable that takes the value 1 if individual i owns (recognises) at least one cryptocurrency in the year t , and 0 otherwise. $D_{i,t}$ is a vector of digitalisation variables at individual level in year t . $S_{i,t}$ is a vector of security and convenience variables at individual level in year t . $X_{i,t}$ is a vector of socioeconomic variables at the individual level that includes gender, age, level of education, income, race and marital status in year t . Finally, standard errors are clustered by individual.

In the cases in which the outcome of interest is a count variable that takes nonnegative integer values 0, 1, 2, 3, ..., i.e., the number of known or owned cryptocurrencies, a standard count model is applied.

Since the outcome of interest is nonnegative, we need to specify our object of interest, $E(Y_{i,t}|W_{i,t})$, by means of a function that guarantees nonnegative values.²⁴ The simplest model in this context is the Poisson model, which models the conditional mean through the exponential function. However, once the goodness-of-fit chi-squared test is performed²⁵, we conclude that the data do not fit the model well. Therefore, a negative binomial model is performed. The main difference between both models is that the negative binomial model relaxes the assumption of the equality of the conditional mean and the conditional variance. Let us consider the following specification for the conditional mean:

$$E(Y_{i,t}|W_{i,t}) = \exp(\beta_0 + \beta_1 D_{i,t} + \beta_2 S_{i,t} + \beta_3 X_{i,t}) = \exp(W_i' \beta) \quad (2)$$

The conditional variance is modelled as follows:

$$V(Y_{i,t}|W_{i,t}) = \exp(W_i' \beta) * (1 + \alpha \cdot \exp(W_i' \beta)) \quad (3)$$

where α is the overdispersion parameter. The negative binomial model is estimated by maximum likelihood (ML) and average marginal effects are computed.

4 Empirical results

The main purpose of this paper is to analyse whether the demand for cryptocurrencies is indeed driven by distrust in cash or the financial industry, and to develop a socioeconomic profile of US retail cryptocurrency investors. The next sections aim at answering these research questions

²⁴Assume for simplicity that $W_{i,t} = \beta_0 + \beta_1 D_{i,t} + \beta_2 S_{i,t} + \beta_3 X_{i,t}$.

²⁵The results of this test are available upon request.

4.1 LPM results

4.1.1 Initial results

Tables 2 and 3 show the econometric results of estimating Equation (1). In each column, we estimate the relationship between each independent variable and the main outcome variable (i.e., owning or recognising at least one cryptocurrency). Weights are included in all regressions.²⁶

The first set of initial results (Table 2, upper rows) show that all the digitalisation variables have a positive impact on the likelihood of owning at least one cryptocurrency. Having a debit card, using a mobile app for payments and using PayPal increase the probability of investing into cryptocurrencies by 1.9, 3.5 and 2 percentage points, respectively. The findings also show that the demand for cryptocurrencies is not driven by distrust in cash or the financial industry, given that there are no differences in the perceived security of cash and offline and online banking. We can thus preliminarily disprove the hypothesis that cryptocurrencies are sought as an alternative to fiat currencies or regulated finance. However, compared with non-owners, cryptocurrency owners tend to find both cash and traditional banking services less convenient, although this is not the case for online banking.²⁷

We also show the correlation between payment experience and level of knowledge about cryptocurrencies. We find that the level of digitalisation increases knowledge about cryptocurrencies by around 16–17 percentage points. Those who recognise at least one cryptocurrency find cash less secure. In other words, *ceteris paribus*, if a consumer considers cash to be one step lower in terms of the security scale, the probability of that consumer knowing about at least one cryptocurrency is 3.5 percentage points lower. That same consumer is also likely to consider paying bills via online banking more secure and paying bills via online banking more convenient.²⁸ These patterns are consistent with those observed among people who have security concerns around fiat money and so acquire information about cryptocurrencies, but ultimately decide not to invest in them.

Of course, broader socioeconomic characteristics matter as well when it comes to knowledge acquisition and investment decisions around cryptocurrencies. From Table 3, it can be derived that education, income, being a man and being married positively influence both knowing about and owning a cryptocurrency. However, being one year older (or being retired) has a negative significant effect only on owning a cryptocurrency. Race is uncorrelated with cryptocurrency ownership.

²⁶Survey weights are provided by the SCPC to generate population estimates.

²⁷In order to purchase cryptocurrencies, investors need a mean of payment such as a debit or a credit card. In Appendix D, we restrict the sample to those individuals who are: (i) debit card adopters, and (ii) credit card adopters. Replicating columns 4-9 of Table 3, results are completely robust.

²⁸Krombholz et al. (2017) present one of the first studies analysing how bitcoin users assess the bitcoin ecosystem in terms of privacy, anonymity and security.

Table 2: Payment behaviour, cryptocurrency ownership and knowledge

	Debit	Mobile	PayPal	Cash		Trad. Bank.		Online Bank.	
				Conv.	Sec.	Conv.	Sec.	Conv.	Sec.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Owner.	0.019***	0.035***	0.019**	-	-0.001	-	-0.002	-0.001	-0.001
				0.007*		0.008***			
	(0.005)	(0.011)	(0.009)	(0.004)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)
R^2	0.003	0.015	0.005	0.004	0.000	0.006	0.000	0.000	0.000
Know.	0.158***	0.171***	0.171***	-0.007	-	-	-0.010	0.035***	0.024**
					0.035***	0.042***			
	(0.033)	(0.023)	(0.022)	(0.010)	(0.007)	(0.009)	(0.009)	(0.011)	(0.010)
R^2	0.017	0.030	0.034	0.000	0.014	0.012	0.001	0.007	0.004
Weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	3,235	3,235	3,235	3,235	3,235	3,235	3,235	3,235	3,235

Notes: ***, ** and * indicate 1%, 5% and 10% significance levels respectively. In parentheses are presented robust standard errors clustered by individual. Constant included but not reported. Owner. (know.) captures whether an individual owns (knows or recognises) at least one cryptocurrency. Debit stands for having a debit card; Mobile: Using of mobile app for payments. Trad. Bank.: bank account number payments; Online Bank.: online banking bill payments. Conv. and Sec. stand for convenience and security respectively.

Table 3: Sociodemographics and cryptocurrency ownership and knowledge

	Education	Income	Age	Retired	Married	Male	White
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Owner.	0.009***	0.002**	-	-	0.017***	0.023***	0.002
			0.001***	0.020***			
	(0.003)	(0.001)	(0.000)	(0.005)	(0.007)	(0.008)	(0.009)
R^2	0.007	0.004	0.010	0.004	0.004	0.008	0.000
Know.	0.110***	0.031***	-0.001	0.007	0.056**	0.114***	0.086**
	(0.010)	(0.003)	(0.001)	(0.027)	(0.025)	(0.023)	(0.029)
R^2	0.086	0.080	0.001	0.000	0.003	0.016	0.007
Weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	3,235	3,235	3,235	3,235	3,235	3,235	3,235

Notes: ***, ** and * indicate 1%, 5% and 10% significance levels respectively. In parentheses are presented robust standard errors clustered by individual. Constant included but not reported. Owner. (know.) captures whether an individual owns (knows or recognises) at least one cryptocurrency.

4.1.2 Payment behaviour and sociodemographics: joint regressions

Table 4 presents a new set of regressions that examine the partial effect of payment behaviour and broader sociodemographics. It shows the econometric results of

estimating Equation (1) when the main outcome variable is owning at least one cryptocurrency. Since education and income are jointly influenced by an unmeasured third variable (latent variable), they are included separately in each regression. This is a way of dealing with the possible endogeneity problem.²⁹ In addition, weights are included. Columns 1 and 2 present the main results excluding the payment behaviour indicators. Columns 3-4 and 5-6 present the outcomes including the digitalisation variables (i.e., having a debit card, usage of mobile app payments, and usage of PayPal) and the convenience and security variables respectively. Finally, columns 7 and 8 present the results with all variables included at the same time.³⁰

Security concerns have no impact on cryptocurrency investments also conditioned on sociodemographic indicators. This highlights that the demand for cryptocurrencies is not driven by distrust in cash, traditional banking payments or online banking payments. Both having a debit card and having used a mobile app to make a payment in the last 12 months increase the probability of owning a cryptocurrency by 0.9 and 2.4-2.7 percentage points, respectively. Compared with non-owners, cryptocurrency investors tend to find traditional banking services less convenient. There are no differences with respect to cash and online banking payments.

Income level does not affect the main outcome variable of this specification. Each additional year of age reduces, on average, the probability of owning a cryptocurrency by 0.1 percentage points. In order to corroborate this result, Table F1, in Appendix F, reproduces Table 4, but instead of using the variable “age” it uses the variable “retired”. “Retired” captures whether a person has withdrawn from active working life or not. Results show that being retired reduces the probability of owning a cryptocurrency, on average, by between 1 and 1.7 percentage points. [Albert and Duffy \(2012\)](#) show that older adults are more risk-averse than younger adults, having a lower expected utility from future income. The study of [Stix \(2019\)](#) also supports this finding. He argues that potential adopters of cryptocurrencies are younger and are more willing to accept financial risks. Analysing mortality beliefs, [Heimer et al. \(2019\)](#) estimate that older individuals place more weight on natural ageing, overestimating long-run survival rates. This reduces consumption and investment during retirement, in line with our results.

Being a man in the US increases, on average, the likelihood of owning at least one cryptocurrency by 2 to 2.2 percentage points.³¹ As [Jianakoplos and Bernasek \(1998\)](#) document, there are gender differences in financial risk-taking. When it comes to holding risky assets, women tend to be more risk-averse than men and therefore are unlikely to trust digital currencies that are volatile. Related research by [Borghans et al. \(2009\)](#) and [Arano et al. \(2010\)](#) also support this finding. Gender differences also extend to a sector closely related to the cryptocurrency industry: the FinTech industry. [Chen et al. \(2021\)](#) find that men are more likely to use Fintech products and services than women. Being married seems to increase the likelihood of investing

²⁹Table E1 presents the results of estimating Equation (1) with both income and education included at the same time. Results do not differ from those presented in Table 4.

³⁰In order to test multicollinearity, we compute the Variable Inflation Factor (VIF) for the regressors in columns 7 and 8. The values of all variables lie in the (1, 2) interval.

³¹This can be interpreted as the difference between 0.7% of female respondents and 2.9% of male respondents in the survey (Figure 8a).

in cryptocurrencies as well. On the contrary, race does not affect the probability of owning a cryptocurrency.

In contrast, the higher the educational attainment achieved by the individual, the more likely it is that that individual owns a cryptocurrency. This result is consistent with the findings of [Black et al. \(2018\)](#). They show that an extra year of education increases participation in financial markets, and therefore risk-taking, by 2 percentage points.

4.1.3 Drivers of knowledge acquisition: joint regressions

For the purpose of this study, it is essential to understand the impact of payment behaviour variables and socioeconomic characteristics on information and knowledge about cryptocurrencies. [Table 5](#) shows the results of estimating [Equation \(1\)](#) when the main outcome variable is knowing about at least one cryptocurrency.

In this case, we find that all the digitalisation indicators are statistically significant, i.e. the digitalisation level increases the knowledge about cryptocurrencies. Those who recognise at least one cryptocurrency also find traditional banking payments less convenient and online banking bill payments more convenient than those who do not. While they also find cash less secure, there is no discernible effect found regarding their opinion of the safety of either traditional or online banking.

Moving from a lower category of education to a higher one increases the probability, on average, of recognising at least one cryptocurrency by around 8.7 to 11.1 percentage points.³² Similarly, the higher the income level, the higher is the probability (from 2.3 percentage points to 3.1) of knowing about at least one cryptocurrency. On the other hand, current marital status (being married, separated, divorced or widowed or never having married) is not statistically significantly related to the dependent variable. Being a man in the US increases, on average, the probability of knowing about at least one cryptocurrency by between 9.6 and 12.1 percentage points. This result is in line with the study of [Bannier et al. \(2019\)](#). They highlight that men have a higher degree of knowledge regarding bitcoin than women. Age, however, is not a relevant factor in terms of knowing about at least one cryptocurrency. If “retired” is incorporated into the model instead of age, results coincide with the ones in the main regression ([Table F2](#) in [Appendix F](#)).

³²The magnitude of the coefficients is generally larger in this section because of the percentage of individuals who know about cryptocurrencies is much larger than the percentage of owners.

Table 4: Ownership – payment behavior and sociodemographics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Digitalisation variables								
Debit card			0.009*** (0.003)	0.009** (0.004)			0.010** (0.004)	0.009** (0.004)
Mobile app			0.029*** (0.010)	0.026** (0.010)			0.027*** (0.010)	0.024** (0.010)
PayPal			0.007 (0.008)	0.009 (0.008)			0.007 (0.008)	0.008 (0.008)
Convenience variables								
Cash					-0.006 (0.004)	-0.006 (0.004)	-0.005 (0.004)	-0.005 (0.004)
Trad. Banking					- 0.007** (0.004)	-0.006* (0.004)	-0.006* (0.004)	-0.006* (0.004)
Online Banking					0.002 (0.004)	0.002 (0.004)	0.000 (0.004)	0.001 (0.004)
Security variables								
Cash					-0.000 (0.003)	0.000 (0.003)	0.000 (0.003)	0.000 (0.003)
Trad. banking					0.001 (0.005)	0.000 (0.005)	0.001 (0.005)	0.001 (0.005)
Online Banking					-0.002 (0.005)	-0.000 (0.005)	-0.002 (0.005)	-0.001 (0.005)
Sociodemographic variables								
Educ.	0.009*** (0.004)		0.006* (0.003)		0.008** (0.004)		0.005* (0.003)	
Income		0.002* (0.001)		0.000 (0.001)		0.001 (0.001)		0.001 (0.001)
Age		- 0.001*** (0.000)		- 0.001*** (0.000)		- 0.001*** (0.000)		- 0.001** (0.000)
Married	0.014** (0.006)	0.011 (0.007)	0.013** (0.006)	0.012* (0.007)	0.013** (0.006)	0.010 (0.007)	0.012** (0.006)	0.011* (0.007)
Male	0.022*** (0.008)	0.020*** (0.007)	0.022*** (0.008)	0.021*** (0.007)	0.022*** (0.008)	0.020*** (0.007)	0.022*** (0.008)	0.021*** (0.007)
White	-0.000 (0.009)	-0.002 (0.009)	-0.001 (0.009)	-0.001 (0.009)	-0.001 (0.009)	-0.002 (0.009)	-0.001 (0.009)	-0.002 (0.009)
Weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R ²	0.018	0.022	0.031	0.032	0.025	0.028	0.036	0.037
Obs.	3,235	3,235	3,235	3,235	3,235	3,235	3,235	3,235

Notes: ***, ** and * indicate 1%, 5% and 10% significance levels respectively. In parentheses are presented robust standard errors clustered by individual. Constant included but not reported. Trad. Banking: bank account number payments. Online Banking: online banking bill payments.

Table 5: Knowledge – payment behavior and sociodemographics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Digitalisation variables								
Debit card			0.079** (0.032)	0.058* (0.032)			0.075** (0.031)	0.056* (0.032)
Mobile app			0.086*** (0.023)	0.095*** (0.025)			0.078*** (0.023)	0.087*** (0.024)
PayPal			0.085*** (0.021)	0.098*** (0.022)			0.074*** (0.021)	0.084*** (0.021)
Convenience variables								
Cash					0.010 (0.009)	0.003 (0.009)	0.016* (0.009)	0.008 (0.009)
Trad. banking					- 0.044*** (0.009)	- 0.052*** (0.009)	- 0.040*** (0.009)	- 0.049*** (0.009)
Online Banking					0.040*** (0.011)	0.041*** (0.011)	0.032*** (0.011)	0.034*** (0.011)
Security variables								
Cash					- 0.026*** (0.007)	- 0.024*** (0.007)	- 0.023*** (0.007)	- 0.022*** (0.007)
Trad. banking					-0.008 (0.010)	-0.015 (0.010)	-0.006 (0.010)	-0.011 (0.010)
Online Banking					0.017 (0.011)	0.019* (0.011)	0.013 (0.011)	0.014 (0.011)
Sociodemographic variables								
Educ.	0.111*** (0.009)		0.092*** (0.010)		0.101*** (0.009)		0.087*** (0.010)	
Income		0.031*** (0.003)		0.025*** (0.003)		0.028*** (0.003)		0.023*** (0.003)
Age		-0.001 (0.001)		0.000 (0.001)		-0.000 (0.001)		0.001 (0.001)
Married	0.022 (0.024)	-0.041 (0.025)	0.013 (0.023)	-0.036 (0.024)	0.016 (0.023)	-0.044* (0.024)	0.009 (0.023)	-0.039* (0.023)
Male	0.117*** (0.022)	0.096*** (0.022)	0.121*** (0.022)	0.104*** (0.022)	0.118*** (0.022)	0.099*** (0.022)	0.120*** (0.021)	0.105*** (0.022)
White	0.080*** (0.028)	0.038 (0.028)	0.074*** (0.027)	0.039 (0.027)	0.074*** (0.027)	0.034 (0.027)	0.068** (0.026)	0.034 (0.026)
Weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R ²	0.111	0.094	0.136	0.120	0.136	0.124	0.156	0.143
Obs.	3,235	3,235	3,235	3,235	3,235	3,235	3,235	3,235

Notes: ***, ** and * indicate 1%, 5% and 10% significance levels respectively. In parentheses are presented robust standard errors clustered by individual. Constant included but not reported. Trad. Banking: bank account number payments. Online Banking: online banking bill payments.

4.1.4 Ownership conditioned on knowing about cryptocurrencies

Table 6 presents the results when we restrict the sample to those individuals that know about at least one cryptocurrency. The hypothesis that the demand for cryptocurrencies is driven by distrust in cash or the financial sector is rejected. Security concerns have no impact on cryptocurrency investment conditioned on knowing about cryptocurrencies. Education increases the likelihood of owning a cryptocurrency conditioned on knowing about at least one cryptocurrency. Nonetheless, becoming one year older decreases, on average, the likelihood of owning a cryptocurrency by 0.1 percentage points. These results are consistent with those presented in Table 4.

4.2 Negative binomial model results

Tables 7 and 8 show the results of estimating Equation (2), when the main outcome variable is the number of cryptocurrencies owned and the number of cryptocurrencies known.

Table 7 reveals that, compared with non-owners, cryptocurrency investors show no differences in their level of security concerns with either cash or commercial banking services. These investors do find traditional banking services less convenient, results that are consistent through the whole study. Nevertheless, educational attainment does not play a role here and income level is not statistically significant when the digitalisation variables are included in the model. With each increasing year of age, the difference in the logs of expected counts would be expected to decrease by 0.002–0.003 units, while holding the other variables in the model constant. This result is in line with the estimates of [Stix \(2019\)](#). The difference in the logs of expected counts is expected to be 0.068–0.106 units higher for males compared with females, while holding the other variables constant in the model. Gender differences in financial risk-taking ([Jianakoplos and Bernasek, 1998](#); [Borghans et al., 2009](#); [Arano et al., 2010](#); [Chen et al., 2021](#)) are also present in this case. Being married compared with being single, divorced or widowed also positively affects the main variable of interest.

Table 8 exhibits results in line with the outcomes presented in Table 5. Its interpretation is as follows: if an individual had achieved one extra level of education, the difference in the logs of expected counts would be expected to increase by around 0.22–0.29 units, while holding the other variables in the model constant. Moreover, being in a higher category of income increases the difference in the logs of expected counts by 0.05–0.07 units. The relationship between the number of known cryptocurrencies and age is negative. The difference in the logs of expected counts is expected to be 0.49–0.56 units higher for males compared with females, while holding the other variables constant in the model. Marital status and race are not relevant factors.

Table 6: Ownership conditional on knowing at least one cryptocurrency

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Digitalisation variables								
Debit card			0.015*** (0.005)	0.011** (0.005)			0.015*** (0.006)	0.011** (0.005)
Mobile app			0.034*** (0.013)	0.029** (0.013)			0.032*** (0.012)	0.027** (0.012)
PayPal			0.010 (0.010)	0.012 (0.010)			0.010 (0.010)	0.011 (0.010)
Convenience variables								
Cash					-0.008 (0.006)	-0.008 (0.006)	-0.006 (0.005)	-0.006 (0.005)
Trad. Banking					-0.009* (0.005)	-0.008* (0.005)	-0.008* (0.005)	-0.007 (0.005)
Online Banking					0.002 (0.005)	0.002 (0.005)	0.000 (0.005)	0.001 (0.005)
Security variables								
Cash					0.000 (0.003)	0.000 (0.003)	0.000 (0.003)	0.000 (0.003)
Trad. banking					0.002 (0.007)	0.001 (0.007)	0.002 (0.007)	0.001 (0.007)
Online Banking					-0.003 (0.006)	-0.001 (0.006)	-0.003 (0.007)	-0.002 (0.006)
Sociodemographic variables								
Educ.	0.011** (0.005)		0.007* (0.004)		0.010* (0.005)		0.006 (0.005)	
Income		0.001 (0.002)		0.000 (0.002)		0.001 (0.002)		0.000 (0.002)
Age		- 0.001*** (0.000)		- 0.001*** (0.000)		- 0.001*** (0.000)		- 0.001** (0.000)
Married	0.020** (0.009)	0.020* (0.011)	0.020** (0.009)	0.022** (0.011)	0.019** (0.008)	0.019* (0.010)	0.019** (0.008)	0.020** (0.010)
Male	0.028*** (0.011)	0.025*** (0.010)	0.029*** (0.011)	0.028*** (0.010)	0.028*** (0.010)	0.026*** (0.010)	0.029*** (0.010)	0.027*** (0.010)
White	-0.002 (0.013)	-0.002 (0.013)	-0.001 (0.013)	-0.001 (0.013)	-0.001 (0.013)	-0.001 (0.013)	-0.000 (0.013)	-0.000 (0.013)
Weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R ²	0.018	0.022	0.031	0.032	0.025	0.028	0.036	0.037
Obs.	3,235	3,235	3,235	3,235	3,235	3,235	3,235	3,235

Notes: ***, ** and * indicate 1%, 5% and 10% significance levels respectively. In parentheses are presented robust standard errors clustered by individual. Constant included but not reported. Trad. Banking: bank account number payments. Online Banking: online banking bill payments.

Table 7: Number of owned cryptocurrencies (negative binomial model)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Digitalisation variables								
Debit card			0.106*	0.078			0.100	0.070
			(0.057)	(0.051)			(0.062)	(0.057)
Mobile app			0.066**	0.050*			0.065**	0.052**
			(0.029)	(0.028)			(0.028)	(0.023)
PayPal			0.054	0.050*			0.057	0.047*
			(0.035)	(0.028)			(0.038)	(0.028)
Convenience variables								
Cash					-	-0.017*	-0.012	-0.013
					0.017**			
					(0.008)	(0.008)	(0.008)	(0.008)
Trad. banking					-	-	-	-
					0.021***	0.016**	0.022**	0.017**
					(0.008)	(0.008)	(0.010)	(0.009)
Online Banking					0.006	0.007	0.003	0.005
					(0.012)	(0.010)	(0.012)	(0.011)
Security variables								
Cash					0.010	0.010	0.011	0.011
					(0.008)	(0.009)	(0.010)	(0.010)
Trad. banking					0.010	0.012	0.008	0.010
					(0.010)	(0.010)	(0.010)	(0.010)
Online Banking					-0.004	-0.006	-0.008	-0.008
					(0.008)	(0.009)	(0.011)	(0.010)
Sociodemographic variables								
Educ.	0.021*		0.005		0.027**		0.013*	
	(0.011)		(0.012)		(0.013)		(0.009)	
Income		0.007**		0.002		0.009*		0.005
		(0.003)		(0.003)		(0.005)		(0.004)
Age		-		-		-		-
		0.003***		0.002**		0.003***		0.002**
		(0.001)		(0.001)		(0.001)		(0.001)
Married	0.058**	0.067**	0.066**	0.072**	0.052***	0.060**	0.062**	0.066**
	(0.023)	(0.027)	(0.030)	(0.031)	(0.020)	(0.024)	(0.028)	(0.027)
Male	0.068**	0.072**	0.098**	0.090**	0.079**	0.085***	0.106**	0.100***
	(0.031)	(0.031)	(0.041)	(0.035)	(0.038)	(0.033)	(0.043)	(0.038)
White	0.007	0.009	0.022	0.025	0.003	0.001	0.018	0.016
	(0.018)	(0.020)	(0.022)	(0.023)	(0.020)	(0.021)	(0.022)	(0.021)
Weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo- R^2	0.053	0.086	0.101	0.116	0.077	0.106	0.117	0.131
Obs.	3,235	3,235	3,235	3,235	3,235	3,235	3,235	3,235

Notes: ***, ** and * indicate 1%, 5% and 10% significance levels respectively. In parentheses are presented robust standard errors clustered by individual. Constant included but not reported. Trad. Banking: bank account number payments. Online Banking: online banking bill payments.

Table 8: Number of known cryptocurrencies (negative binomial model)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Digitalisation variables								
Debit card			0.245**	0.191*			0.243**	0.189*
			(0.116)	(0.111)			(0.112)	(0.108)
Mobile app			0.388***	0.352***			0.374***	0.341***
			(0.077)	(0.079)			(0.077)	(0.079)
PayPal			0.229***	0.260***			0.205***	0.233***
			(0.070)	(0.071)			(0.071)	(0.073)
Convenience variables								
Cash					-0.007	-0.015	0.018	0.005
					(0.029)	(0.029)	(0.028)	(0.029)
Trad. banking					-	-	-	-
					0.113***	0.114***	0.097***	0.104***
					(0.031)	(0.031)	(0.032)	(0.032)
Online Banking					0.075**	0.077**	0.051	0.057*
					(0.034)	(0.034)	(0.034)	(0.034)
Security variables								
Cash					-	-	-	-
					0.083***	0.075***	0.077***	0.073***
					(0.021)	(0.022)	(0.021)	(0.021)
Trad. banking					0.005	-0.020	0.011	-0.011
					(0.037)	(0.036)	(0.036)	(0.036)
Online Banking					0.020	0.038	0.010	0.023
					(0.040)	(0.039)	(0.040)	(0.040)
Sociodemographic variables								
Educ.	0.293***		0.225***		0.271***		0.215***	
	(0.031)		(0.030)		(0.033)		(0.031)	
Income		0.073***		0.051***		0.067***		0.049***
		(0.014)		(0.013)		(0.014)		(0.013)
Age		-		-		-		-
		0.012***		0.008***		0.011***		0.006***
		(0.002)		(0.002)		(0.002)		(0.002)
Married	-0.004	-0.119	-0.022	-0.101	-0.024	-0.136	-0.033	-0.115
	(0.077)	(0.088)	(0.074)	(0.086)	(0.075)	(0.087)	(0.073)	(0.085)
Male	0.555***	0.494***	0.556***	0.513***	0.559***	0.503***	0.557***	0.518***
	(0.076)	(0.073)	(0.073)	(0.071)	(0.075)	(0.072)	(0.072)	(0.071)
White	0.066	-0.016	0.056	-0.008	0.053	-0.024	0.042	-0.020
	(0.088)	(0.087)	(0.086)	(0.086)	(0.087)	(0.086)	(0.086)	(0.086)
Weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo- R^2	0.038	0.035	0.052	0.047	0.045	0.042	0.058	0.053
Obs.	3,235	3,235	3,235	3,235	3,235	3,235	3,235	3,235

Notes: ***, ** and * indicate 1%, 5% and 10% significance levels respectively. In parentheses are presented robust standard errors clustered by individual. Constant included but not reported. Trad. Banking: bank account number payments; Online Banking: online banking bill payments.

4.3 Robustness checks

In the baseline specification (Equation (1)), a LPM was employed. One limitation of the LPM is that it does not impose any restriction on the probability. The inability to impose restrictions on the values of the regressors or the parameters means we could obtain estimated probabilities outside the unit interval. The logit model overcomes this limitation by modelling the probability as a cumulative distribution function that always lies in the $[0,1]$ interval. Tables 9 and 10 reports the estimations using a logit model. As marginal effects are not constant, the average marginal effects are computed.

The main results are completely robust to the use of a logit model.³³ Overall, the findings in Table 9 suggest that we can disprove the hypothesis that cryptocurrencies are sought as an alternative to fiat currencies or regulated banking. Cryptocurrency investors show no differences in their level of security concerns with either cash or commercial banking services. They also consider traditional banking services less convenient. Results highlight that being a digital native boosts the usage of cryptocurrencies. Education and being a man increase, on average, the probability of owning at least one cryptocurrency by 0.5 and 1 percentage points, respectively. On the contrary, becoming one year older decreases, on average, the likelihood of owning at least one cryptocurrency by 0.1 percentage points. Results in Table 10 are in line with those in Table 5.

4.4 Differences across cryptocurrencies

Are there differences in investor characteristics across groups of cryptocurrencies? This section starts by introducing the best-known cryptocurrencies. As Figure 3a shows, the most widely known cryptocurrency is bitcoin, followed by bitcoin cash and ether. Figure 3b depicts the percentage of owners classified by each kind of cryptocurrency in 2019. Bitcoin is the most widely owned cryptocurrency, with twice as many investors as is the case for ether. After ether, litecoin is the third most owned cryptocurrency.

So far, we have treated the owners of cryptocurrencies as if they were a uniform and homogeneous group of investors who share the same sociodemographic profile. Investor characteristics may, however, vary across groups of cryptocurrencies. Figure 3c shows that cryptocurrency owners are generally more educated than the average. Among the various cryptocurrencies, owners of xrp and ether are the most educated, while those owning litecoin are the least educated, with bitcoin owners ranking in the middle. Cryptocurrency owners have a household income level higher than the average, with owners of xrp, ether and stellar being the wealthiest (Figure 3d).

³³In Appendix G, we control for potential rare event bias in the logit model. The sign and significance of the main variables of the logistic rare event regression à la King and Zeng (2001) are completely robust.

Table 9: Ownership - payment behaviour and sociodemographics (logit model)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Digitalisation variables								
Debit card			0.031** (0.015)	0.026* (0.015)			0.031** (0.015)	0.026* (0.015)
Mobile app			0.023*** (0.009)	0.019** (0.008)			0.021** (0.008)	0.017** (0.007)
PayPal			0.008 (0.007)	0.009 (0.007)			0.009 (0.008)	0.009 (0.007)
Convenience variables								
Cash					-0.005* (0.003)	-0.005 (0.003)	-0.004 (0.003)	-0.003 (0.003)
Trad. banking					- 0.007** (0.003)	-0.006* (0.003)	- 0.006** (0.003)	-0.006* (0.004)
Online Banking					0.002 (0.003)	0.002 (0.003)	0.000 (0.003)	0.000 (0.003)
Security variables								
Cash					-0.001 (0.003)	-0.000 (0.002)	-0.001 (0.002)	-0.001 (0.002)
Trad. banking					0.001 (0.004)	0.001 (0.004)	0.001 (0.004)	0.001 (0.004)
Online Banking					-0.002 (0.004)	-0.002 (0.004)	-0.002 (0.004)	-0.001 (0.004)
Sociodemographic variables								
Educ.	0.010** (0.004)		0.006* (0.004)		0.009** (0.004)		0.005* (0.004)	
Income		0.002 (0.002)		0.001 (0.002)		0.002 (0.002)		0.002 (0.001)
Age		- 0.001*** (0.000)		- 0.001** (0.000)		- 0.001** (0.000)		- 0.001** (0.000)
Married	0.020* (0.012)	0.024* (0.013)	0.020* (0.011)	0.024** (0.012)	0.020* (0.012)	0.023* (0.013)	0.020* (0.011)	0.023** (0.012)
Male	0.025** (0.010)	0.025** (0.010)	0.025** (0.010)	0.025** (0.010)	0.025** (0.010)	0.024** (0.010)	0.024*** (0.009)	0.024*** (0.009)
White	-0.000 (0.009)	-0.003 (0.009)	0.001 (0.009)	-0.003 (0.009)	-0.000 (0.009)	-0.003 (0.009)	0.001 (0.009)	-0.002 (0.009)
Weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo- R^2	0.110	0.168	0.184	0.217	0.151	0.197	0.213	0.238
Obs.	3,235	3,235	3,235	3,235	3,235	3,235	3,235	3,235

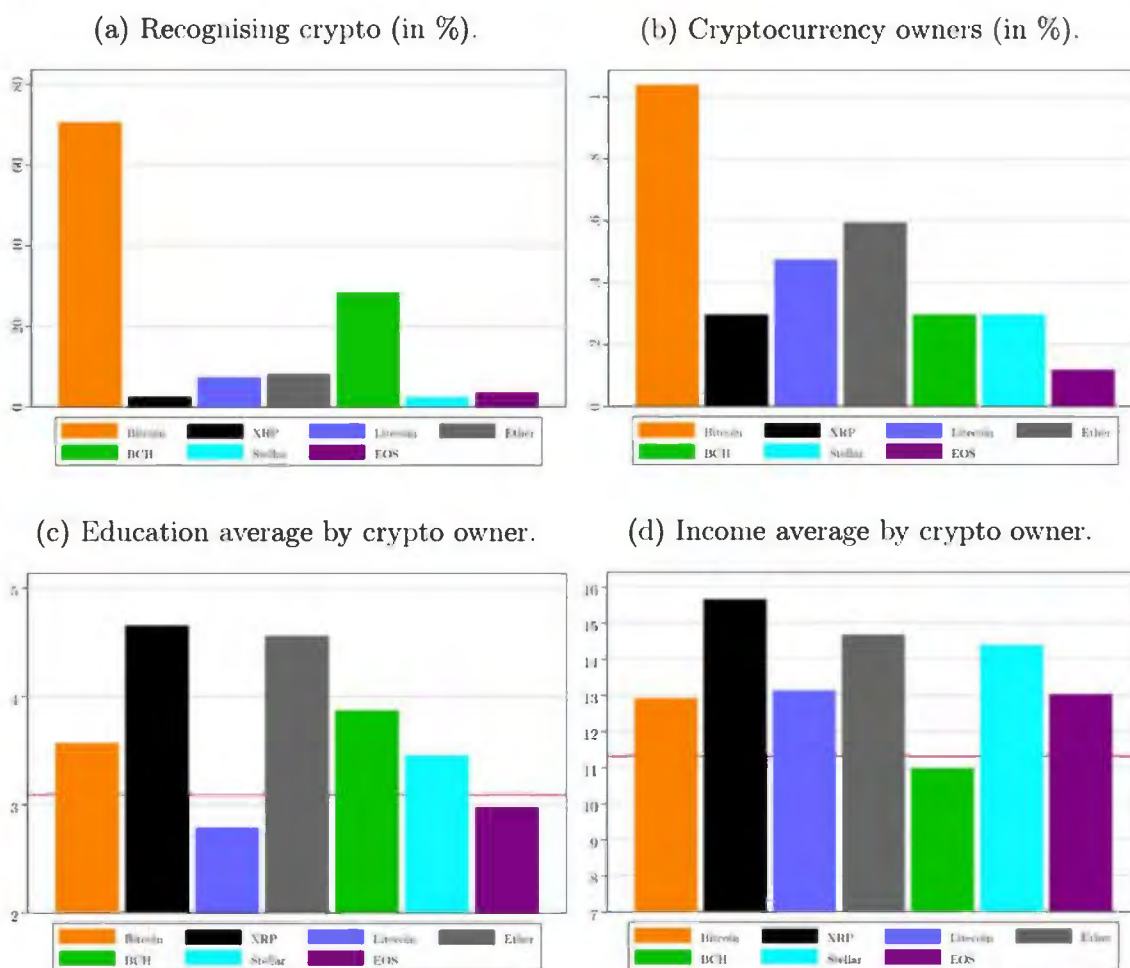
Notes: ***, ** and * indicate 1%, 5% and 10% significance levels respectively. In parentheses are presented robust standard errors clustered by individual. Constant included but not reported. Trad. Banking: bank account number payments. Online Banking: online banking bill payments.

Table 10: Knowledge - payment behaviour and sociodemographics (logit model)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Digitalisation variables								
Debit card			0.066** (0.027)	0.050* (0.028)			0.064** (0.026)	0.048* (0.027)
Mobile app			0.098*** (0.026)	0.107*** (0.028)			0.086*** (0.025)	0.094*** (0.027)
PayPal			0.089*** (0.023)	0.102*** (0.023)			0.076*** (0.023)	0.087*** (0.023)
Convenience variables								
Cash					0.010 (0.009)	0.002 (0.009)	0.015 (0.009)	0.007 (0.009)
Trad. banking					-	-	-	-
					0.045*** (0.010)	0.053*** (0.010)	0.041*** (0.009)	0.049*** (0.010)
Online Banking					0.039*** (0.011)	0.040*** (0.011)	0.028*** (0.011)	0.032*** (0.011)
Security variables								
Cash					-	-	-	-
					0.024*** (0.007)	0.024*** (0.007)	0.022*** (0.007)	0.021*** (0.007)
Trad. banking					-0.011 (0.011)	-0.017 (0.010)	-0.008 (0.011)	-0.013 (0.010)
Online Banking					0.020* (0.011)	0.022* (0.012)	0.015 (0.011)	0.016 (0.011)
Sociodemographic variables								
Educ.	0.110*** (0.009)		0.090*** (0.009)		0.098*** (0.009)		0.084*** (0.009)	
Income		0.028*** (0.002)		0.021*** (0.003)		0.025*** (0.002)		0.020*** (0.003)
Age		-0.001 (0.001)		0.000 (0.001)		-0.000 (0.001)		0.001 (0.001)
Married	0.023 (0.023)	-0.037 (0.024)	0.011 (0.022)	-0.035 (0.023)	0.016 (0.022)	-0.040* (0.023)	0.006 (0.022)	-0.038* (0.023)
Male	0.118*** (0.022)	0.095*** (0.022)	0.122*** (0.021)	0.104*** (0.022)	0.118*** (0.021)	0.100*** (0.022)	0.120*** (0.021)	0.105*** (0.021)
White	0.076*** (0.026)	0.035 (0.026)	0.066*** (0.025)	0.034 (0.026)	0.069*** (0.025)	0.030 (0.025)	0.060** (0.025)	0.029 (0.025)
Weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo- R^2	0.097	0.077	0.121	0.102	0.121	0.104	0.139	0.124
Obs.	3,235	3,235	3,235	3,235	3,235	3,235	3,235	3,235

Notes: ***, ** and * indicate 1%, 5% and 10% significance levels respectively. In parentheses are presented robust standard errors clustered by individual. Constant included but not reported. Trad. Banking: bank account number payments. Online Banking: online banking bill payments.

Figure 3: Knowledge and owners by group of crypto (2019).



Source: 2019 SCPC.

Note. In panels (c) and (d), the brown line represents the average income and education for all individuals (see Appendix C, Tables C1 and C2 for the household income and educational attainment classifications respectively). Survey weights are included.

5 Trends in and outlook for the cryptocurrency industry

What do the findings of this study imply for the future of the cryptocurrency industry? We discuss whether cryptocurrencies are likely to attract new investors in the future and whether they may retain their existing ones. We also discuss trends in the socioeconomic characteristics of cryptocurrency investors.

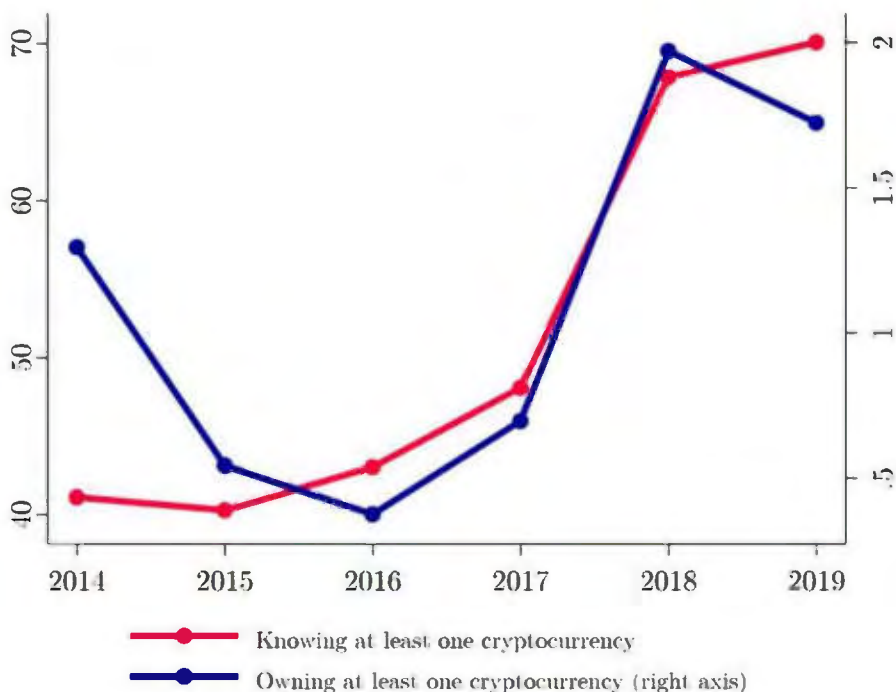
5.1 Attracting new investors

While knowledge about cryptocurrencies is becoming pervasive, ownership remains limited to a niche population. In 2014 only some 40% of US citizens were aware of at least one cryptocurrency (mainly bitcoin). This percentage increased to almost 70% in 2019 (see Figure 4). If the trend continues, in one or two years the entire US population will recognise at least one cryptocurrency. The acceptance and usage of cryptocurrencies are nonetheless not high. Only 1.4% of the US population owned

EXHIBIT E

at least one cryptocurrency in 2019.³⁴ The fraction of crypto-owners experienced a positive trend since 2016 with a slight decline in 2019.

Figure 4: Cryptocurrency facts



Source: SCPC.

Note. Survey weights are included.

Since knowledge about cryptocurrencies is already pervasive, it is not likely that significant numbers of new investors will be won over to the asset class via the route of new people learning about the topic. Figure 5 shows the amount of new weekly Twitter followers of some of the major cryptocurrency exchanges, such as Binance or Coinbase. There was a significant increase of Twitter followers at the end of the first bitcoin rush.³⁵ By the end of 2020, cryptocurrency exchanges were gaining some new followers, but not as much as during the last quarter of 2017 or the first quarter of 2018. It is likely that once a person follows one of these accounts, she is much more likely to show interest in a cryptocurrency and to invest in the future. Shen et al. (2019) show that the number of tweets concerning bitcoin can predict the next day's trading volume and volatility.

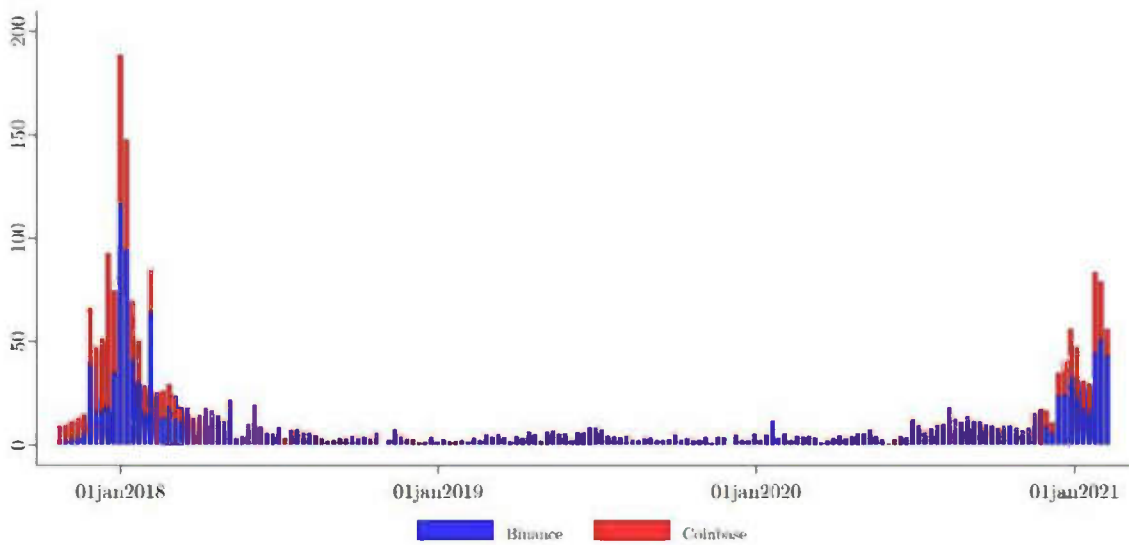
At the end of 2017, LendEDU launched two surveys³⁶ asking about bitcoin as an investment option. At the time, over 80% of respondents believed that bitcoin would be the largest cryptocurrency in terms of market capitalisation in five years (Figure 6a). Asked whether they would like to own bitcoin through futures contracts if that were possible, more than 40% of the respondents answered affirmatively, while

³⁴This percentage is in line with that of other countries. For instance, Stix (2019) shows that about 1.5% of Austrians own crypto-assets.

³⁵Note that it is possible to game this statistic by buying Twitter followers.

³⁶Both surveys were answered by the same people, i.e., 564 Americans. See Gitlen (2017) for further details about the methodology of the survey.

Figure 5: New Weekly Twitter Followers of Cryptocurrency Exchanges

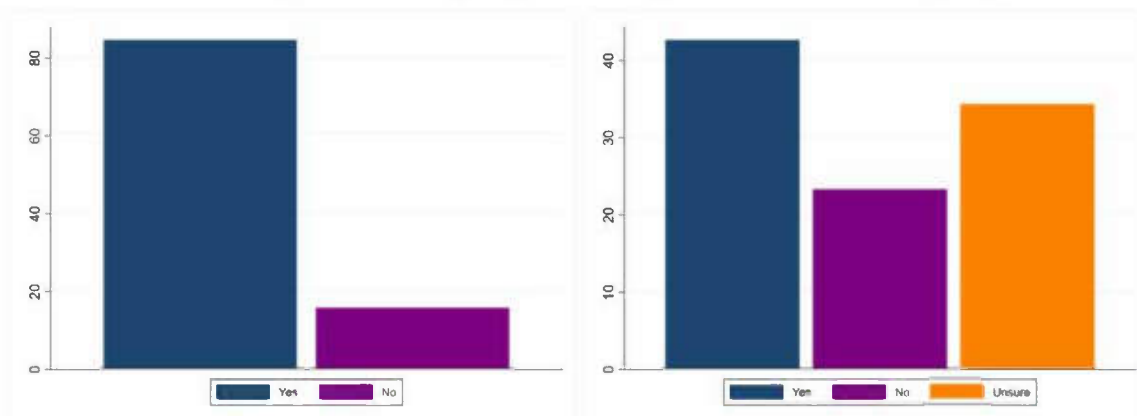


Source: Socialblade (retrieved from The Block).

around 34% were not sure (Figure 6b). As a result of the high volatility of bitcoin and other cryptocurrencies, the market for cryptocurrency futures contracts grew during 2020 as cryptocurrency investors started to make agreements to buy or sell a cryptocurrency at a later date for a fixed price. Concurrently, some regulatory agencies banned the sale of cryptocurrency derivatives and exchange-traded notes, arguing that these products pose harm and so are ill-suited for the average investor. The UK Financial Conduct Authority (FCA), for example, was the first agency to take such a step, banning the sale of cryptocurrency derivatives and exchange-traded notes.³⁷

Figure 6: Bitcoin’s prospects

(a) In 5 years, will Bitcoin be the largest crypto (b) If possible, would you rather own Bitcoin in terms of market capitalization? (in %). through futures contracts? (in %).



Source: Gitlen (2017).

Note: These questions belong to Part #2 of the survey conducted in November 2017, and correspond to questions 4 and 3, respectively.

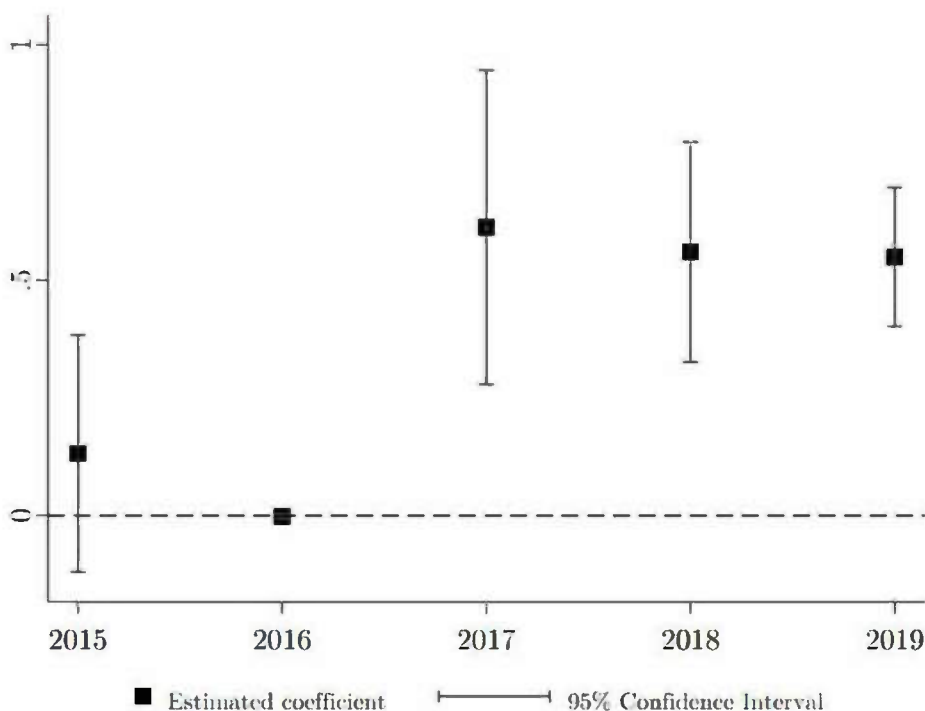
³⁷For further information, see FCA (2020).

5.2 Retaining existing investors

One of the main features of the cryptocurrency market is its volatility. The price of cryptocurrencies can rise and fall dramatically in the course of a single day. Recognising that the market is prone to such swings, as well as manipulation, the “holding strategy” has evolved. Hodling means to buy a cryptocurrency and hold onto it for a prolonged time without any selling or trading activity. But what is the probability of hodling in the population we examine? To answer this question, we compute the likelihood that an individual that has a cryptocurrency one year continues being an owner the following year.³⁸ To do so, we estimate Equation (1) maintaining just those individuals that are repeated each two years in the SCPC.³⁹

Figure 7 presents the estimated coefficients for the variable of owning at least one cryptocurrency in the previous year.⁴⁰ Five regressions are performed. Results are as follows. The likelihood of owning a cryptocurrency in 2015 and 2016 is not affected by owning a cryptocurrency in 2014 and 2015 respectively.

Figure 7: Estimated coefficients (LPM)



Source: Authors' elaboration.

Note: The regression of the 2014-2015 waves contains 900 repeated individuals. The 2015-2016, 2016-2017, 2017-2018 and 2018-2019 waves have 1013, 2575, 2526, 2652 repeated individuals respectively.

Notwithstanding, owning a cryptocurrency in 2016, 2017 and 2018 increases the probability, on average, of owning a cryptocurrency in 2017, 2018 and 2019 by 61,

³⁸This measure only captures one dimension of *hodling*. Investors might also increase or reduce the size of their position.

³⁹For instance, if an individual responded to the 2014 survey but did not answer the 2015 wave, this observation is deleted.

⁴⁰Figure H1 in the Appendix H shows the estimated coefficients and standard errors presented in Figure 7.

56 and 55 percentage points, respectively. In other words, those who invested in cryptocurrencies in the past are likely to remain invested.

If this finding – that *hodling* has become more pervasive, remains constant in years to come, it may indicate a certain stabilisation in cryptocurrency markets since investors may be using this asset as a store of value rather than a speculative asset. This confirms concurrent work in the field of computer science [Abramova et al. \(2021\)](#), which identifies that the population of cryptocurrency users has grown out of the original group of tech-savvy “cypherpunks” into a heterogeneous community of individuals, including both professional and amateur investors (called “hodlers” and “rookies”, respectively).

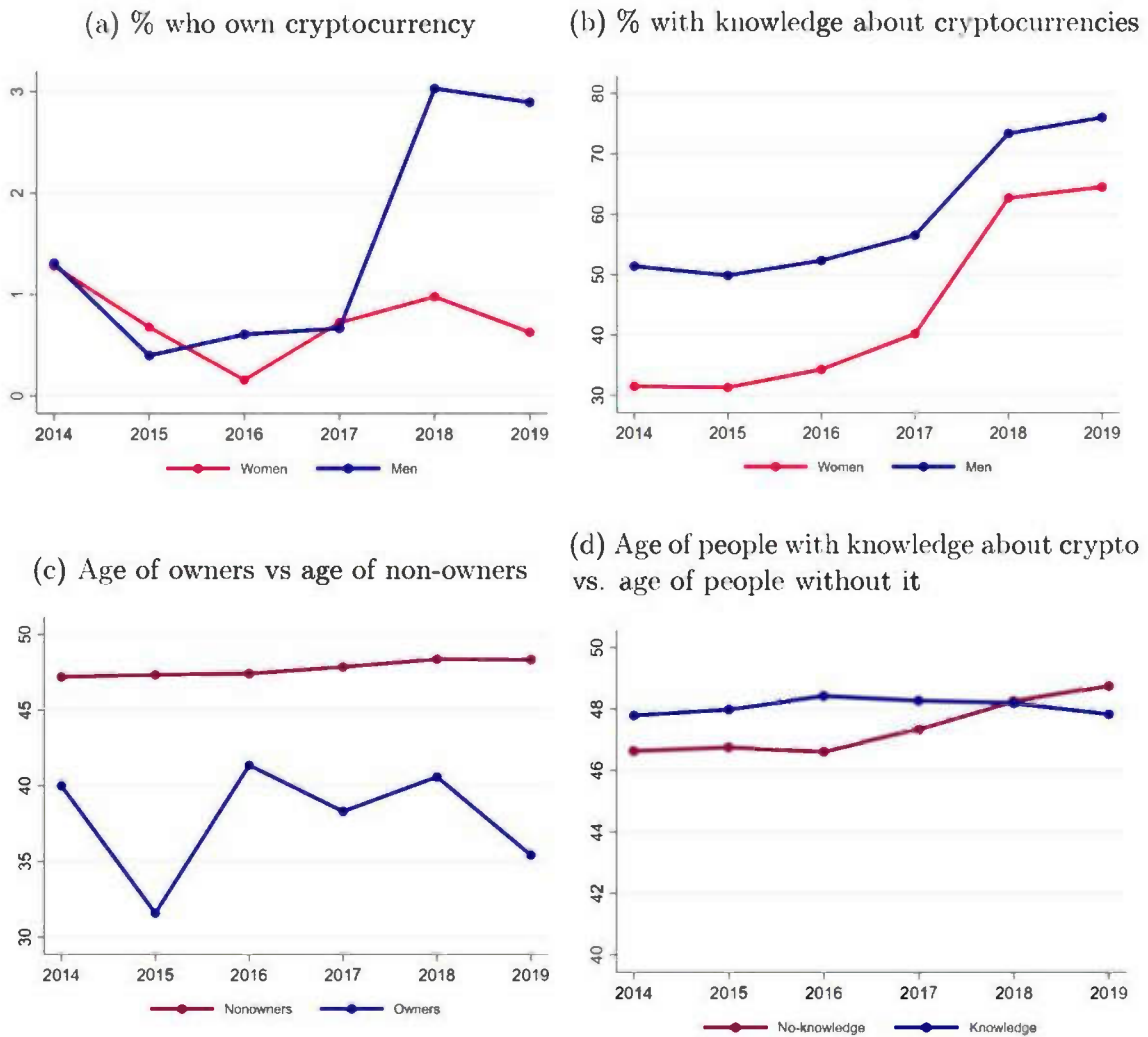
5.3 Trends in the gender and age gap

The impact of characteristics such as gender and age on cryptocurrency investments may be driven by preferences rather than differences in knowledge about the underlying technology. In terms of gender, the knowledge gap has decreased over time. In 2014 only 30% of women had knowledge of at least one cryptocurrency (the percentage was 50% for men), while in 2019 almost 65% of women (and 75% of men) recognised at least one cryptocurrency (Figure 8b). However, during that time, an ownership gap actually emerged, evidencing that preferences matter. As Figure 8a shows, whilst the percentage of male and female owners was pretty similar from 2014 to 2017, in 2018 a gender gap emerged.⁴¹

At the same time, Figure 8c presents the age profile of cryptocurrency users. Owners are younger, on average, than non-owners of cryptocurrencies. This has a strong effect on investment decisions. On the other hand, the age profile of those who recognise at least one cryptocurrency is similar to those who have not (Figure 8d). This evidences that differences in ownership across age are not driven by knowledge, but rather by preferences

⁴¹The gender gap is present not only in the cryptocurrency industry but also in the FinTech industry. [Chen et al. \(2021\)](#) find that only 21% of women use fintech products and services while 29% of men do.

Figure 8: Cryptocurrency trends (2014-19).



Source: 2019 SCPC.

Note. Survey weights are included.

6 Conclusion and policy implications

Providing an in-depth exploration of representative data on cryptocurrency owners, we disprove the hypothesis that cryptocurrencies are sought as an alternative to fiat currencies or regulated finance: compared with the general population, US cryptocurrency investors show no differences in their level of security concerns with either cash or commercial banking services.

We also examine the underlying socioeconomic correlates of cryptocurrency investing. We find that men tend to invest more in cryptocurrencies than women. Furthermore, higher levels of income and education, and having digital financial experience (captured through having a debit card and using a mobile app to pay for products and/or services) increase the likelihood of recognising at least one cryptocurrency.

We show that these patterns are driven by the impact of socioeconomic features on knowledge about cryptocurrencies, but also on investment decisions conditional on knowledge about this asset class. Among the various cryptocurrencies, owners of ether and xrp have the highest income and educational levels, while those owning litecoin are the least educated. Last, we document that owning a cryptocurrency increases the probability, on average, of owning a cryptocurrency in one's portfolio the following year by more than 50%.

Finally, we provide some evidence that the impact of gender and age on cryptocurrency investment is unrelated to differences in knowledge about the underlying technology. For example, while knowledge levels have converged over the sample we observe, a gender gap in terms of ownership has emerged.

From a policy perspective, the overall takeaway of our analysis is that as the objectives of investors are the same as those for other asset classes, so should be the regulation.⁴² Cryptocurrencies are not sought as an alternative to fiat currencies or regulated finance, but instead are a niche digital speculation object. A clarifying regulatory and supervisory framework for cryptocurrency markets may be beneficial for the industry. In fact, regulatory announcements have had a strong impact on cryptocurrency prices and transaction volumes (Auer and Claessens, 2019, 2020), and those pointing to the establishment of specific regulations tailored to cryptocurrencies and initial coin offerings are strongly correlated with relevant market gains.

Better regulation may also be beneficial – quintessential in fact – for the industry when it comes to the basic security model of many cryptocurrencies. This is so as the long-term viability of cryptocurrencies based on proof-of-work is questionable. Auer (2019a) shows that proof-of-work can only achieve payment security (i.e., finality) if the income of miners is high,⁴³ and it is questionable whether transaction fees will always be high enough to generate an adequate level of income to guarantee save transactions and rule out majority attacks. In the particular for the case of Bitcoin, the security of payments will decrease each time the “block subsidy” declines (Auer, 2020). Potential solutions⁴⁴ often involve some degree of institutionalisation, which in the long-run may require regulation or supervision.⁴⁵

In the light of these considerations, an important point regards how one could

⁴²Bouri et al. (2017) stress that although bitcoin was a poor hedge in the 2011-2015 period, it may be suitable for diversification purposes. In the same spirit, Corbet et al. (2018) find that cryptocurrencies may serve as diversification assets for investors in the short-term. Bonaparte (2021) argues that cryptocurrency investors consider cryptocurrencies as a portfolio diversification vehicle.

⁴³See also Chiu and Koepl (2017) and Budish (2018) for related arguments of the cost of decentralised trust, and Leshno and Strack (2020) for a generalization.

⁴⁴Hasu et al. (2019) and Moroz et al. (2020) propose protocol-level changes, among others by increasing miner income or implementing double-spend counter-attacks. Other important platforms in the crypto sphere have already moved or are planning to move to proof-of-stake (Kim, 2021). One of the drawbacks of proof-of-stake is however that so called “long-run” attacks may occur.

⁴⁵Also the enforcement of anti-money laundering and countering the financing of terrorism regulations are paramount for the industry (FATF, 2014, 2020).Coelho et al. (2021) map out regulatory approaches followed around the world in this respect.

apply technology-neutral regulation to this asset class, while at the same time harnessing the potential of the technology itself in the supervision process. In this regard, one promising option that supervisory and regulatory agencies could pursue is “embedded supervision” (Auer, 2019b). By this, we understand implementing a supervisory framework for cryptocurrencies that allows for compliance to be automatically monitored by reading the market’s ledger. The main aim is low-cost supervision of decentralised markets, which may be particularly relevant amidst recent deliberations of the need for adequate prudential oversight of the cryptocurrency industry (Basel Committee, 2019, 2021).

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Appendix

This Appendix provides additional explanations, tables and figures that are also discussed in the paper.

Appendix A. Social networks move markets

A rumour that professional money managers and some hedge funds were shorting GameStop's shares spread on the forum Reddit in the mid of January 2021. Boosted by comments on WallStreetBets, a subreddit page where users discuss stock trading, a large number of online traders – and some hedge funds⁴⁶ – started to buy shares and stock options, increasing the price of GameStop's shares. GameStop's market capitalisation increased to over \$22.6 billion from \$5 billion, with the stock opening on 27 January at \$354.83 a share. Many retail investors were using the American financial services firm Robinhood, which is used to trade stocks and exchange-traded funds through a mobile app. Robinhood, however, had to cease trading of GameStop's shares, as it was facing a \$3 billion security demand by its clearing house NSCC amid a massive spike of trading activity and heightened price volatility (Kelly et al., 2021).⁴⁷

⁴⁶Some hedge funds have made profits of more than \$700 million. See Chung (2021).

⁴⁷See Jasinski (2021) for further details about all of the factors that led to Robinhood having to cease trading GameStop shares.

Appendix B. Descriptive statistics

Table B1 presents the main descriptive statistics with weights. In the SCPC, respondents were assigned post-stratified survey weights designed to align as much as possible the composition of the SCPC sample with that of the Current Population Study (CPS) (Foster et al., 2020).

Table B1: Weighted Descriptive statistics

Variable	Mean	Std. Dev.	Min.	Max.
Main outcome variables				
Ownership	0.017	0.131	0	1
Ownership-number	0.04	0.356	0	7
Knowledge	0.709	0.454	0	1
Knowledge-number	1.327	1.382	0	8
Digitalisation variables				
Having a debit card	0.826	0.379	0	1
Mobile app for payments	0.301	0.459	0	1
Usage of PayPal	0.379	0.485	0	1
Secur. and conv. variables				
Convenience of cash	3.945	1.172	1	5
Security of cash	2.733	1.554	1	5
Conv. of bank acc. number paym.	3.213	1.198	1	5
Sec. of bank acc. number paym.	2.836	1.304	1	5
Conv. of on. bank. bill payments	3.909	1.084	1	5
Security of on. bank. bill paym.	3.244	1.214	1	5
Sociodemographic variables				
Income	11.386	4.083	1	16
Education	3.111	1.209	1	5
Married	0.666	0.472	0	1
Age	48.218	16.824	18	109
Retired	0.195	0.396	0	1
Male	0.482	0.5	0	1
White	0.732	0.443	0	1

The final sample includes 3235 observations. Ownership (knowledge) captures whether an individual owns (recognises or knows) at least one of the following cryptocurrencies: Bitcoin, xrp, litecoin, ether, bitcoin cash, stellar, eos, or any other different cryptocurrency. Ownership-number (knowledge-number) stands for the number of different cryptocurrencies that a person owns (recognises or knows).

Appendix C. Income and education

Table C1 shows the household income classification. Table C2 depicts the educational attainment classification. Education was divided into 16 categories in the 2018 and 2019 waves. However, since it was divided into just five categories in the 2014–17 waves, we reduced it to five.

Table C1: Household income classification

Category	Interval	Category	Interval
1	Less than 5,000.	9	30,000 to 34,999.
2	5,000 to 7,499.	10	35,000 to 39,999.
3	7,500 to 9,999.	11	40,000 to 49,999.
4	10,000 to 12,499.	12	50,000 to 59,999.
5	12,500 to 14,999.	13	60,000 to 74,999.
6	15,000 to 19,999.	14	75,000 to 99,999.
7	20,000 to 24,999.	15	100,000 to 149,999.
8	25,000 to 29,999.	16	150,000 or more.

Source: 2014-19 SCPC.

Table C2: Educational attainment classification

Category	Education level
1	12th grade (no diploma) or less.
2	High school graduate - high school diploma or the equivalent.
3	Some college but no degree.
4	Associate degree in college (occupational/vocational program or) academic program or bachelors degree.
5	Master's degree, professional school degree or Doctorate degree.

Source: 2014-19 SCPC.

Appendix D. Ownership conditioned on having a debit - credit card

The most common and accepted payment methods to buy cryptocurrencies include debit cards, credit cards and bank transfers. As the SCPC allows us to restrict the sample to those individuals that are (i) debit card adopters and (ii) credit card adopters, we replicate columns 4–9 of Table 3 to assess whether our results are robust.

As Table D1 shows, compared with the general public, cryptocurrency owners show no differences in their level of security concerns with either cash or commercial banking services. Cryptocurrency investors find cash and traditional banking services less convenient. These results are consistent with those presented in Table 3 although the coefficients of cash convenience and traditional banking payments convenience are higher in magnitude.

Table D1: Ownership conditional on being a debit/credit card adopter

	Cash		Trad. Banking		Online Banking	
	Conv.	Sec.	Conv.	Sec.	Conv.	Sec.
	(1)	(2)	(3)	(4)	(5)	(6)
Debit card adopter						
Owner.	-0.008*	-0.001	-0.010***	-0.003	-0.003	-0.001
	(0.005)	(0.003)	(0.004)	(0.004)	(0.005)	(0.005)
R^2	0.005	0.000	0.007	0.001	0.000	0.000
Credit card adopter						
Owner.	-0.009*	-0.002	-0.011***	-0.002	-0.004	-0.001
	(0.005)	(0.003)	(0.004)	(0.005)	(0.005)	(0.005)
R^2	0.005	0.001	0.008	0.000	0.001	0.000
Weights	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	2,636	2,636	2,636	2,636	2,636	2,636

Notes: ***, ** and * indicate 1%, 5% and 10% significance levels respectively. In parentheses are presented robust standard errors clustered by individual. Constant included but not reported. Owner. captures whether an individual owns at least one cryptocurrency. Trad. Banking: bank account number payments; Online Banking: online banking bill payments. Conv. and Sec. stand for convenience and security respectively.

Appendix E. LPM with income and education

Table E1 and E2 present the results of the LPM with both income and education included at the same time. If these results are compared with those in Tables 4 and 5, they do not differ.

Table E1: LPM (ownership) with income and education

	(1)	(2)	(3)	(4)
Digitalisation variables				
Debit card		0.009** (0.004)		0.009** (0.004)
Mobile app		0.024** (0.010)		0.023** (0.009)
PayPal		0.007 (0.008)		0.006 (0.008)
Convenience variables				
Cash			-0.005 (0.004)	-0.004 (0.004)
Trad. Banking			-0.006* (0.004)	-0.005* (0.004)
Online Banking			0.001 (0.004)	0.000 (0.004)
Security variables				
Cash			0.000 (0.003)	0.000 (0.003)
Trad. banking			0.001 (0.005)	0.001 (0.005)
Online Banking			-0.001 (0.005)	-0.002 (0.005)
Sociodemographic variables				
Education	0.008*** (0.003)	0.007** (0.003)	0.007** (0.003)	0.006* (0.003)
Income	0.000 (0.001)	-0.001 (0.001)	0.000 (0.001)	-0.000 (0.001)
Age	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.000** (0.000)
Married	0.014* (0.007)	0.014** (0.007)	0.012* (0.007)	0.013* (0.007)
Male	0.021*** (0.008)	0.022*** (0.008)	0.021*** (0.008)	0.021*** (0.008)
White	-0.000 (0.009)	0.000 (0.008)	-0.000 (0.009)	-0.000 (0.008)
Weights	Yes	Yes	Yes	Yes
R^2	0.015	0.029	0.023	0.034
Observations	3,235	3,235	3,235	3,235

Notes: ***, ** and * indicate 1%, 5% and 10% significance levels respectively. In parentheses are presented robust standard errors clustered by individual. Trad. Banking: bank account number payments. Online Banking: online banking bill payments.

Table E2: LPM (knowledge) with income and education

	(1)	(2)	(3)	(4)
Digitalisation variables				
Debit card		0.054*		0.053*
		(0.032)		(0.031)
Mobile app		0.080***		0.075***
		(0.025)		(0.024)
PayPal		0.077***		0.068***
		(0.022)		(0.021)
Convenience variables				
Cash			0.010	0.014
			(0.009)	(0.009)
Trad. Banking			-0.046***	-0.044***
			(0.009)	(0.009)
Online Banking			0.035***	0.029***
			(0.011)	(0.011)
Security variables				
Cash			-0.023***	-0.021***
			(0.007)	(0.007)
Trad. banking			-0.008	-0.005
			(0.010)	(0.010)
Online Banking			0.014	0.010
			(0.011)	(0.011)
Sociodemographic variables				
Education	0.082***	0.073***	0.075***	0.068***
	(0.011)	(0.011)	(0.011)	(0.011)
Income	0.019***	0.015***	0.018***	0.014***
	(0.003)	(0.003)	(0.003)	(0.003)
Age	-0.001	0.000	-0.000	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Married	-0.019	-0.018	-0.023	-0.021
	(0.024)	(0.024)	(0.024)	(0.023)
Male	0.107***	0.113***	0.108***	0.112***
	(0.022)	(0.022)	(0.022)	(0.021)
White	0.056**	0.055**	0.050*	0.049*
	(0.027)	(0.027)	(0.027)	(0.027)
Weights	Yes	Yes	Yes	Yes
R^2	0.130	0.147	0.153	0.167
Observations	3,235	3,235	3,235	3,235

Notes: ***, ** and * indicate 1%, 5% and 10% significance levels respectively. In parentheses are presented robust standard errors clustered by individual. Trad. Banking: bank account number payments. Online Banking: online banking bill payments.

Appendix F. Retired population

Table F1 estimates Equation (1). It reproduces Table 4 but instead of using the variable "age", it uses the variable "retired". "Retired" captures whether a person has withdrawn from active working life or not.

Results show that being retired reduces the likelihood of owning at least one cryptocurrency, on average, between 1 and 1.7 percentage points. The rest of the results are completely in line with those in Section 4.1.2.

Table F2 estimates Equation (1). As in the previous case, it reproduces Table 5 but instead of using the variable "age", it uses the variable "retired".

Results show that being retired does not affect the probability of recognising at least one cryptocurrency. The rest of the results are consistent with those presented in Section 4.1.3.

Appendix G. Logistic rare event regression.

Table G1 presents the outcomes of the logistic regression controlling for rare events à la King and Zeng (2001). The sign and significance of the main variables are completely consistent with those of the logistic regressions without applying the rare events correction.

Table F1: Owning at least one cryptocurrency

	(1)	(2)	(3)	(4)
Digitalisation variables				
Debit card		0.010** (0.004)		0.010** (0.004)
Mobile app		0.029*** (0.011)		0.027*** (0.010)
PayPal		0.009 (0.008)		0.008 (0.008)
Convenience variables				
Cash			-0.006 (0.004)	-0.005 (0.004)
Trad. Banking			-0.008** (0.004)	-0.006* (0.003)
Online Banking			0.002 (0.004)	0.001 (0.004)
Security variables				
Cash			-0.000 (0.003)	0.000 (0.003)
Trad. banking			0.000 (0.005)	0.001 (0.005)
Online Banking			-0.001 (0.005)	-0.002 (0.005)
Sociodemographic variables				
Income	0.001 (0.001)	0.000 (0.001)	0.001 (0.001)	0.000 (0.001)
Being retired	-0.018*** (0.004)	-0.010*** (0.003)	-0.015*** (0.004)	-0.008*** (0.003)
Married	0.011 (0.007)	0.012* (0.007)	0.010 (0.007)	0.011 (0.007)
Male	0.020*** (0.007)	0.022*** (0.007)	0.020*** (0.008)	0.021*** (0.008)
White	-0.002 (0.009)	-0.001 (0.009)	-0.002 (0.009)	-0.001 (0.009)
Weights	Yes	Yes	Yes	Yes
R^2	0.015	0.029	0.023	0.034
Observations	3,235	3,235	3,235	3,235

Notes: ***, ** and * indicate 1%, 5% and 10% significance levels respectively. In parentheses are presented robust standard errors clustered by individual. Trad. Banking: bank account number payments. Online Banking: online banking bill payments.

Table F2: Knowing at least one cryptocurrency

	(1)	(2)	(3)	(4)
Digitalisation variables				
Debit card		0.060*		0.058*
		(0.032)		(0.031)
Mobile app		0.100***		0.089***
		(0.024)		(0.023)
PayPal		0.099***		0.085***
		(0.022)		(0.021)
Convenience variables				
Cash			0.002	0.009
			(0.009)	(0.009)
Trad. Banking			-0.054***	-0.049***
			(0.009)	(0.009)
Online Banking			0.041***	0.033***
			(0.011)	(0.011)
Security variables				
Cash			-0.024***	-0.023***
			(0.007)	(0.007)
Trad. banking			-0.015	-0.011
			(0.010)	(0.010)
Online Banking			0.018	0.013
			(0.011)	(0.011)
Sociodemographic variables				
Income	0.031***	0.025***	0.028***	0.023***
	(0.003)	(0.003)	(0.003)	(0.003)
Being retired	0.009	0.045*	0.024	0.055**
	(0.026)	(0.026)	(0.025)	(0.026)
Married	-0.041	-0.035	-0.043*	-0.038
	(0.025)	(0.024)	(0.024)	(0.023)
Male	0.097***	0.105***	0.100***	0.106***
	(0.022)	(0.022)	(0.022)	(0.022)
White	0.037	0.037	0.032	0.031
	(0.028)	(0.027)	(0.027)	(0.026)
Weights	Yes	Yes	Yes	Yes
R^2	0.093	0.121	0.124	0.145
Observations	3,235	3,235	3,235	3,235

Notes: ***, ** and * indicate 1%, 5% and 10% significance levels respectively. In parentheses are presented robust standard errors clustered by individual. Trad. Banking: bank account number payments. Online Banking: online banking bill payments.

Table G1: Ownership - Logistic rare events regression

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Digitalisation variables								
Debit card			1.361*	1.079			1.376*	1.110
			(0.761)	(0.828)			(0.779)	(0.824)
Mobile app			1.409***	1.167***			1.262***	1.031**
			(0.424)	(0.439)			(0.401)	(0.402)
PayPal			0.489	0.549			0.524	0.567
			(0.444)	(0.427)			(0.471)	(0.460)
Convenience variables								
Cash					-0.319*	-0.284	-0.220	-0.198
					(0.178)	(0.187)	(0.170)	(0.173)
Trad. Banking					-	-	-	-0.351
					0.449**	0.396**	0.401**	
					(0.188)	(0.201)	(0.194)	(0.217)
Online Banking					0.089	0.099	0.008	0.009
					(0.192)	(0.189)	(0.189)	(0.193)
Security variables								
Cash					-0.049	-0.024	-0.040	-0.034
					(0.153)	(0.154)	(0.146)	(0.146)
Trad. banking					0.081	0.055	0.082	0.063
					(0.260)	(0.239)	(0.236)	(0.226)
Online Banking					-0.139	-0.111	-0.129	-0.092
					(0.266)	(0.256)	(0.251)	(0.239)
Sociodemographic variables								
Educ.	0.584***		0.375*		0.516**		0.330*	
	(0.195)		(0.202)		(0.204)		(0.208)	
Income		0.134		0.068		0.144*		0.087
		(0.093)		(0.095)		(0.087)		(0.085)
Age		-		-		-		-
		0.079***		0.064***		0.070***		0.056***
		(0.020)		(0.021)		(0.020)		(0.021)
Married	1.106*	1.397*	1.153*	1.438**	1.149	1.316*	1.182*	1.366**
	(0.669)	(0.736)	(0.658)	(0.698)	(0.707)	(0.732)	(0.684)	(0.686)
Male	1.455***	1.486***	1.491***	1.531***	1.493***	1.459***	1.478***	1.466***
	(0.539)	(0.549)	(0.523)	(0.537)	(0.503)	(0.520)	(0.481)	(0.495)
White	-0.047	-0.221	0.028	-0.180	-0.028	-0.188	0.018	-0.148
	(0.553)	(0.561)	(0.552)	(0.554)	(0.535)	(0.536)	(0.534)	(0.547)
Weights	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: ***, ** and * indicate 1%, 5% and 10% significance levels respectively. In parentheses are presented robust standard errors clustered by individual. Constant included but not reported. Trad. Banking: bank account number payments. Online Banking: online banking bill payments.

Appendix H. Owners over time

Table H1 shows the estimated coefficients and standard errors presented in Figure 7.

Table H1: Owners over time

	2015	2016	2017	2018	2019
Estimated coefficient	0.132 (0.128)	-0.002 (0.003)	0.612*** (0.170)	0.556*** (0.119)	0.549*** (0.075)
R^2	0.039	0.014	0.169	0.142	0.418
Observations	900	1,013	2,575	2,526	2,652

Notes: ***, ** and * indicate 1%, 5% and 10% significance levels respectively. In parentheses are presented robust standard errors clustered by individual.

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Digital Assets, Distributed Ledger Technology and the Future of Capital Markets

INSIGHT REPORT
MAY 2021

Contents

3	Foreword
4	Context
5	Introduction
7	Key insights
14	1. Background
15	Business and technology developments in capital markets
17	Overview of DLT in the capital markets context
24	Timeline of major technical, regulatory and business developments
26	2. DLT and digital assets in capital markets
27	Spectrum of future scenarios
28	DLT-related considerations for different capital markets actors
29	Framework for different approaches to DLT solutions
32	3. Use case analysis by asset class/product line
35	Equity markets
46	Debt markets
56	Securitized products
64	Derivatives
72	Securities financing
79	Asset management/fund administration
84	Enablement use cases
87	Conclusion
91	Contributors
94	Acknowledgements
96	Endnotes

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Foreword

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In recent years, the financial institutions comprising the capital markets have begun to approach digital transformation with a level of urgency previously seen only in consumer-facing financial services. The need to improve client service delivery, achieve greater efficiency and enable new services (e.g. through monetization of data) have converged on imperatives for all capital markets executives to explore how technology should be used to redesign product offerings and operations.

At the same time, distributed ledger technology (DLT), of which blockchain is the most widely known example, has gone through several pendulum swings in terms of industry and public interest. Depending on one's perspective, this technology could disintermediate the capital markets as we know them, radically simplify operations for leading capital markets players, help expand access to markets for small businesses and retail investors or fade into irrelevance.

Since the World Economic Forum published *The Future of Financial Infrastructure* in 2016, we have seen relatively little of the blockchain-enabled transformation explored in the report. Yet we are potentially approaching an inflection point, with meaningful DLT use cases going live and many institutions acknowledging that this technology will likely play some role in the future of capital markets. This report explores the various ways in which this technology is starting to be used, as well as the challenges involved in attempting industry-wide transformation.

Consistent with the World Economic Forum's multistakeholder approach, the insights presented here are based on dialogues and interviews with expert practitioners from across the capital markets ecosystem. We thank all who participated in this initiative and shaped our understanding of this space.

Context

Distributed ledger technology (DLT)* has existed for more than a decade. For nearly as long, advocates have argued either that this technology could be used by financial institutions to radically simplify operations or that its decentralized capabilities would enable an entirely new financial system, wherein capital could flow without traditional intermediaries. DLT's detractors – perhaps just as numerous – have pointed out challenges in both of these visions, stemming from the potential costs of transformation, the capital markets' reliance on relationships of trust and the existence of other technologies that might be better suited for certain uses. In this context, firms have invested heavily in DLT efforts, with a wide range of strategic motivations.

Over the past two to three years, several regulators have expressed greater comfort with this technology, and some DLT-enabled products and services have moved from exploration and experimentation to commercialization. It has become clear that, at a market-wide level, DLT offers the potential for significant transformation. This report explores what has been learned from these efforts. While ultimately neutral as to what the capital markets of the future will look like – and what role or roles will be played by DLT – it aims to provide capital markets executives and regulators with the strategic insights needed to understand the current state of use-case developments and potential future scenarios.

*This paper uses the term "DLT" to refer to distributed ledger technology and blockchain.

What use cases have been developed across asset classes, and how are they being adopted?

Which DLT use cases are gaining traction, in which jurisdictions and why?

What are the impediments to adoption, and what has been learned as a result?

How are industry dynamics – collaboration and competition – shaping adoption and demand?

Introduction

Over the past year, financial services and technology experts were engaged in a series of global workshops and expert interviews

Global workshops*

Eight workshops were conducted over the course of 2020 – all virtually. These brought together executives from banks, asset managers, exchanges and infrastructure providers, financial technology companies and regulators for a series of interactive discussions. Three workshops were focused on developments from a regional perspective (North America, Europe and Asia-Pacific), while five were focused on emerging uses of DLT within specific asset classes or product lines (equities, debt, securitized products, derivatives and securities financing, and asset management).

Expert interviews*

In-depth interviews were conducted with almost 200 executives from leading financial services and financial technology firms, as well as with experts from outside the industry.

Survey*

More than 60 firms participated in an anonymized survey focused on details of DLT use cases that their firms are developing. While not a scientific sampling, this survey enabled the team to effectively map out where DLT experiments are being conducted within the capital markets.



The inclusion of company case studies within this report does not reflect an endorsement of the company or its products and services by the World Economic Forum.

*Please see Acknowledgements for a list of individuals who participated in workshops and interviews.

INTRODUCTION

This report will provide executives, regulators and policy-makers with insights on the emerging uses of DLT in capital markets

This report will...

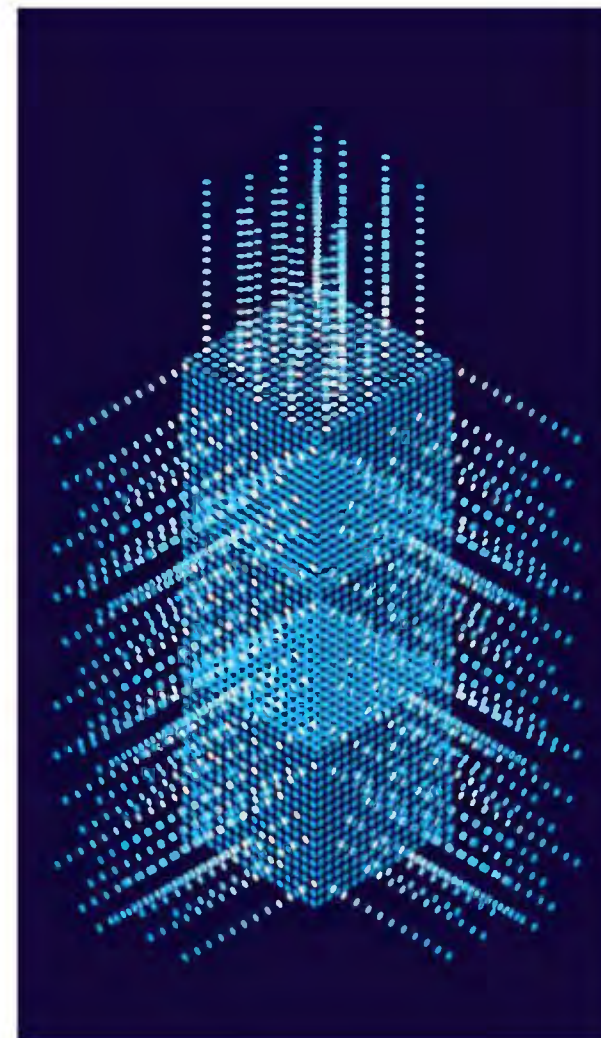
- Explore many of the ways in which capital markets institutions and technology firms are experimenting with or building products enabled by distributed ledger technology
- Illustrate how individual DLT use cases may address challenges or inefficiencies in specific markets
- Share insights from relevant experts on potential paths forward, challenges or enablers for these use cases
- Highlight examples of firms bringing specific use cases to market, with summary details on each

This report will not...

- Focus on DLT-related use cases outside the capital markets, including payments, digital currencies, lending, working capital solutions and trade finance (except as they relate to specific capital markets use cases)
- Explore cryptocurrencies, non-fungible tokens (NFTs) or decentralized finance (DeFi) applications
- Provide detailed technical explanations of financial, operational or technological dimensions of use cases
- Evaluate use cases or make recommendations on strategies that individual institutions should pursue

This report seeks to help...

- Strategic decision-makers at financial institutions to understand the potential roles DLT is beginning to play in the capital markets, critically assess different use cases and explore how their institution might operate within different future state visions
- Regulators and policy-makers to understand how financial institutions in different jurisdictions are adopting DLT-enabled solutions so that they may craft responses that appropriately balance innovation and market safeguards



Key insights

DLT is beginning to reshape capital markets, but the future is uncertain

1

Market forces, supported by regulatory and technical developments, are pushing participants in capital markets to **digitize and consider the use of distributed ledger technology (DLT)**. Key trends include growing institutional and regulatory comfort with blockchain technology, the potential for central bank digital currencies (CBDCs) in several jurisdictions, and commercial dynamics, such as cost pressures and client service expectations.

2

The underlying challenges that DLT is trying to solve in capital markets are **real and substantial**. Inefficiencies vary by asset class and jurisdiction, but legacy processes and technology systems have created complexity, opacity and fragmentation across markets, which likely has a meaningful impact on costs, market liquidity and firms' balance sheet capacity. While DLT is not necessarily the optimal technology option for every proposed use case, **experiments are proving its viability in addressing significant operational inefficiencies and increasingly improving balance sheet management.**

3

After years of experimentation, many **DLT and smart contract use cases in capital markets are live** across jurisdictions. Market participants are launching solutions designed to improve existing processes for defined ecosystems in numerous asset classes and in some cases are reimagining value chains as we know them today. **However, grand visions of disintermediation or total digital transformation at scale are still far from being realized.**

4

While most emerging DLT use cases are being developed collaboratively, **there is no industry-wide vision of the future in most jurisdictions** – due in part to substantial competing incentives and the risk of value migration across market participants – potentially limiting the ability to scale up many solutions.

5

While greater digitization is inevitable, **substantial headwinds may continue to limit adoption** of DLT solutions, including limited leadership buy-in and uncertain business cases, the need for significant restructuring of business operations, challenges relating to bridging legacy systems with new solutions, and perceptions about regulatory uncertainty.

KEY INSIGHTS

1. Significant tailwinds may support adoption of DLT solutions in capital markets

Mutually reinforcing developments supporting financial institutions' exploration of DLT...

...are intersecting with broad capital market trends

Market developments	Policy developments	Technical developments
Growing retail and institutional investor interest in digital assets, most notably cryptocurrencies	Growing regulatory comfort with DLT across several jurisdictions	Technical advancements in DLT/blockchain: growing maturity, platform consolidation and improvements in interoperability
Developments in adjacent markets, including stablecoins and DLT-based trade finance and payment solutions	Serious exploration of CBDCs in numerous jurisdictions, including some based on DLT	Institutional-grade infrastructure in digital asset markets

- Increased competition, including the rise of digital disrupters challenging the roles of traditional intermediaries and service providers
- Emergence of a bifurcated client service model, with a focus on digitization and simplification for all client types
- Balance sheet capacity continuing to be a major constraint
- Acceleration of digital adoption due to COVID-19 pandemic
- Sustained cost pressures across the value chain

Across the capital markets ecosystem, broad trends are accelerating the digital push

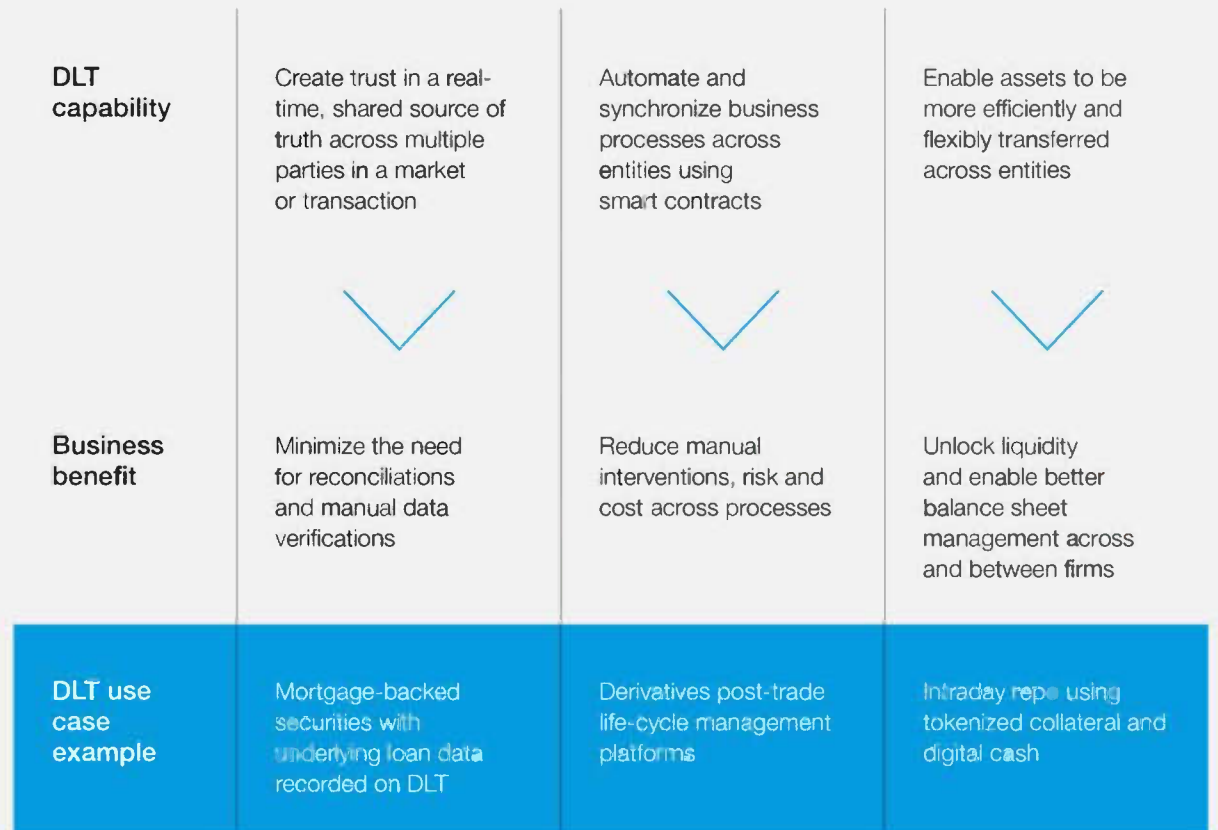
KEY INSIGHTS

2. DLT may be able to address significant challenges across the capital markets

The scale and nature of inefficiencies varies across markets, but legacy structures tend to:

- Require firms to independently maintain siloed records of transactions, securities and other data, with each institution independently processing events and subsequently reconciling records. This adds complexity to operations, increases the risk of error, limits the ability to automate processes and likely adds costs across the capital markets ecosystem
- Limit the flexibility of transaction windows and time frames in order to accommodate the need for sequential processing and verification. While many highlight the costs of liquidity needed to fund multi-day trade settlement cycles, this dynamic also limits the ability to optimize balance sheets, as firms are unable to rapidly move securities and cash to address funding and liquidity needs and availability

DLT is proving well-suited for addressing operational inefficiencies, and is increasingly demonstrating the possibility of better resource management across firms and markets:

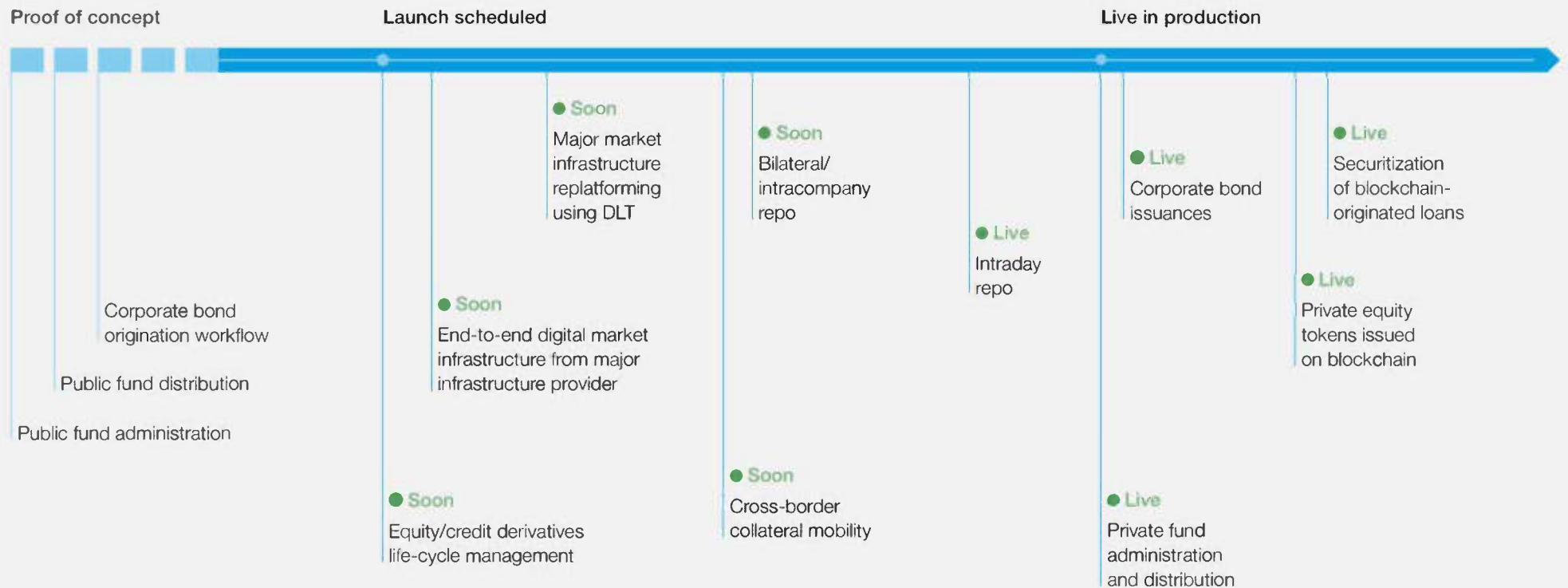


KEY INSIGHTS

3. DLT applications are going live across the capital markets

After years of experimentation, financial institutions and technology providers have begun to launch DLT-based products and projects. While capital markets are not necessarily moving inexorably towards a global, fully digitized, DLT-based utopia as many predicted, DLT-enabled use cases are becoming a reality across a range of asset classes, business cases and ecosystems.

Examples of use cases gaining traction (as of April 2021)



4. Strategic considerations are driving divergent visions of the future

Institutions are deciding where to invest across a range of strategic choices, including:

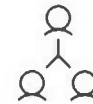
Digital product strategy

1. **Market selection:** focus on developing solutions for individual asset classes or develop an asset-class agnostic infrastructure solution
2. **Value chain breadth:** focus on addressing challenges in one slice of the value chain or build an end-to-end solution
3. **Degree of change:** attempt to improve existing processes or fundamentally disrupt the market as it exists today
4. **Technology fit:** identify whether DLT is the most appropriate technology for a specific set of challenges and how it will be used

Go-to-market strategy

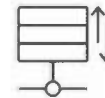
1. **Commercial and technical approach:** attempt to build a new ecosystem, work with an existing set of partners or another approach
2. **Transformation management:** determine whether to build a new system and migrate all participants or build and operate in parallel
3. **Interoperability:** determine whether and how solutions will integrate with other platforms and systems, technically and commercially

But as different players embark on varying strategies, these choices are creating tensions:



Redistribution of value pools and the “collaboration paradox”

DLT-enabled transformation could make the industry more efficient, but it would likely shift value pools among both incumbent firms and new entrants. Given the potential for new business opportunities and the possible disintermediation of some existing roles – a conceivable reality as regulations adapt to DLT – firms may be increasingly reluctant to participate in collaborative initiatives. Without collaboration, however, ecosystem-wide value will be difficult to achieve.



A complex patchwork of initiatives, spanning different institutions, business lines and geographies, limiting the ability to reach scale

Since many DLT-based initiatives would independently require a substantial level of transformation, institutions' focus on a limited set of initiatives or consortia – which makes sense from the perspective of any individual firm – can prevent the cross-institution alignment needed for many use cases. Similarly, while regulations can help define the guardrails for innovation, in some cases, vastly different regulatory frameworks have led to very different technology needs in different markets.



Short-term vs. long-term strategies

While achieving short-term objectives will build comfort with the technology, it may, counter-intuitively, inhibit the appetite for large-scale transformation. Given the long pathway to transforming entire markets, lack of buy-in for long-term solutions may limit the upfront investment needed.

5. Challenges to DLT adoption remain substantial



Business case and leadership buy-in

Many DLT projects are focused on achieving a long-term (i.e. five-plus years) value proposition but require substantial upfront investment and industry-wide transformation in the short term. Where the business case is long-term, projects must be championed by leaders with the authority to influence industry-wide alignment in order to move forward. Where the business case is unclear or the technology is not necessarily fit-for-purpose, leaders should consider whether these projects are diverting energy from other worthwhile digitization efforts.



Bridging the old with the new

Maintaining legacy systems while building and scaling new solutions is likely to be costly and complex. While common technical and financial standards are essential for many DLT use cases, they may also prove essential for enabling interoperability between legacy systems and DLT-based solutions. Nevertheless, institutions and markets attempting parallel (DLT and legacy) infrastructures will have to effectively manage costs and risks.



“Chicken and egg” dilemmas

For most use cases, achieving scale may be more challenging than reaching production. Except for completely internal systems, all use cases will require a “minimum-viable ecosystem” of participants (e.g. at least one of each of the relevant parties for a certain type of transaction). However, some DLT solutions will create new markets that will exist in parallel to traditional markets. With neither an active investor base nor an active issuer base, these parallel markets may not have a clear path to liquidity, thereby limiting the willingness of investors to participate or issuers to issue in these markets.



Coordination challenges combined with limited risk appetites

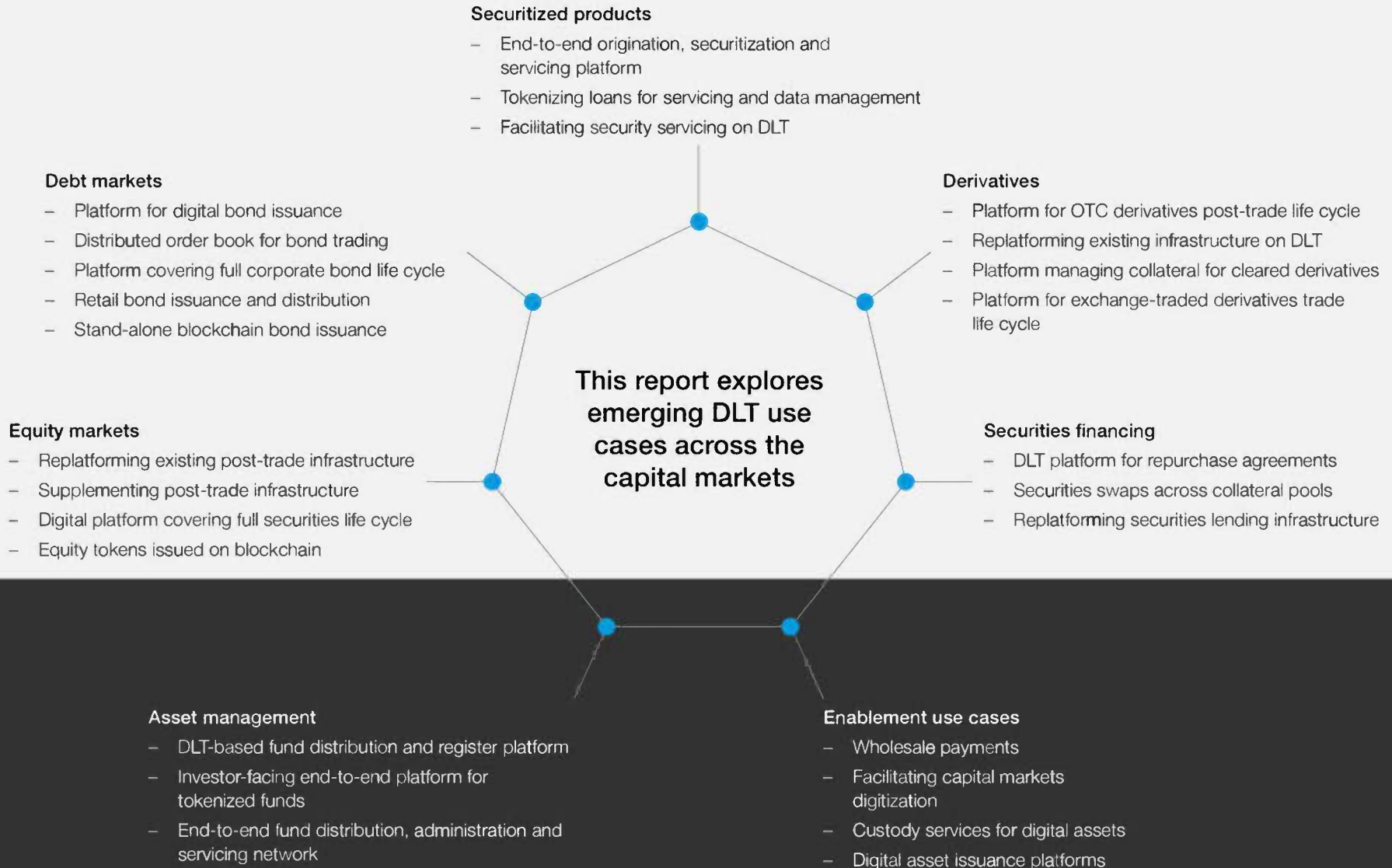
In many cases, realizing the anticipated benefits of DLT will require significant restructuring of roles, processes and operations, potentially introducing new risks as markets adjust. While industry consortia have tackled large-scale challenges and transformations before, the appetite for system-wide change remains limited without a “burning platform” for change.



Regulatory and legal uncertainty

Without a clear playbook for regulatory compliance and generally agreed-upon principles for the legal standing of DLT-enabled transactions and securities, market participants are unlikely to make the substantial investments required to fundamentally change processes. Further, regulation varies across jurisdictions, complicating global solutions. While many regulators have expressed openness to DLT-based innovation, a perception remains that the future path is unclear, particularly as most new entrants have not yet faced prudential regulation.

Summary



1 Background

- Business and technology developments in capital markets
- Overview of DLT in the capital markets context
- Timeline of major technical, regulatory and business developments

Across the capital markets ecosystem, institutions are facing a combination of new market dynamics and technology advancements, presenting opportunities and challenges...

Key business developments	Broad technology implications	DLT implications	Likely impact on DLT interest			
			Immaterial	Significant		
1 Acceleration of digital transformation, especially following COVID-19: once-emerging technologies continue to gain scale, and client demand for digital assets grows	Increasing experience with artificial intelligence, machine learning, cloud and DLT solutions	Increasing comfort with DLT; potential for increased interest in solutions that benefit from multiplicative effect of DLT with other technologies	●	●	●	●
2 Bifurcated client service model: transition to a low-touch digital service model for certain clients and transactions	Increasing need for digital self-service client solutions, as well as digital enablement solutions to support teams servicing high-touch clients	DLT and smart contracts can facilitate solutions offering greater automation, with potential for integration with self-service solutions	●	●	●	●
3 Sustainable finance as a source of growth: demand for products that meet clients' sustainability objectives	Increasing need for solutions that capture sustainability impact	Potential demand for DLT-enabled solutions for measuring, reporting and transacting with sustainability-related data, potentially linked to financial instruments	●	●	●	●
4 Consolidation of trading venues: emergence of a small set of trading venues that will attract the bulk of liquidity in certain markets	Potential for more electronic trading and greater standardization in more concentrated markets	More consistent and scalable digital processes and convergence of market-wide standards could be a tailwind for DLT implementations, but DLT use could actually stimulate more trading venues	●	●	●	●
5 Monetization of data: insights from trade, position and client data to power customized offerings	Increasing need for effective data capture and analytic solutions (e.g. machine learning)	DLT solutions may offer better data quality and data accessibility than existing systems	●	●	●	●

...while margin pressures are forcing all players to identify meaningful cost savings and sustainable sources of revenue growth

	Key business developments	Broad technology implications	DLT implications	Likely impact on DLT interest			
				Immaterial	Significant		
6	Sustained cost pressures across the value chain: continued need to realize meaningful efficiencies via operating model transformations and infrastructure redesigns	Increased investment in modernizing technologies, with growing demand for solutions that unlock step-change cost reductions	DLT-enabled automation and operational transformation could unlock significant cost efficiencies, but the scale of investment might be prohibitive for some	●	●	●	●
7	Scale continues to be a key competitive advantage: subscale players will exit or transition to “white-labelled” products	Consolidation of tech solutions and providers where critical mass takes hold	Increasing returns for the DLT solutions that gain scale and magnify competitive advantage (i.e. first-mover advantage with network effects)	●	●	●	●
8	Balance sheet capacity continues to be a constraint: financial resources continue to be judiciously allocated to clients, business lines and products	Increased interest in tech solutions that facilitate better capital/liquidity management	Increased demand for DLT-based solutions that offer meaningful improvements to balance sheet management, with potential for interest in new models for custody	●	●	●	●
9	Increased focus on core competencies: non-core functions that are not a source of competitive differentiation will continue to be transitioned to industry utilities or external service providers	Service providers become tech leaders, offering cost and quality advantages via their solutions	Increased comfort with DLT solutions that power non-core functionality, with growing competition among service providers	●	●	●	●
10	Increased competition: the competitive landscape is intensifying among both traditional players and new entrants, with continued value migration across the sell-side, buy-side and service and infrastructure providers	Firms will continue to seek to differentiate with technology, both as a vehicle for cost savings and improved client experience	Increased demand for DLT solutions with clear and differentiated client benefits or that enable step-change cost savings	●	●	●	●

What is distributed ledger technology?

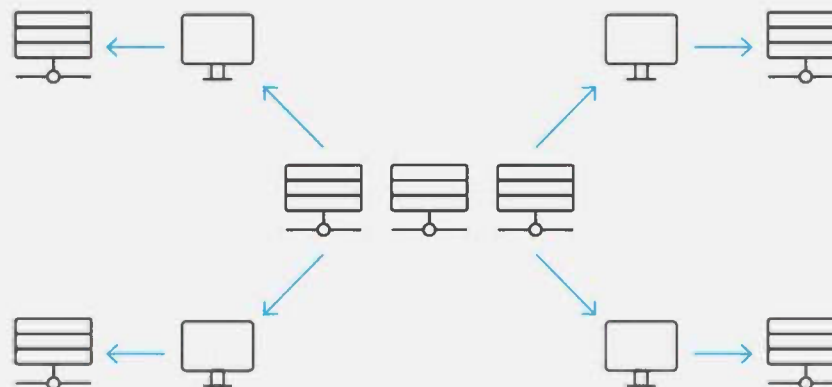
DLT is an immutable distributed database that governs the flow of data between decentralized participants.

By ensuring data is consistent, accurate and up-to-date, DLT/blockchain aims to enhance trust among all participants.¹

The technology is built on a foundation of four key elements:²

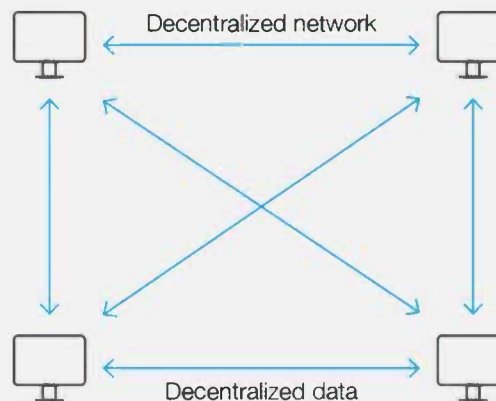
1. **Distributed ledger and peer-to-peer network:** data representing assets or transactions is replicated across each node on the network, ensuring resiliency and transparency
2. **Digital signatures and hash functions:** strong encryption and anti-tampering measures guard against data being retroactively altered
3. **Consensus algorithms:** a consensus mechanism authenticates the underlying data to ensure that all participants have the same view of the data, potentially eliminating the need for trusted intermediaries in a transaction
4. **Smart contracts:** machine-executable code is automatically triggered to enforce contractual obligations under predefined circumstances

Today Centralized intermediaries and separate databases



- Siloed participants interact via a central authority
- Central authority can be a single point of failure, limiting resilience
- Centralized maintenance and administration

DLT Distributed, synchronized ledger



- All parties interact directly and access the same, synchronized information (with permissions)
- Highly resilient (e.g. no single point of failure, and numerous redundant data stores with continuous syncing)

DLT’s unique technical properties could provide material benefits to capital markets

DLT offers the potential for mutualized infrastructure for efficiently managing shared data and workflows, based on three interrelated technical capabilities:

Trusted sharable data

Multiple parties have identical, immutable and perpetually synchronized “copies” of a shared ledger, eliminating the need for each party to maintain its own data silo.



Data consensus eliminates manual reconciliations, minimizes disputes and increases data sharing, accuracy and transparency across the ecosystem

Tokenization

Financial instruments are established as a digital token, with the token serving as either a representation of the asset or as the asset itself. Custody of the token’s cryptographic key confers ownership similar to the custody of a physical bearer stock certificate.



Tokenization benefits include:

- Faster and lower-cost asset transfers
- Fractionalized securities
- Increased liquidity for niche markets

Smart contracts

Smart contracts define market rules, terms of an individual security and/or rules for shared business processes, creating the possibility for seamless, automated execution of operations among multiple parties without manual intervention.



Smart contracts enable fast and reliable zero-touch processing, reducing costs and risk in transaction settlement, asset servicing and compliance

Reduced costs through automation and elimination of redundant activities

Balance sheet optimization through faster and more efficient capital and liquidity deployments

Reduced complexity, risk and cost through removing counterparty credit risk in settlement

Newer DLT platforms have addressed concerns about scaling and environmental impact

Bitcoin, the earliest and most notable DLT platform, can process only a few transactions per second, while transaction confirmations can lag by 10+ minutes.³ Bitcoin’s “proof of work” consensus algorithm requires highly energy-intensive mining. By some estimates, Bitcoin mining globally consumes more electricity than the entire country of Argentina.⁴

In contrast, modern DLT platforms, which typically rely on alternative consensus algorithms such as “proof of stake”, are orders of magnitude more energy efficient, while also demonstrating far better performance. A 2018 study conducted by the Depository Trust and Clearing Corporation, R3 and Digital Asset showed that Corda could sustain throughput of 6,300 trades per second.⁵ In addition to using more energy-efficient consensus algorithms, most enterprise DLT use cases in the capital markets also use private and/or permissioned ledgers, which consume far less energy than public ledgers.⁶

Is DLT necessary to achieve business outcomes?

Key conditions that favour DLT

- **Multiple parties requiring trustful interactions**
There must be multiple parties that wish to interact via well-understood and shared business processes with pre-agreed workflows, rules and exceptions. Similarly, these parties need to rely on a trusted data source to facilitate their interactions.
- **Multiple parties require a shared understanding**
There must be substantial value in a single shared version of truth that enables greater transparency, efficiency or ease of transaction.
- **Challenges with central intermediary**
Markets with no central intermediary – or where reliance on an intermediary presents challenges (e.g. excessive cost or intermediary does not obviate need for verifying data) – stand to benefit more from DLT.

While other technologies enable secure data sharing, cryptography can ensure trust in shared data

As data moves through APIs, institutional boundaries and the patchwork of systems that comprise a typical value chain, there are many factors that can cause data to become out of sync (e.g. translation errors, propagation delays, conflicting updates). Even when there is no data disagreement at the business process level, these small data variations put substantial pressure on reconciliation processes, which remain both labour-intensive and costly, to detect and fix data issues both internally and between institutions.

DLT seeks to obviate reconciliations by using cryptography to ensure that data, once written, can never be altered. This golden data source is propagated to all authorized parties in real time so they can automatically audit the complete data lineage to ensure that it hasn't been altered – thereby ensuring that both parties' data remain in-sync, with verifiable proof that their records are accurate and complete.

Can smart contracts achieve the desired outcomes – synchronized, automated workflows – without a distributed ledger?

Increasingly, some firms are developing smart contract solutions that do not necessarily run on a distributed ledger.⁷ Smart contract languages have been designed to empower domain experts to create inter-company applications that enforce strict data governance and complex workflows, without transforming the underlying database technology. Without a DLT, data integrity would need to be provided by a trusted central intermediary. In these solutions, smart contracts could enable straight-through processing across firms by orchestrating multiparty workflows, enforcing rights and obligations of the involved parties and ensuring the appropriate level of data privacy. In principle, these smart contracts could eventually be migrated to a DLT-based platform with little effort.⁸

PROJECT SPOTLIGHT

HKEX **DTCC**
香港交易所 **Digital Asset**

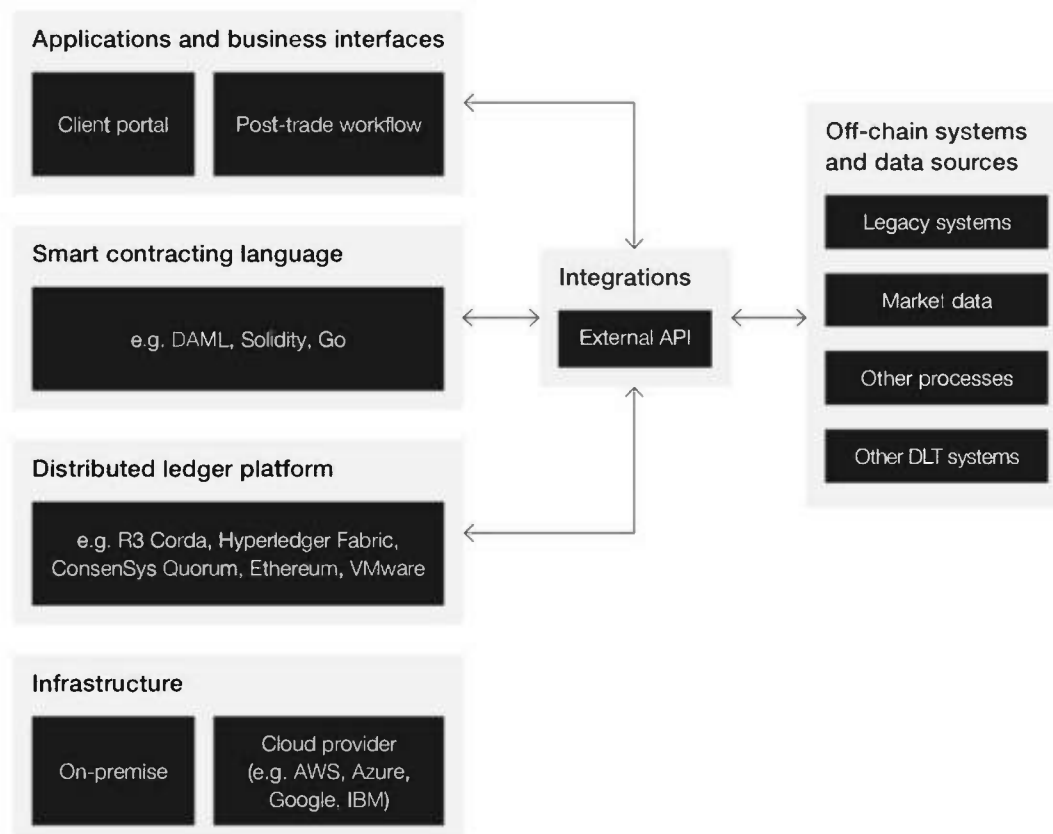
HKEX Synapse

HKEX is currently developing a solution that enables participants in the Northbound Stock Connect programme to meet the shorter equities settlement window of Mainland China ([see slide 42 for details](#)). Rather than building a new settlement infrastructure based on a distributed ledger, this tool will use smart contracts on top of the existing centralized infrastructure to synchronize the workflow among parties.⁹

Technology stack and technology choices

While some technology choices have limited implications for underlying business considerations, other choices may have a direct impact on the features and functionalities of business applications

Illustrative technology stack for a DLT-based application



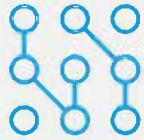
Degree of system centralization

Distributed ledgers can have controls over who can view, use and validate transactions on the ledger. Unsurprisingly, most capital markets participants are developing applications on permissioned, private, hierarchical ledgers. Some argue that this may limit the benefits of the technology, but others contend that this construct allows for the level of trust and control needed in capital markets, while still enabling data to be shared and processes mutualized.

Updating the ledger	Permissionless	Anyone can validate transaction on the ledger
	Permissioned	Only trusted parties can validate transactions on the ledger
Access to use the ledger	Public	Anyone can read and initiate transactions on the ledger
	Private	Only trusted parties can read and initiate transactions on the ledger
Access to view the ledger	Non-hierarchical	Everyone can hold a full copy of the ledger and can read all of the information on the ledger
	Hierarchical	Only some parties can hold a full copy of the ledger or read all of the information on the ledger. Some parties may have view-only permission for specific data

Source: Adapted from BIS, "On the Future of Securities Settlement", 1 March 2020: <https://www.bis.org/publ/qrpdf/qf2003i.htm> (link as of 8/4/21), based on Reserve Bank of New Zealand, "Decrypting the Role of Distributed Ledger Technology in Payments Processes", 28 May 2018: <https://www.rbnz.govt.nz/research-and-publications/reserve-bank-bulletin/2018/rbb2018-81-05> (link as of 8/4/21).

While DLT promises many benefits, it is a fundamentally new technology, with a range of risks that must be understood and addressed¹⁰



Technology

- Potentially new cybersecurity risks (e.g. 51% attack, Sybil attack)
- Unique concerns about data security and privacy
- Interoperability and integration with other systems
- Long-run performance and reliability uncertainty in production



Operational governance and controls

- Limited experience with validating and auditing smart contracts
- Challenges with enforcing data standards across a network
- Unique governance risks (e.g. coordinating software upgrades, emergency patches and “hard fork” issues)



Implementation

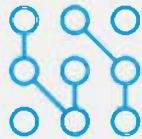
- Ecosystem-wide change management
- Potential challenges running parallel operations for certain asset classes or processes



Legal and regulatory

- Fragmented and incomplete regulatory landscape
- Lack of a standard regulatory “playbook”
- Challenges with new legal requirements (e.g. smart contracts, settlement finality)

Additional detail on DLT-related risks¹¹



Technology

While solutions and platforms are increasingly tested in different scenarios, DLT is still a bleeding-edge technology that has yet to be tested in all areas (e.g. extended operations in production environments). There are potential risks associated with how DLT-based systems will integrate with other DLT-based systems and legacy technology and data platforms, including the extent to which interoperability will even be possible. While DLT is resilient to hardware and infrastructure failures by design, the unique decentralized architecture may pose novel cybersecurity risks, particularly in terms of the security of private keys and preventing unwanted data dissemination. Given the decentralization of confidential data, DLT systems require new data privacy controls to ensure that parties may access only certain data; zero-knowledge proofs, stealth addresses and several other solutions have emerged to address these risks.



Operational governance and controls

Implementation of DLT-based applications, especially when used by multiple parties, is complex, as decentralized systems introduce new governance questions. Key questions to answer include: How are these networks upgraded and maintained? How are smart contracts enforced, audited and validated (both at the point of creation and throughout the life cycle of a particular asset)? What are the risks due to incorrect representation of terms in smart contract code? Is there a risk of a “hard fork” of the blockchain (i.e. modifying past transactions or bringing about other structural changes to the blockchain)? Conversely, is there a risk of theft or loss of digital assets because of the irreversible nature of transactions in the blockchain protocol? And lastly, how is the real-world change of assets ownership made consistent and reflected on-chain, if necessary, under the legal framework?



Implementation





As DLT-based solutions may offer a radically different way of doing business for some organizations, effective change management is critical. Not only must firms build the ecosystem, they must also ensure that the organization has the requisite processes and talent to effectively assess, develop, measure, monitor and respond to risks. Data standards, data governance and data privacy standards must be adopted and enforced. Additionally, in instances where an institution is building parallel processes for similar assets (e.g. traditional and digitally native assets in the same asset class), there may be risks associated with additional complexity for operational teams.



Legal and regulatory

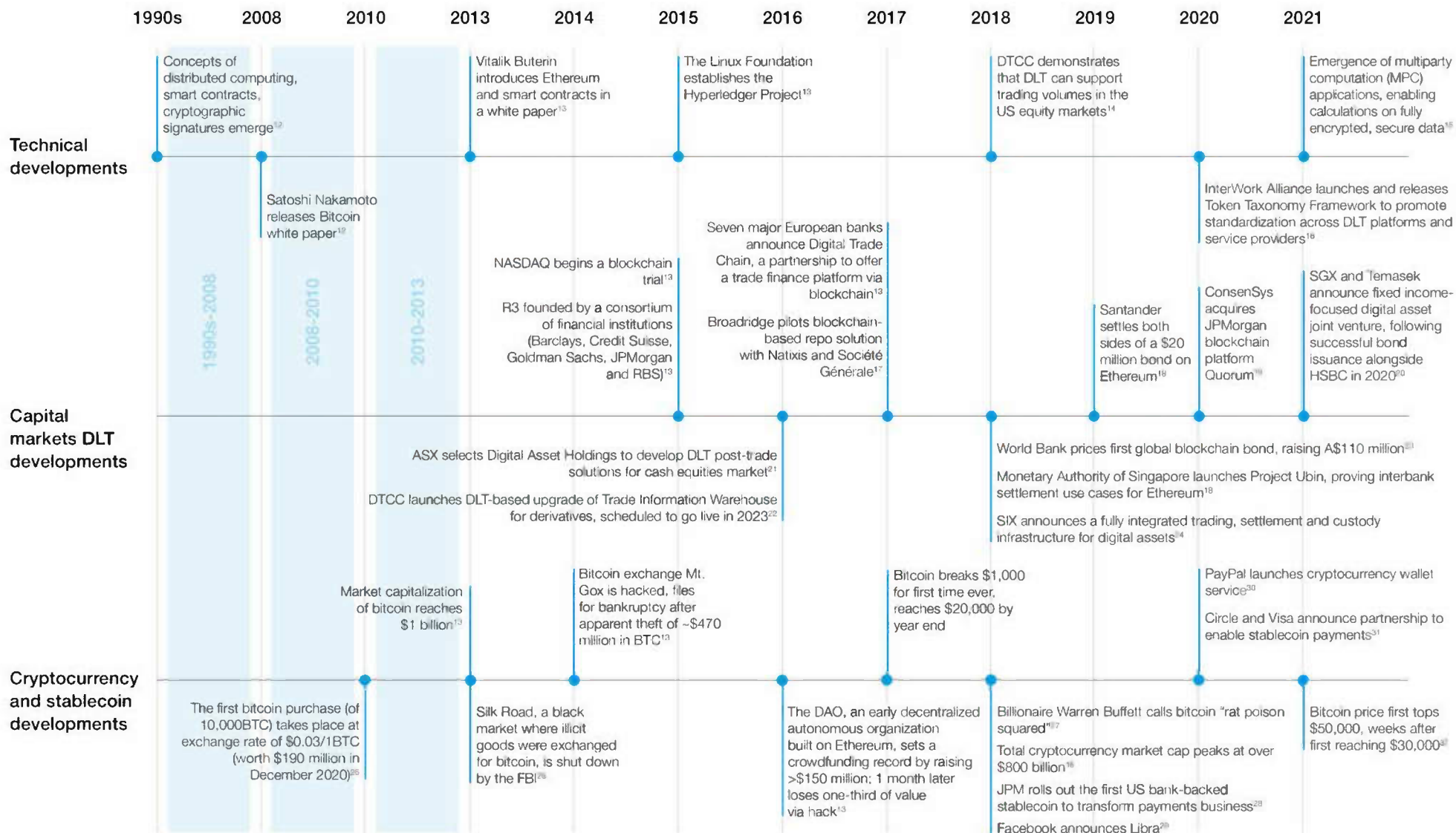
In many jurisdictions, financial and capital markets regulators have not made definitive statements or rulings on the applicability of existing regulatory frameworks to DLT-based solutions or platforms. Thus, there is a risk in some instances that a key feature of a particular DLT application may one day fall foul of future regulations. Even in jurisdictions with more developed regulatory frameworks, many institutions have not yet developed a standard regulatory “playbook” to ensure that products are developed in line with regulatory requirements. Legal and regulatory risks include uncertainty about security registry requirements, cross-jurisdictional regulations, anti-trust violations, smart contract enforceability, anti-money laundering (AML) and know-your-customer (KYC), and intellectual property (IP) protection.

DLT is one of several technologies transforming capital markets: some are complementary, and some potential substitutes

				
Technology	Cloud computing	AI + machine learning	Robotic process automation	Next-generation APIs
Description	The on-demand availability of computing resources (e.g. computer power, storage, databases, application software etc.), without the need to manage the supporting infrastructure. Cloud computing typically offers a flexible pay-as-you-go model that minimizes upfront infrastructure costs compared to traditional data centres	The application of advanced analytical methods, including advanced analysis of unstructured data, to create multidimensional predictive models that support and/or automate human decision-making	A productivity tool that runs predefined scripts to automate repetitive tasks including data entry and transformation. The script mimics the actions taken by a human worker – within or across applications – in order to execute business processes, albeit in a narrow and highly structured way	An application programming interface, or API, is an interface that provides programmatic access to service or data within a remote application or a database. APIs that allow minimal, more efficient data transfer – a component of microservices design patterns – along with new data interchange standards (e.g. ISO 20022) have renewed financial institutions' interest in APIs
Benefits	Cost efficiencies, faster deployments, reliability, global scale, improved productivity and performance, and flexible capacity	Increased automation, enhanced decision-making and process optimization	Increased automation of repetitive tasks, process optimization	Real-time data integration among parties, increased automation, process optimization, increased standardization
Key capital market applications/ use cases	Infrastructure as a service especially for big data services and analytics, and software as a service, especially in HR and sales	Enhancing pre-trade and execution activities such as predicting M&A opportunities/valuation features, producing trading signals or servicing client flow	Focused on post-trade and support segments, with a high number of repetitive tasks (e.g. payments processing and client onboarding)	Primary market intelligence, digital payments, innovative customer applications and experiences
Relation to DLT	Complementary Use of cloud can be an important enabler for DLT use, accelerating development with prebuilt infrastructure	Potential substitute Enables straight-through processing for more complicated tasks (e.g. potentially reconciliation) Complementary Better data for AI models	Potential substitute Mimics straight-through processing for limited sets of tasks	Potential substitute APIs are the main system integration tool today, and modern APIs are likely to improve data sharing across institutions Complementary DLT use cases with interoperability rely on APIs

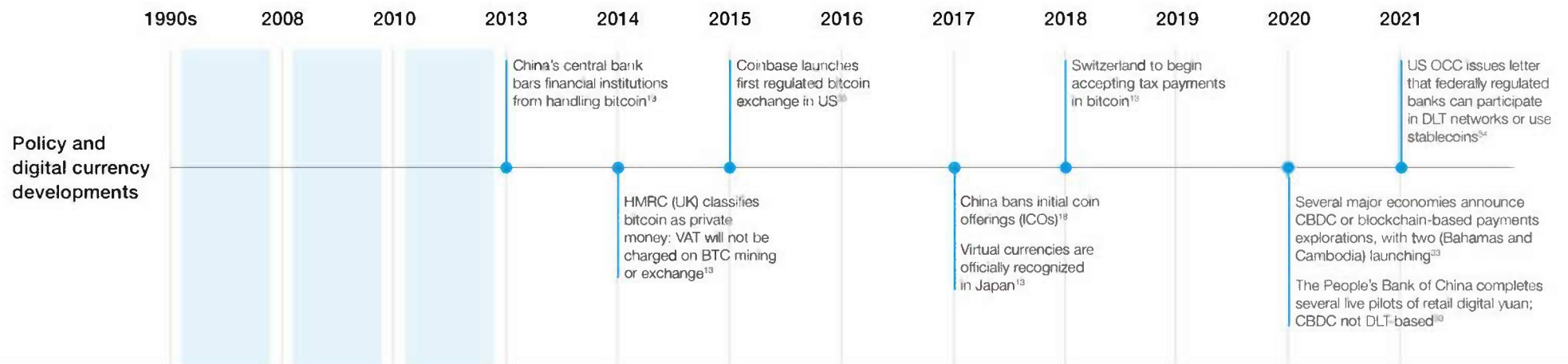
TIMELINE

Technical and business developments for DLT in capital markets



TIMELINE

Regulatory, policy and digital currency developments



Notable regulatory developments

Singapore

JULY 2020 Monetary Authority of Singapore (MAS), proposes new regulations for digital tokens created in Singapore. Among other things, the provisions strengthen anti-money laundering (AML) compliance procedures and expand MAS's power to impose requirements on technology risk management, including cybersecurity risks and data protection.³⁶

AUG 2017 MAS clarifies when securities tokens must comply with Securities and Futures Act.³⁷

Germany

DEC 2020 The German government abolishes its paper-based certificate requirement, which paves the way for dematerialized securities, including securities recorded solely on distributed ledgers.³⁸

OCT 2019 In an effort to be "at the forefront of innovation", the German government publishes a comprehensive blockchain strategy, which includes prioritizing the development of a digital identity system.³⁹

China

DEC 2020 China regulates cryptography, a key component underpinning all DLT platforms. The regulation defines a standard for all "encrypted" behaviours, arguing that the existing "loose" systems are not suitable for either the industry or national interests.⁴⁰

JAN 2019 The Cyberspace Administration of China (CAC) releases Administrative Provisions on Blockchain Information Services (i.e. blockchain provisions), which encourage industry self-regulation and define security requirements and penalties.⁴¹

Switzerland

SEPT 2020 New DLT regulations include sanctioning digital assets trading venues with trading between regulated market participants and private customers, and custody, clearing and settlement for digital assets. These regulations also clarify the treatment of digital assets in a bankruptcy event, and create a new type of digital security, "uncertificated register", affording these the same protection and functionality as a traditional security.⁴² The regulations seek to enable DLT-based innovation while remaining technology-neutral.⁴³

United States

DEC 2020 SEC issues guidance for broker-dealer custody of digital assets to be in place for five years, clarifying requirements separate from traditional securities.⁴⁴

AUG 2020 INX is the first security token IPO registered with the SEC that is not currently listed on either a stock or crypto exchange.⁴⁵

JULY 2019 SEC and FINRA issue a joint staff statement on custody of digital asset securities.³¹⁴⁶

② DLT and digital assets in capital markets

- Spectrum of future scenarios
- DLT-related considerations for different capital markets actors
- Framework for different approaches to DLT solutions

SPECTRUM OF FUTURE SCENARIOS

Financial institutions and technology providers have developed a range of views on how DLT will be used moving forward

DLT is unique as an enabling technology in the capital markets because it offers a potential pathway both to operational simplification for many institutions and to disruption, where existing processes and roles may be made redundant. As a result, the way in which it is employed – influenced by the institutions “leading the charge” – will have a significant impact on the structure of markets moving forward, leading to great


uncertainty about what the future may look like. Adding to the uncertainty is the reality that, in the near term, the technology is likely to be implemented for different use cases across different asset classes and jurisdictions, likely leading to a range of different future states. An imperfect mapping of these potential future states would encompass a spectrum of possibilities:



Each potential future state implies a different set of roles for different institutions and a different level of disruption for existing market processes and operations

DLT-RELATED CONSIDERATIONS

Strategic considerations differ for players across the capital markets, though there are common themes




Corporate issuer

- Potential opportunity for lower cost of funding due to wider investment base, greater secondary market liquidity, lower transaction costs and/or direct participation in capital markets




Investment bank

- Potential opportunity for new lines of business from emergence of new asset classes or parallel markets
- Potential cost savings from streamlined or automated processes and operations
- Potential loss of business if issuers access markets directly




Broker/dealer

- Potential cost savings from streamlined or automated processes and operations, and capital/liquidity savings from more flexible settlement
- Potential loss of business from greater market concentration in over-the-counter markets



Custodian bank

- Potential cost savings from streamlined or automated processes and operations, and capital/liquidity savings from more flexible settlement
- Potential for better optimization of collateral due to greater flexibility in collateral mobility
- Potential risk to business model if there is a radical change to the “custody” role



Asset manager

- Potential opportunity for new lines of business from emergence of new asset classes or parallel markets
- Potential cost savings from streamlined or automated processes and operations (e.g. lower custody costs), and capital/liquidity savings from more flexible settlement




Asset owner/investor

- Potential opportunity for improved liquidity in secondary markets for some asset classes
- Potential opportunity for investments in new asset classes, parallel markets or markets that were previously difficult to access




Exchange

- Potential opportunity to expand role in the value chain or into additional asset classes



Infrastructure provider

- Potential risk to business model if markets shift away from traditional model of central securities depositories, but strong regulatory support in favour of continued role as systemic infrastructure
- Potential opportunity for new lines of business in governing decentralized platforms and smart contracts

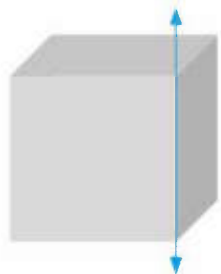


Other institutions

(e.g. trustees, transfer agents, registrars)

- Potential risk to business models due to greater transparency in securities and automation of reporting and life-cycle activities, but legal/regulatory basis for roles remain in many markets
- Potential opportunity for new lines of business in providing value-add

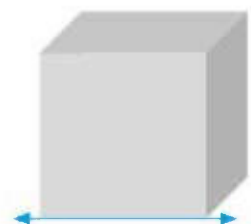
Capital markets DLT products or platforms are being developed across several dimensions, reflecting key differences between institutions



Degree of change implied

Improving existing processes
 e.g. DLT-based infrastructure offering greater transparency of asset-servicing processes

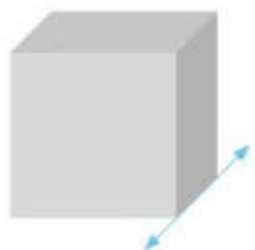
Reimagining
 e.g. fully digital securities with life-cycle events automated through smart contracts



Scope of value chain included

One part of the value chain
 e.g. DLT-based equity post-trade infrastructure

End-to-end
 e.g. DLT-based equity issuance, trading, custody and settlement platform



Asset class focus

Single asset class
 e.g. DLT-based bond-origination platform

Asset class-agnostic
 e.g. security token issuance platform

Combined, these choices reflect:

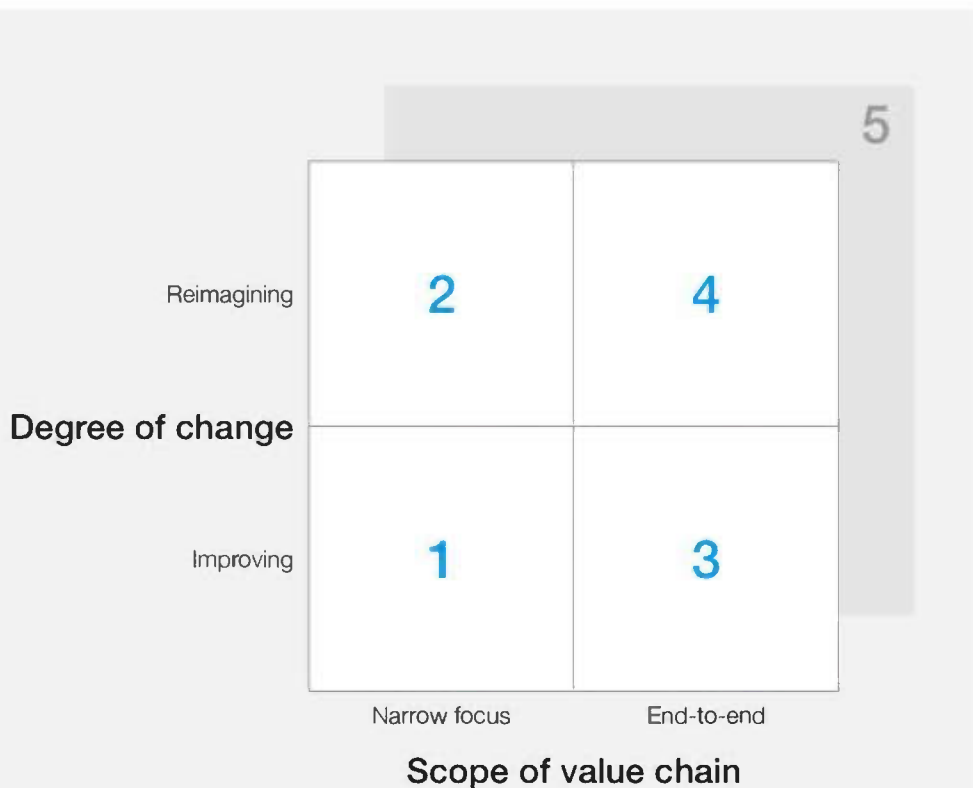
Where an institution's core competencies lie (e.g. providing trust and data verification, building technology, banking services)

What the institution sees as the critical business problems that can be addressed by a DLT-based solution (e.g. over-reliance on reconciliation for processing transactions, limited transparency and high levels of complexity)

How the institution believes DLT will be used in the capital markets in future (e.g. Will DLT be used on the margins to solve discreet challenges? Will DLT-based central infrastructures dominate? Will DLT remove the reliance on central infrastructures and intermediaries?)

FRAMEWORK FOR DIFFERENT APPROACHES TO DLT SOLUTIONS

Within and across asset classes, institutions are developing DLT-based solutions to improve or reimagine value chains



Considerations

- 1 Pointed improvements**
Solutions focused on optimizing specific areas of the value chain

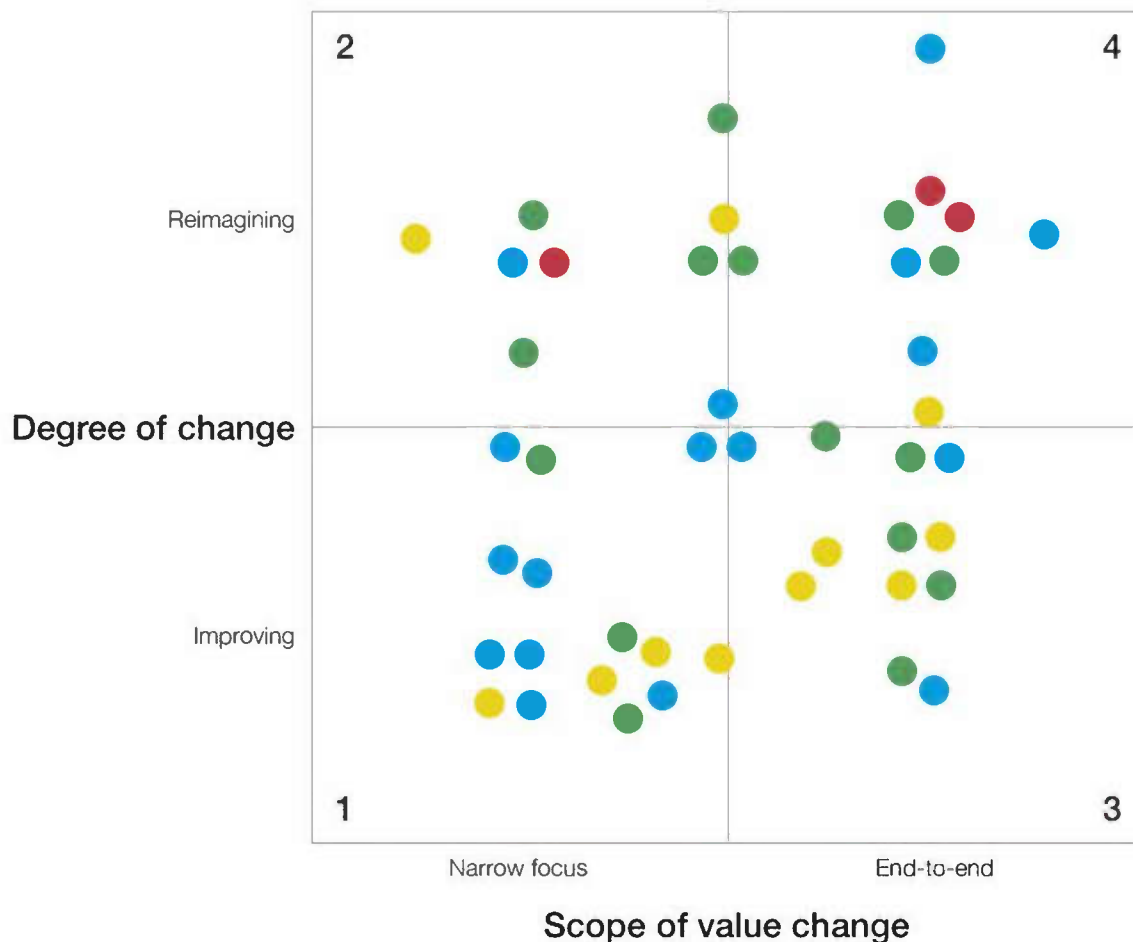
Even with a narrow focus, ecosystem-wide transformation may still be needed, but the **path to implementation may be clearer and easier**
- 2 Narrow reimagining**
Solutions focused on redefining specific areas of the value chain

While narrowly focused on the value chain, these use cases may gain traction with only a **limited ecosystem**
- 3 Broad improvements**
Solutions focused on optimizing many (or most) aspects of the value chain

End-to-end use cases **require change across front-, middle- and back-office processes** and teams, introducing additional complexity
- 4 Broad reimagining**
Solutions focused on redefining many (or most) aspects of the value chain

These use cases are more likely to build **parallel “digital asset” ecosystems to traditional markets**, often facing the “chicken or egg” challenge of generating liquidity
- 5 Wholesale disruption**
Solutions, such as DeFi, focused on entirely rethinking how the capital markets operate (out of scope)

Use cases in development today reveal a fragmented and divergent set of visions

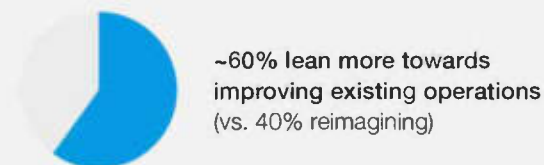
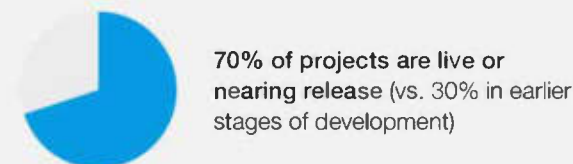


Project status

- Live in production
- Production
- build/test
- Pilot Proof of concept
- Strategic formation

We surveyed more than 60 companies, representing banks, infrastructure providers, fintech firms and asset managers.

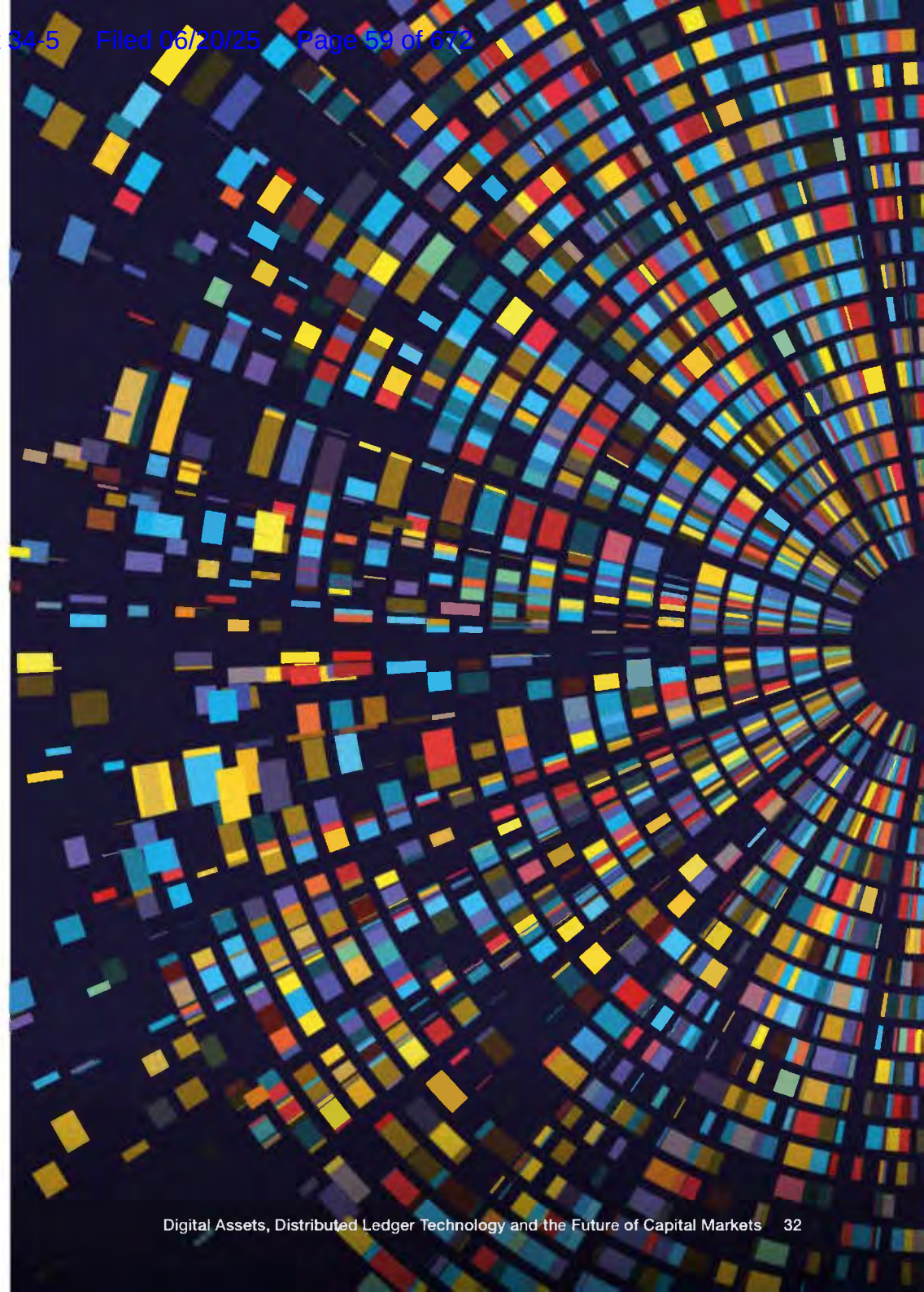
The collective responses validated the great diversity of use case applications and approaches. Summary findings include:




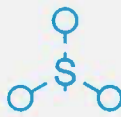




3 Use case analysis by asset class/product line

This chapter examines DLT-related developments in the capital markets from the starting point of traditional asset classes and business lines, to understand how DLT and smart contracts use cases are being adopted or explored in the industry. Each section examines the different use cases emerging for each asset class – or specific ways in which DLT could be used across the relevant value chain, whether aiming to improve existing processes or disrupt markets as we know them.

- Equity markets
- Debt markets
- Securitized products
- Derivatives
- Securities financing
- Asset management/fund administration
- Enablement use cases



While DLT use cases are being explored across capital markets, this report offers a deeper examination of efforts in core securities markets and related businesses

	Securities markets			Adjacent product lines		
						
	Equity markets	Debt markets	Securitized products	Derivatives	Securities financing	Asset management
Focus areas	<ul style="list-style-type: none"> Publicly listed equities 	<ul style="list-style-type: none"> Corporate bonds Commercial paper Government bonds 	<ul style="list-style-type: none"> Mortgage-backed securities Asset-backed securities Collateralized loan obligations 	<ul style="list-style-type: none"> Exchange-traded and OTC derivatives 	<ul style="list-style-type: none"> Repurchase agreements Securities lending 	<ul style="list-style-type: none"> Mutual funds Private funds (private equity, debt and hedge funds)
Key processes	<ul style="list-style-type: none"> Primary issuance Secondary markets Clearing and settlement Custody and asset servicing 	<ul style="list-style-type: none"> Primary issuance Secondary markets Clearing and settlement Custody and asset servicing 	<ul style="list-style-type: none"> Loan origination Loan servicing Securitization/issuance Secondary markets Security servicing 	<ul style="list-style-type: none"> Trading Clearing Position management Settlement 	<ul style="list-style-type: none"> Collateral allocation Clearing and settlement Collateral swaps 	<ul style="list-style-type: none"> Fund origination Fund distribution Transfer agency Fund administration Securities services Custody



Enablement use cases

DLT-enabled or supporting products and services being developed in order to facilitate digitalization across asset classes: wholesale payments; digital asset custody and services; digital asset issuance and life-cycle management tools

How to read the following sections

The subsequent pages examine DLT use cases for each asset class or product line. Each section includes:

- A high-level summary of opportunities and developments in the asset class
- An overview of the asset class or product line, including a summary of market characteristics and major relevant participants
- An illustrative value chain for the asset class or product line, including existing pain points and potential DLT roles
- A summary of the use cases to be examined

Each detailed use case description (one or two pages) includes:

- A summary description of the use case
- The use case plotting on the “degree of change” and “scope of value chain” framework ([presented on slides 29-31](#))
- Value chain components that may be affected/addressed by the use case
- Major intended changes to processes or operations from the current state (at a high level, as these are likely to vary for different solutions)
- Proposed benefits of the use case, along with potential risks or challenges
- What the potential path forward might look like, including enablers and impediments
- Examples of solutions being developed by different firms, as well as a spotlight on notable examples



The inclusion of a firm’s solution or discussion as a spotlight does not reflect an endorsement of the company or its products and services by the World Economic Forum.

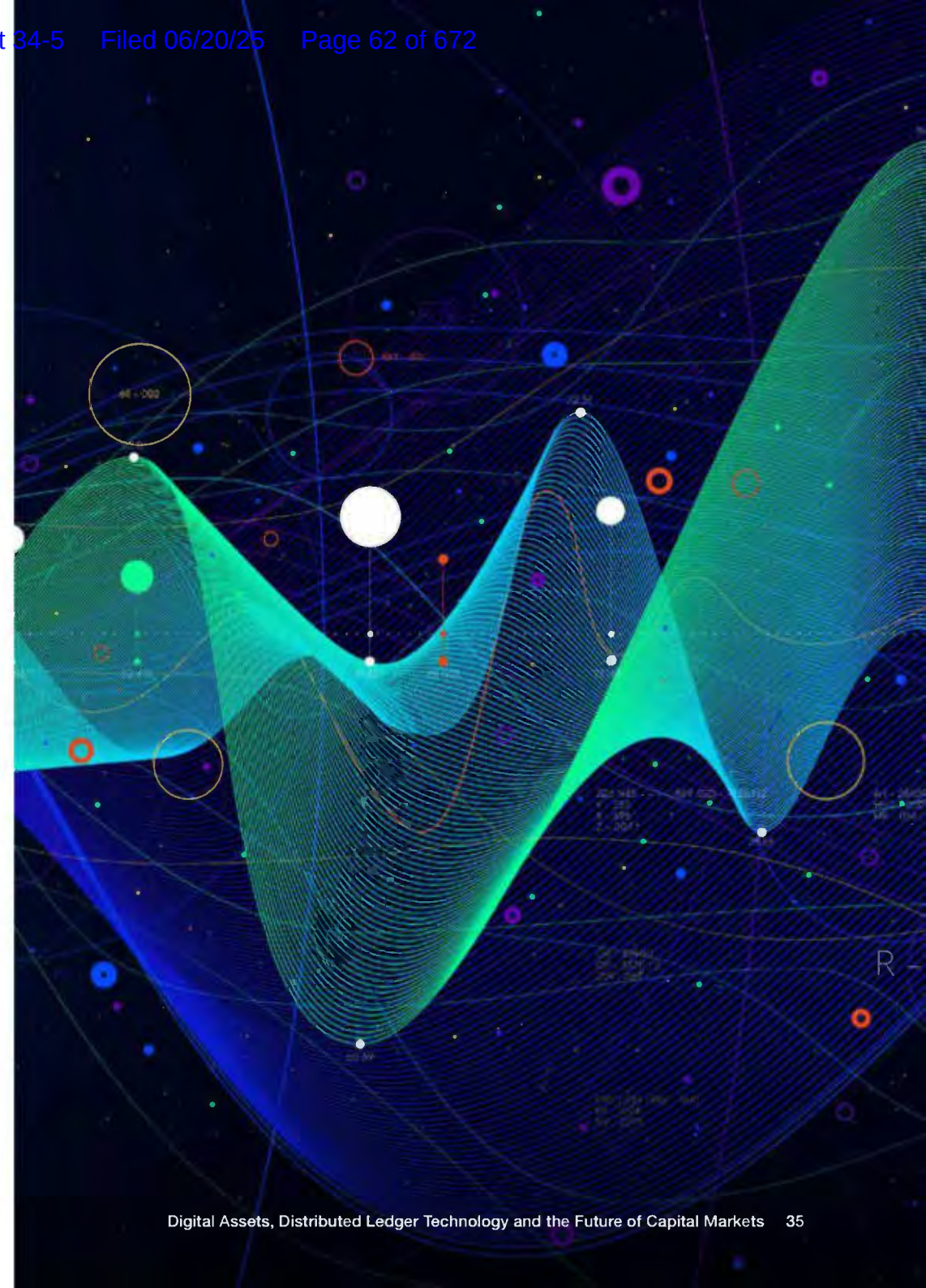
Equity markets: summary

While most market participants and service providers consider operations and infrastructure in public equity markets to be efficient, a range of parties are exploring or bringing to market DLT-based or smart contract solutions, including applications aiming to:

- Introduce greater flexibility in clearing and settlement timelines
- Reduce or eliminate settlement risk
- Address operational burdens associated with data siloes in post-trade processing

Given the scale of transformation required to achieve the potential benefits of most DLT-based solutions in centralized public equities markets, these developments are primarily in the early stages.

Privately held equities – which do not benefit from the central infrastructures, standardized processes and ample liquidity of the public markets – are likely to continue to be a focus for many parties. Many of the solutions in development attempt to bring the efficiencies of public equity markets to private and SME shares using DLT and tokenization.



Overview of asset class

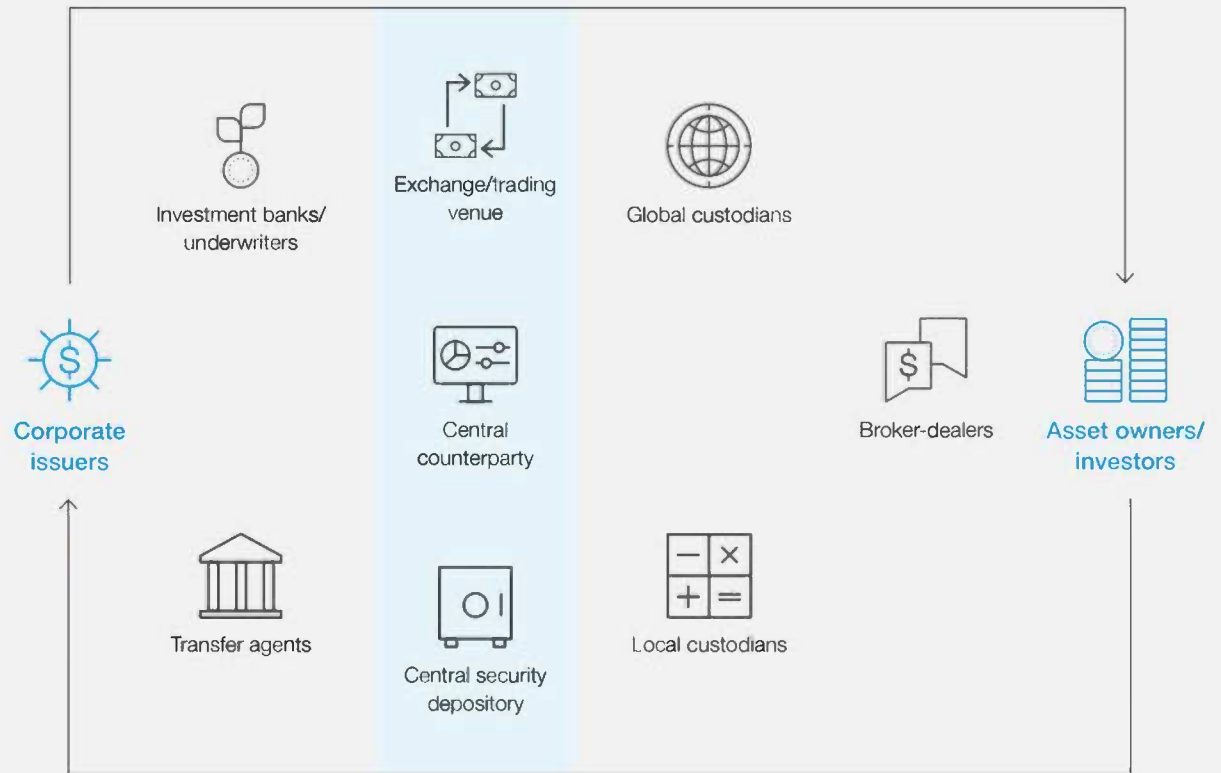
Market overview

Globally, the market capitalization of publicly traded equities totalled more than \$95 trillion at the end of 2019.⁴⁷ With an average of \$500 billion–\$750 billion in annual issuance (over the preceding decade), equity markets remain an important funding tool for corporations and an essential asset class for investors. While market liquidity varies by country and market, most equity markets are deep and liquid relative to other asset classes, with significant daily trading volumes.

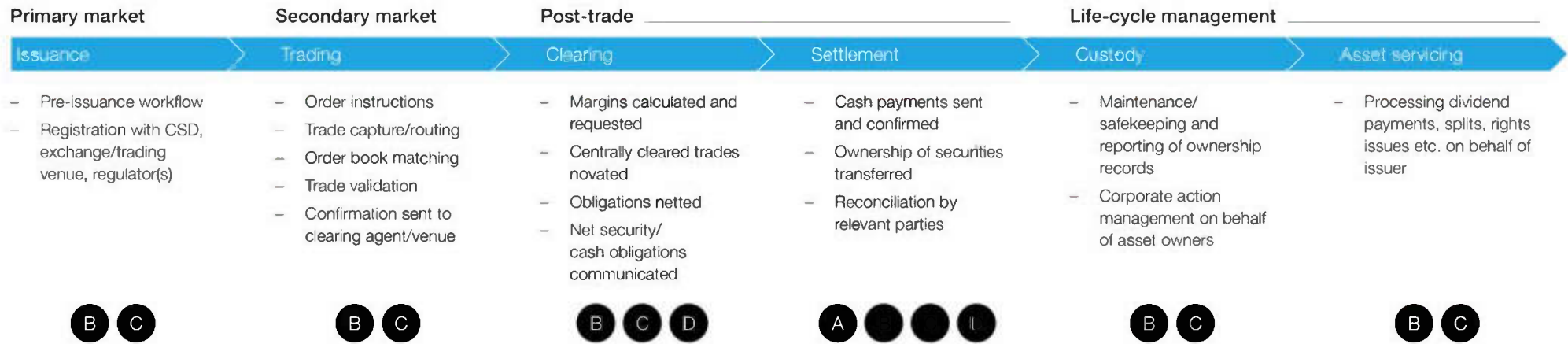
Key characteristics

Equity markets are primarily concentrated in a limited number of public exchanges for each jurisdiction, which tend to be highly regulated. Increasingly, trading also takes place in dark pools, or private trading venues operated by broker-dealers or other parties, to facilitate large trades by institutional investors. Both public exchanges and private trading venues rely primarily on electronic trading between registered brokers. Trades tend to be centrally cleared by central counterparties (CCPs). These markets rely on central securities depositories (CSDs), which register ownership, safekeep either physical or dematerialized securities and effect transfer of ownership through their securities settlement systems.

Several intermediaries and infrastructure providers facilitate the flow of capital from investors to equity issuers, trading between investors, and processing of corporate actions



DLT in the equity market value chain



Anticipate biggest changes in post-trade and life-cycle activities

Existing pain points

Although equity markets are a largely mature ecosystem with efficient processing, participants still face challenges associated with legacy processes and systems:

- A** Settlement/counterparty risk, requiring costly margins and capitalization of the central counterparty
- B** Data siloes between institutions, requiring manual reconciliation across the life cycle of equities
- C** Substantial numbers of intermediaries involved in transactions, many required by regulation
- D** Ageing legacy infrastructure systems in some jurisdictions

These factors combine to make equity issuance relatively expensive, limiting issuers to only the largest companies in any market.

Potential DLT roles in equities

While there are opportunities to apply a range of technology solutions to address pain points and modernize many participants' technology stacks, DLT may be uniquely suited to optimize post-trade operations and life-cycle management, by:

- Synchronizing references and mutualizing workflows across all parties involved in trading, settlement, custody or corporate actions, thereby limiting the need for reconciliation
- Automating settlement instructions and/or corporate actions processes using smart contracts
- Reducing settlement risk and/or settlement time frames or enabling greater flexibility in settlement time frames

Summary of emerging use cases in equity markets

1

Replatforming existing post-trade infrastructure

What? Replace existing centralized post-trade infrastructure (e.g. CSD, settlement system and/or clearing house) with a DLT-based system

Who? Led by the existing central infrastructure provider, but likely to require operational changes by all clearing participants

Why? Enable operational efficiencies from a shared single source of truth and the use of smart contracts; potential for settlement flexibility; potentially enable future innovation and interoperability with emerging payments systems (e.g. CBDCs)

2

Supplementing post-trade infrastructure

What? Introduce a DLT-based system on top of the existing post-trade infrastructure for a specific use case and/or set of users

Who? Led by either the existing central infrastructure provider or a challenger; likely to require adoption by a more limited ecosystem

Why? Varies by specific example, but generally designed to take advantage of the ability to mutualize workflows across participants (thereby reducing the time required to process certain transactions) and/or the ability to settle atomically in real time (thereby eliminating the need to fully fund central counterparties)

3

Digital platform covering full securities life cycle

What? Introduce a DLT-based end-to-end platform enabling the issuance, trading, post-trade and servicing of digitally native securities

Who? Can be led by existing central infrastructure providers, challenger infrastructure providers (e.g. digital asset exchanges) or other parties; ecosystems may include participants across the value chain, including direct access by corporate issuers and/or investors

Why? Enable the full potential of digital assets (end-to-end processes automated by embedded smart contracts, risk-free atomic settlement etc.) in a regulated environment in parallel to existing infrastructure

4

Equity tokens issued on blockchain

What? Issue equities as security tokens on a public or permissioned distributed ledger, with trading across multiple digital asset exchanges

Who? Can be led by financial technology providers, with potential for this model to intersect with end-to-end digital platforms and/or DeFi exchanges; currently regulatory environments would permit only privately listed securities to be issued in this manner

Why? Enable the full potential of digital assets (end-to-end processes automated by embedded smart contracts, risk-free atomic settlement etc.) at a potentially significantly lower cost, enabling greater access

Replatforming of existing equities post-trade infrastructure

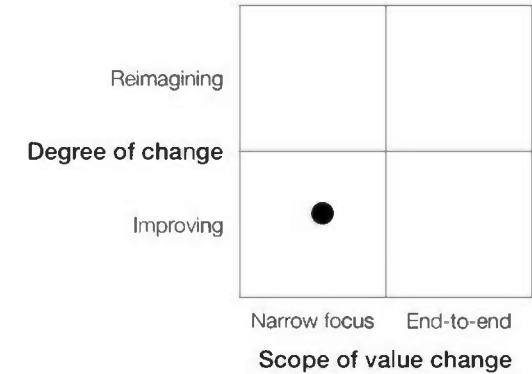
Replatforming / Supplementing / End-to-end / Equity tokens

Overview

In several jurisdictions, market infrastructure providers are replacing, or considering replacing, existing systems with DLT-based solutions, essentially moving the CSD onto a distributed ledger. While some aim to address specific market inefficiencies, others are focused on DLT as a replacement for ageing legacy systems. A replacement can be a massive undertaking in terms of investment and market-wide education, but the objective is to improve existing processes via new

technologies, rather than reinvent or disrupt an existing value chain.

Replacements are also targeted in scope, applying DLT to a specific use case, for example, in post-trade infrastructure, rather than attempting an end-to-end solution. This approach tends not to disintermediate any stakeholders, even though some roles can be redundant, with activities performed by the technology or by other parties.



Value chain components in scope



Major changes from current state*

- Introduce a single source of truth on trade data, accessible by all participating parties (via a node on DLT network or API interface)
- Potential to mutualize workflows associated with asset servicing (e.g. processing corporate actions) through shared data and smart contracts
- Introduce ability to conduct non-batch delivery vs. payment (DvP) settlement

Proposed benefits*

- Introduce a single source of truth on trade data, accessible by all participating parties (via a node on DLT network or API interface)
- Potential to mutualize workflows associated with asset servicing (e.g. processing corporate actions) through shared data and smart contracts
- Introduce ability to conduct non-batch delivery vs. payment (DvP) settlement

Potential risks/challenges

Requires all clearing participants to migrate to the new platform and adopt new operating procedures

While, in principle, flexible and/or shorter settlement should reduce counterparty risk, new (or multiple) settlement timelines would introduce the need for new risk management practices, regulatory capital requirements and market structures and processes that might take time to perfect

* May differ by exact model.

Replatforming of existing equities post-trade infrastructure

Replatforming / Supplementing / End-to-end / Equity tokens

Potential path forward

Despite being driven by a central infrastructure, this approach requires moving an entire ecosystem. As such, the market can transition only when all participants are comfortable with the new processes and operational requirements. But phased transition plans enable the central infrastructure to “switch on” additional features and functionalities of the new system over time, thereby limiting the degree of operational change required at one time. Participants may not realize the core benefits at first. For example, rather than maintaining a node on the distributed network, clearing participants may still be able to use traditional messaging interfaces for communicating with the CSD. However, over time, they could transition to directly participating in the DLT network by hosting their own node. In this example, clearing participants would receive the maximum platform benefits only by hosting a node.

Enablers

- Markets where securities are already dematerialized require limited change to regulation/legislation to pursue a DLT-based CSD
- More concentrated equity markets with fewer participants are more likely to be able to make this transition (given fewer and less diverse stakeholders to consult)
- Availability of CBDC could prompt greater comfort with DLT among both infrastructure providers and market participants, as CBDCs would allow for atomic DvP settlement in central bank money

- Most equity markets are electronically traded, so market participants are used to high levels of straight-through processing

Impediments

- Despite standardization in many markets, decades of building upon legacy systems has led to significant fragmentation across market processes and internal systems, thereby making it difficult to develop standard playbooks for transitioning
- Clearing participants and regulators may see infrastructure providers as too systemically important to be early movers with cutting-edge technology, thereby limiting many institutions’ willingness to pursue this model

Example firms/projects/products

ASX (in partnership with Digital Asset): CHES Replacement	Status: in production build, scheduled to go live 2023
TMX and Bank of Canada (in partnership with R3): Project Jasper Phase III	Status: successful proof of concept in 2018

PROJECT SPOTLIGHT



Digital Asset

ASX CHES Replacement

The Australian Securities Exchange (ASX) is in the process of replacing its legacy post-trade system (CHES) with a DLT-based system. Participants will be able to communicate with the system using ISO 20022 messages over SWIFT or a web interface (operationally similar to the status quo) or by hosting a DLT node, which would introduce new functionalities. The project has been under way since late 2017, with a plan to go live in spring 2023, following extensive consultation with stakeholders.⁴⁸

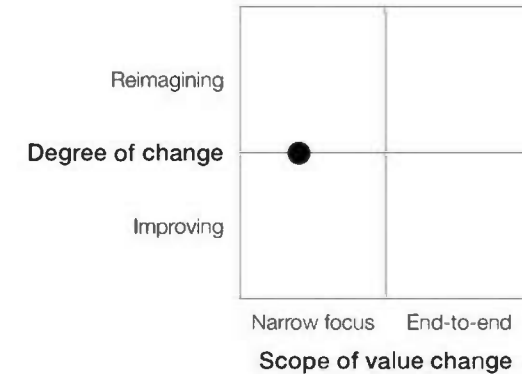
Supplementing post-trade infrastructure

Replatforming / **Supplementing** / End-to-end / Equity tokens

Overview

Central infrastructure providers and new entrants are developing solutions that supplement existing market infrastructure to address specific challenges. While specific approaches vary, the common theme is an attempt to use DLT (or smart contracts) to automate clearing and settlement processes while still relying on the core underlying CSD. This might enable greater flexibility or speed in settlement, or alternatively could enable bilateral (rather than central) clearing for certain

transactions. Importantly, these use cases do not require the entire market ecosystem to migrate to new technologies or processes, enabling a subset of operationally prepared parties to benefit from advantages offered by the technology. Though focused on improving existing processes via new technology, this approach can potentially reimagine a portion of the equities value chain as participants develop comfort with the technology.



Value chain components in scope

● In scope ● Partially in scope ● Not in scope



Major changes from current state*

- Ability to settle atomically on a continuous basis or net settlement obligations on a bilateral basis, rather than novating trades and clearing centrally in batch processes
- Potentially introduce the ability to settle certain trades on a shorter timeline
- Introduce a single, shared source of truth on settlement instructions/obligations, accessible by all relevant parties (or a subset of parties) for specified transactions

Proposed benefits*

- Clearing participants do not need to capitalize the central counterparty, but need only to fund margin for their own settlement obligations, thereby freeing up liquidity
- Enable better balance sheet management (e.g. reduced funding requirements for risk capital, clearing fund and/or settlement liquidity)
- Ability to mutualize and automate workflows across parties, and potentially conduct processes in parallel (with potential to reduce settlement time as a result)
- Greater transparency into settlement status and open positions throughout the day

Potential risks/challenges

A supplemental clearing system could introduce additional operational complexity for some participants, thereby introducing additional risk

* May differ by exact model.

Supplementing post-trade infrastructure

Replatforming / Supplementing / End-to-end / Equity tokens

Potential path forward

By enabling a limited number of technologically and operationally prepared participants to become early adopters of a DLT-enabled solution, use cases following this approach have the potential to build trust in the underlying technology. Building upon this foundation, new entrants are well positioned to enlarge the scope of their offering over time, possibly expanding vertically and/or horizontally to offer a full additional market infrastructure to challenge dominant market players. Similarly, existing infrastructure providers would likely be able to build on the technology more confidently, expanding the scope of DLT- or smart contract-enabled services, either to further supplement their existing offering or eventually replace it. Regardless of whether they are offered by existing infrastructure providers or new entrants, it is unclear how these services would coexist with an end-to-end digital market infrastructure or DLT-based replatforming of existing infrastructure.

Enablers

- Since these use cases are aimed at solving specific problems, they are likely to be developed in close consultation with initial partners, thereby ensuring an interested client base
- Availability of CBDCs would likely prompt greater comfort with DLT among both infrastructure providers and market participants, as CBDCs would allow for atomic DvP settlement in central bank money

Impediments

- For new entrants in the infrastructure space, regulatory scrutiny is likely to be substantial given the potential for systemic importance
- For some use cases, it might be difficult to expand the user base quickly; and given network effects, this may limit the potential benefits realized by participants

Example firms/projects/products

HKEX (in partnership with Digital Asset, DTCC): Synapse	Status: in production build, scheduled to go live 2022
Paxos: Securities Settlement Service	Status: live in production for limited set of participants (with permission of US SEC)
DTCC: Project Ion	Status: in prototype development

PROJECT SPOTLIGHT

HKEX **DTCC**
 香港交易所 **Digital Asset**

HKEX Synapse

HKEX is in the process of developing a solution to streamline post-trade workflows for participants in the Northbound Stock Connect. While using a centralized system (not a distributed ledger), this product aims to ensure that different parties' settlement processes can take place in parallel to facilitate compliance with Mainland China's t+0 settlement window. The system will be built on top of the existing Stock Connect post-trade infrastructure, using smart contracts, API connectivity (built on ISO 20022 standards) and DTCC's trade processing systems to facilitate a single source of truth for settlement instructions and instantaneous status updates. Announced in November 2020, this is scheduled to go live in 2022.⁴⁹

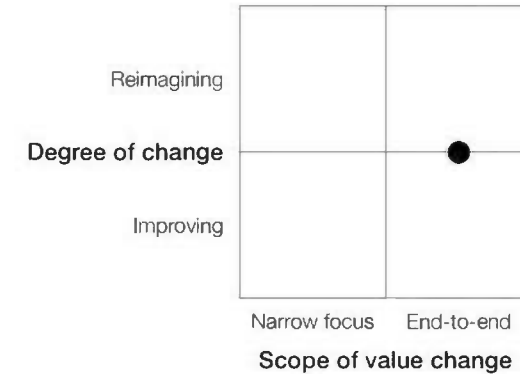
Digital platform covering full securities life cycle

Replatforming / Supplementing / **End-to-end** / Equity tokens

Overview

Some central market infrastructures or financial technology firms are building new, end-to-end digital platforms to integrate the full life cycle of securities and other digital assets. The platforms enable market participants and intermediaries to list or issue, trade, settle trades and provide custody services for digital assets – in this case, digitally native equity tokens – in a fully regulated environment. These platforms exist in

parallel to existing market infrastructure and existing securities markets, offering an alternative digitized version of a standard asset class. While DLT may be the core technology on which the “Central Securities Depository” is maintained, some functions/processes may use existing technologies if there is no clear case for using DLT. This approach does not necessarily disintermediate any parties, although some roles may become redundant.



Value chain components in scope

● In scope ● Partially in scope ● Not in scope



Major changes from current state*

- Introduce a single, shared source of truth on all aspects of the security, including ownership and post-trade activities
- Enable programmability of securities from issuance
- Potentially introduce the ability to settle certain trades on a shorter or more flexible timeline
- Potential for investors and issuers to interact directly with market infrastructure or exchange (or with one another)

Proposed benefits*

- Greater transparency for all parties
- Potential to reduce complexity in operations and/or operational burdens associated with reconciliation activity
- Potential for streamlining/automating all processes associated with servicing security, clearing and settling and/or maintaining compliance
- Enable better balance sheet management (e.g. reduced funding requirements for risk capital, clearing fund and/or settlement liquidity)
- Issuers could potentially list directly and/or have greater transparency of ownership, without relying on additional intermediaries, potentially lowering cost of capital

Potential risks/challenges

- A supplemental market infrastructure could introduce additional operational complexity for participants
- Need for mechanisms to verify smart contract terms upon issuance
- Need to rethink regulation requiring separation of responsibilities in securities value chain

* May differ by exact model.

Digital platform covering full securities life cycle

Replatforming / Supplementing / **End-to-end** / Equity tokens

Potential path forward

A range of potential (not mutually exclusive) future states exist: (1) infrastructure coexists with traditional infrastructure indefinitely, providing regulated services to a select group of investors and issuers; (2) participating parties begin to realize cost savings (from process streamlining and risk mitigation) and/or greater liquidity from access to global markets, leading to a preference for this platform and therefore a "sunsetting" of traditional infrastructures; (3) regulation evolves to permit issuing, trading, settlement or custody without certain parties, leading to those parties' roles being eliminated/scaled back; (4) a DLT-based platform is deemed essential only for cryptocurrencies and a limited set of digital assets, limiting applications to regulated securities markets.

Enablers

- Regulators are more likely to be open to new infrastructures (especially from existing providers), rather than attempts to replace systemically important systems with new technology
- Growing institutional investor interest in cryptocurrencies could drive enough initial interest in digital issuances to create a virtuous cycle
- Availability of CBDCs would likely prompt greater comfort with DLT among both infrastructure providers and market participants, as CBDCs would allow for atomic DvP settlement in central bank money

Impediments

- "Chicken and egg" scenario: liquidity begets issuance, which begets liquidity, but without strong incentives to issue or invest in this market (vs. traditional markets), both will remain limited
- In order to truly open a global liquidity pool, a range of regulations need to be harmonized across jurisdictions, in addition to further development in technological interoperability between systems

Example firms/projects/products

SIX Digital Exchange (SDX)	Status: in production build
DTCC: Project Whitney (for private markets)	Status: proof of value
SBI Holdings, SMFG: Osaka Digital Exchange	Status: in production build
SDX, SBI: Singapore-based digital asset exchange	Status: in production build
Gibraltar Stock Exchange: GRID	Status: live in production

PROJECT SPOTLIGHT



Swiss Digital Exchange

SIX Swiss Exchange is in the process of building SDX, an end-to-end, fully regulated exchange and CSD for the listing, trading, settlement and custody of digital assets. It aims to allow financial institutions to trade digitized shares, bonds and other assets with the help of distributed ledger technology. SDX is not targeting publicly listed equities as one of the initial asset classes on the platform (choosing instead to focus on asset classes with more significant inefficiencies, including private SME equity shares). SDX was founded in 2018, launched its prototype in September 2019 and plans to go live with several asset classes in 2021.⁵⁰

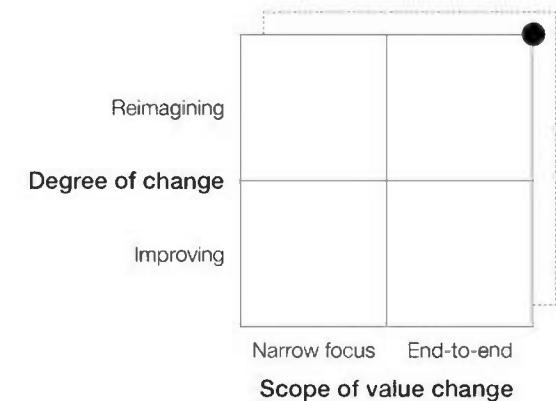
Equity tokens issued on blockchain

Replatforming / Supplementing / End-to-end / Equity tokens

Overview

This approach is potentially the most disruptive threat to existing equity markets, with DLT being used to replace most of the traditional intermediaries and processes in equity markets. By listing securities directly on public blockchains – either on their own or with the help of banks – issuers could eliminate many of the processes associated with each component of the value chain (e.g. operations designed for legacy environments or required by current regulations). Security tokens are one area where traditional

markets could intersect with DeFi (decentralized finance), through decentralized exchanges, allowing for multiple trading venues and a range of additional applications. While, to date, the focus has been on private shares – whose fragmented markets and largely manual processes could benefit from the potential for standardization and automation offered by DLT – many anticipate a future blurring of the lines between traditional publicly listed equities and tokenized private company shares.



Value chain components in scope

● In scope ● Partially in scope ● Not in scope



Major changes from current state*

- Rather than issuing on a centralized exchange with a single CSD, tokens would be issued on a public or permissioned blockchain, with investors accessing markets and trading through multiple decentralized exchanges

Proposed benefits*

- Potentially significantly lower cost of issuance, thereby opening access to smaller firms
- Without consideration for legacy architecture or processes, a likely easier path to realizing the workflow and operational benefits offered by the technology

Potential risks/challenges

Fundamental change to existing market functioning, with no fundamental agreement on how roles (e.g. custody) are defined. In many jurisdictions, changes to securities legislation could be required for public equities to be issued directly to blockchains, thereby limiting activity in the space for all but the smallest firms

In some jurisdictions, regulatory requirements around disclosures and transparency could be prohibitive to smaller companies interested in issuing shares on DLT platforms. Potentially exposes participants to a new class of cyber risks, thereby necessitating an entirely new control framework

Potential path forward

This approach faces the greatest uncertainty, but most see strong potential for SME issuance and significantly less opportunity in the traditional public equity markets. However, a range of future scenarios exists: (1) issuance is driven primarily by SMEs and other firms traditionally excluded from capital markets, but limited demand from investors prevents the market from taking off; (2) investor demand and DeFi growth leads to robust private markets for private equity shares issued on blockchain, bringing liquidity to the market and blurring the line between public and private shares; and (3) archetypal bottom-up disruption, beginning with SMEs and private firms but eventually expanding to other market segments as participants realize the benefits and cost savings associated with listing on public blockchains vs. traditional markets.

* May differ by exact model.

Debt markets: summary

Fixed income – and bonds, in particular – has been seen by many observers and participants as an asset class with significant potential for digital transformation, with several major DLT-based projects under way (including a number of highly publicized “blockchain bonds” issued in recent years). While there is substantial variation in market characteristics and functioning between different fixed-income markets, challenges that could potentially be addressed by DLT-based digitalization include:

- Inefficiencies in issuance, trading and post-trade processes
- Illiquidity in secondary markets and limited primary market issuance
- Limited access to markets due to high minimum transaction sizes

As with other asset classes, various institutions attempt to address these challenges through both end-to-end platforms and solutions that are more narrowly focused on specific components of the value chain. Given the fragmented, over-the-counter nature of secondary market trading, bonds are seen as both likelier to benefit from DLT-based solutions and easier to transform, without necessarily requiring wholesale market transformation.

Overview of asset class

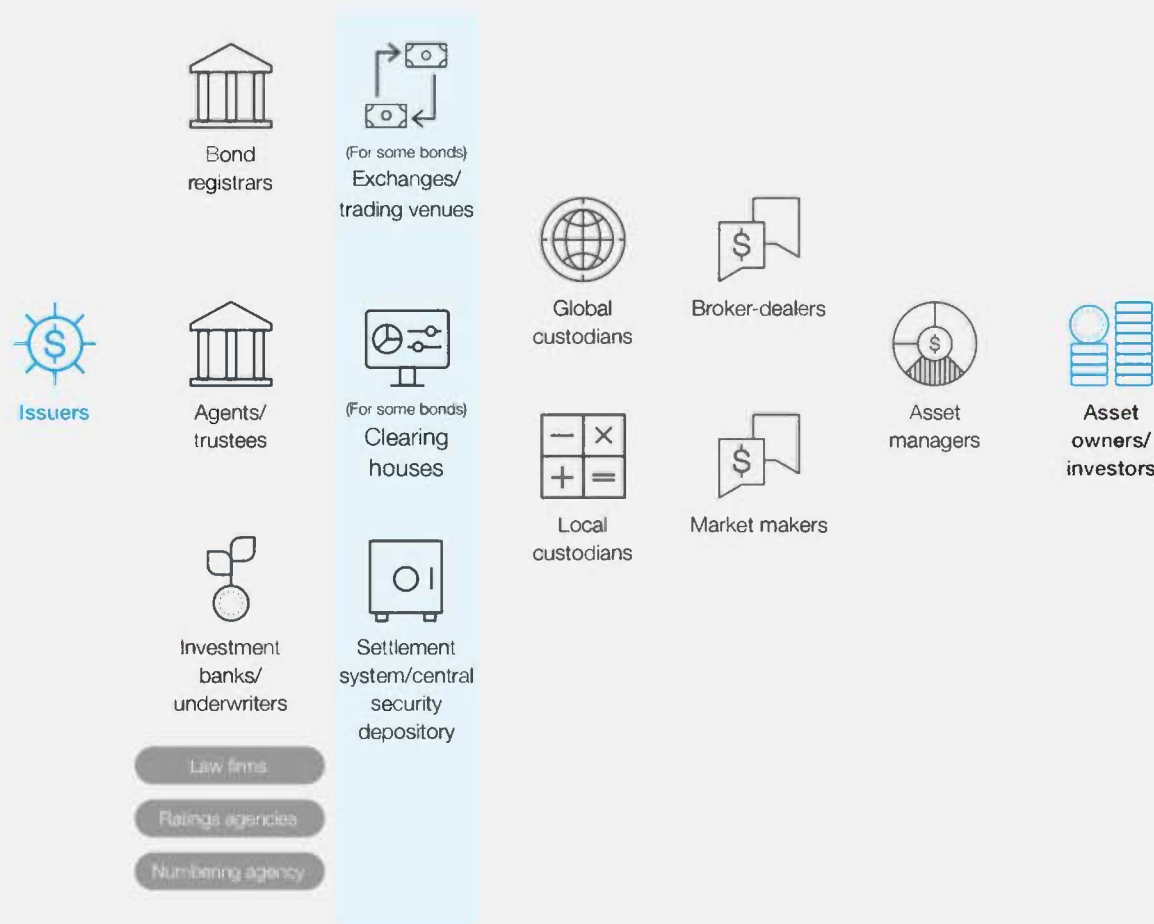
Market overview

Fixed-income debt markets are highly diverse, with instruments defined primarily by their issuers (investment-grade corporates, high-yield corporates, national governments and subnational governments) and their maturity (shorter-term paper and longer-term bonds). In some cases, markets for retail and wholesale investors are also separate. Within each of these categories, bonds differ in terms of their seniority in the capital structure and, most importantly, the terms of the debt. As such, even in bonds from the same issuer, there is relatively little fungibility between issuances. Globally, the notional value of bonds outstanding totalled \$106 trillion at the end of 2019, with a range of \$17 trillion–\$21 trillion in annual issuance over the preceding decade.⁵¹

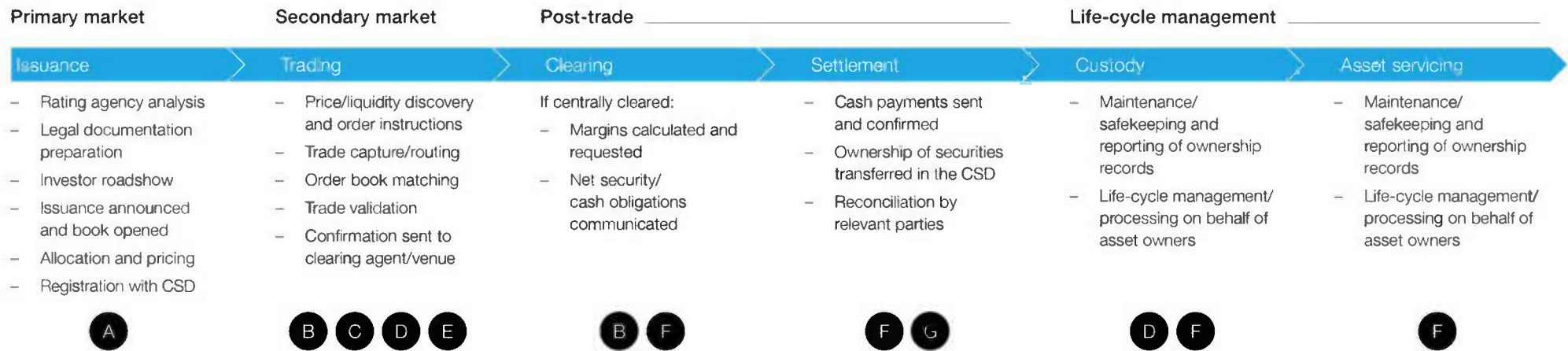
Key characteristics

Market operations and functioning vary significantly across countries and types of instruments. In general, bonds tend to be traded over-the-counter (OTC), with some trading taking place on exchanges. While recent years have seen an increase in electronic trading, most trading involves orders placed telephonically with broker-dealers. Some markets are entirely or partially centrally cleared, while many instruments always settle bilaterally. Liquidity in bond markets ranges dramatically, from the deep and highly liquid US Treasury market to many syndicated corporate bonds that are held to maturity.

Several intermediaries and infrastructure providers facilitate the flow of capital from investors to corporate or sovereign bond issuers, trading between investors and the flow of funds from coupon and principal payments:



DLT in the fixed-income debt value chain



While pain points are concentrated in secondary market trading, they also reflect challenges and inefficiencies across the entire value chain

Existing pain points

Given the diversity in bond markets, pain points vary somewhat between different debt instruments:

- A** The corporate bond issuance process is highly manual and prolonged, with significant time required to issue and receive proceeds
- B** Because secondary markets are largely over-the-counter, liquidity tends to be fragmented, with limited ability to accurately price trades
- C** Corporate bond markets tend to face limited secondary market liquidity overall, thereby limiting some investor interest and affecting cost of capital
- D** Trading processes are largely manual, leading to significant inefficiencies and poor data quality for all participants

- E** Relatively high minimum ticket sizes (given high transaction costs) exclude most retail investors
- F** All parties retain siloed data structures, calculating payments and other transactions independently using reference data, thus creating inefficiencies
- G** Extended settlement time frames add additional cost and risk

Potential DLT roles in debt markets

While the inefficiencies in debt markets could be addressed by a range of technologies replacing or augmenting manual processes, there may be opportunities for which DLT is particularly well suited, such as:

- Establishing a single source of truth for reference data on bond terms, trade and settlement status, ownership and coupon/repayment instructions

- Automating settlement instructions and/or life-cycle events using smart contracts
- Creating a low-cost new infrastructure for bond markets without established infrastructures (e.g. retail issuances in emerging markets)
- Fractionalization of debt instruments
- Entirely new products enabled by smart contracts (e.g. creating a new instrument by separating coupon payment cash flow from a bond)

DLT in the fixed-income debt value chain

1

Platform for digital bond issuance

What? Replace existing manual pre-issuance processes with a digital platform that connects all relevant parties

Who? Led by third-party technology provider or exchange/infrastructure, with the goal of including all parties involved in a bond issuance (e.g. issuer, banks, CSD, registrar, ratings agencies, law firms etc.)

Why? Reduce the time and cost required to issue a bond by digitizing current manual processes and patchwork of paper documentation; possible to achieve with traditional technologies, but DLT may allow for greater certainty in data

2

Distributed order book for bond trading

What? Establish a distributed platform for consolidating trade orders, where orders are visible only to potential trading matches

Who? Led by third-party technology provider, but including both buy- and sell-side market participants involved in secondary market trading

Why? Reduce fragmentation and manual price/liquidity discovery in the corporate bond markets by creating a concentrated trading venue with minimal data leakage

3

Platform covering full corporate bond life cycle

What? Introduce a DLT-based end-to-end platform enabling the issuance, trading, settlement and custody of digitally native bonds

Who? Led primarily by exchanges/infrastructure providers and/or bank consortia, with participant ecosystem including issuers, infrastructure providers and a range of other service providers

Why? Enable the full potential of digital assets (end-to-end processes automated by embedded smart contracts, risk-free atomic settlement etc.) in a regulated environment in parallel to existing infrastructure

4

Retail bond issuance and distribution

What? Develop DLT platform to facilitate retail investor access to corporate and government bonds (via tokenizing and fractionalizing bonds)

Who? To date, primarily governments and financial institutions in emerging markets seeking to develop a trusted, low-cost infrastructure and distribution channel for bond investments by retail owners

Why? Enable a larger population of retail investors to both own and trade bonds efficiently and at low costs, where the existing infrastructure supports only high-ticket-price investments

5

“Stand-alone” blockchain bond issuance

What? Issue a stand-alone bond via DLT to test the underlying technology and prove its value

Who? Generally speaking, the issuances have been arranged by one bank or a small syndicate, with a limited number of investors and limited secondary market trading

Why? Affirm DLT’s potential ability to modernize/optimize the bond issuance process (e.g. faster time to market, increased scalability, lowering issuance costs etc.)

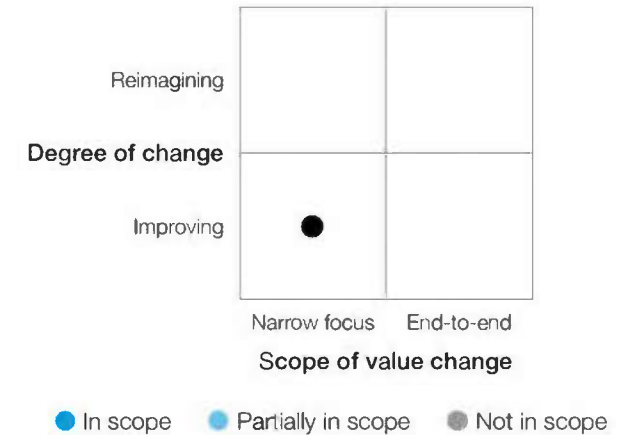
Platform for digital bond issuance

Issuance / Trading / Full life cycle / Retail distribution / Stand-alone

Overview

Numerous firms are developing digital solutions to address inefficiencies in the processes to issue bonds. While some of these solutions use DLT outright, others use a combination of connected, centralized databases and smart contracts, with the potential for interoperability with DLT-based platforms in the future. These solutions are designed to bring together the relevant parties involved in a bond issuance through a streamlined

digital channel, replacing the current patchwork of paper documentation shared via email and fax. In doing so, they reduce the time required to issue a bond and the cost of issuance. These solutions do not necessarily aim to achieve downstream efficiencies in trading, settlement or life-cycle management – though some are built to issue digital bonds that will integrate with other platforms to achieve end-to-end efficiencies.



Value chain components in scope



Major changes from current state*

Replace existing manual issuance processes with a digital platform (either DLT-based or centralized); existing initiatives focus on one or both components of issuance:

- Document preparation processes
- Primary issuance allocation and pricing

Proposed benefits*

Expedited issuance by streamlining communication and document preparation (elimination of inefficiencies including substantial manual back-and-forth, errors, lack of transparency and lack of standardization and structured data)

Potential risks/challenges

Given the need to integrate workflows from non-financial institutions (e.g. law firms, ratings agencies, issuers), coordination/onboarding challenges may be substantial

Uncertainty about technology fit (i.e. whether DLT is uniquely able to address issuance workflow inefficiencies)

Example firms/projects

Nivaura Aurora	Status: live in production
agora Digital Capital Markets (building end-to-end smart bonds, but initial focus on issuance)	Status: production scheduled 2021
DirectBooks (not DLT-based)	Status: live in production

Potential path forward

While a digital bond issuance platform could achieve stand-alone efficiencies (without changing the underlying security status), observers believe these platforms will earn significantly more value when combined with an end-to-end digital infrastructure. Securities can subsequently be issued on a distributed ledger, with smart contracts to automate compliance and life-cycle management, and ultimately traded and settled in a more frictionless manner. By introducing greater standardization in bond issuances, platforms can expedite the development of a broader digital infrastructure. Conversely, some market participants also believe that issuance processes can be improved with relatively straightforward digital tools, potentially limiting market participants' appetite for DLT or other emerging technologies. Either way, the successful transition to digital operating models during the COVID-19 pandemic is likely to encourage institutions to replace manual correspondence with digital collaboration platforms.

* May differ by exact model.

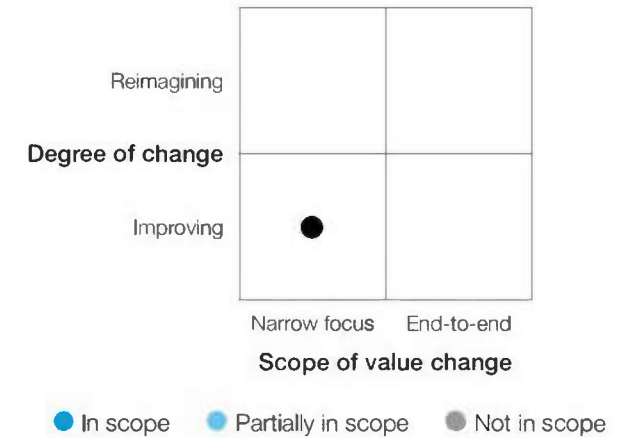
Distributed order book for corporate bond trading

Issuance / **Trading** / Full life cycle / Retail distribution / Stand-alone

Overview

Some firms seek to use DLT and related technologies to address core inefficiencies in secondary markets for corporate bonds. Rather than tackling bond issuance, the underlying infrastructure for custody and settlement or end-to-end tokenization, efforts are focused on bond trading to bring greater transparency and liquidity into bond markets while allowing market participants to

maintain control of their trading data. This could promote greater liquidity for corporate bonds, which generally face illiquidity due to both the idiosyncratic nature of individual securities and the structure of bond markets, where trading primarily takes place over-the-counter.



Value chain components in scope



Major changes from current state*

Rather than contacting multiple dealers to locate inventory/ trade matches, orders are routed to a DLT-based platform, where orders are visible only to potential trading matches

Proposed benefits*

- Reduce fragmentation in corporate bond trading (assuming sufficient adoption)
- Allow better data controls, limiting leakage of trade information (and potentially allow participants to monetize their trading data)

Potential risks/challenges

Achieving benefits requires substantial trading activity to migrate to platform, potentially centralizing risk in a new trading venue

Uncertainty about technology fit (i.e. whether DLT is uniquely able to address trading inefficiencies), particularly as electronic trading platforms gain trading market share

Example firms/projects

LedgerEdge

Status: in development; scheduled to launch autumn 2021

Potential path forward

Since corporate bond trading is decentralized across many venues and market participants, a stand-alone DLT-based trading platform could drive value without requiring the entire ecosystem to transform. However, observers question whether a DLT solution for trading would limit interest in other DLT-based bond market solutions (e.g. issuance tools or underlying custody and settlement infrastructure) or if it might lead market participants to be more open to such solutions.

* May differ by exact model.

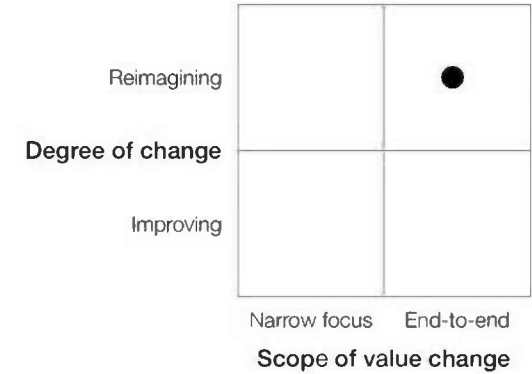
Platform covering full corporate bond life cycle

Issuance / Trading / **Full life cycle** / Retail distribution / Stand-alone

Overview

As with the equity market, several exchanges/ infrastructure providers and financial technology firms are developing end-to-end platforms for debt-fixed income securities. The platforms enable market participants and intermediaries to list or issue, trade, settle trades and provide custody services for digital assets – in this case, digitally native bonds – in a fully regulated environment. These platforms exist in parallel to existing market

infrastructure and existing bond markets, offering an alternative digitized version of standard bonds. While DLT may be the core technology on which the “Central Securities Depository” is maintained, some functions/ processes may employ existing technologies if there is no clear case for using DLT (e.g. trading). This approach does not necessarily disintermediate any parties, although some roles may become redundant over time.



Value chain components in scope

● In scope ● Partially in scope ● Not in scope



Major changes from current state*

- Introduce a single, shared source of truth on all aspects of the security, including terms, ownership and trade/ post-trade activities
- Digitize bond terms, enabling programmability of securities from issuance (replacing document-based manual processes)
- Potential for investors and issuers to interact directly with market infrastructure (or with one another)

Proposed benefits*

- Greater transparency for all parties
- Potential to reduce complexity in operations and/ or operational burdens associated with reconciliation activity, thereby reducing transaction costs for all parties
- Potential for streamlining/automating all processes associated with coupon and principal payments, clearing and settling and/or maintaining regulatory compliance
- Issuers could potentially list directly and/or have greater transparency of ownership, without relying on additional intermediaries, reducing costs to issue

Potential risks/challenges

Need for mechanisms to verify and validate smart contract terms among all relevant parties upon issuance

Potential for interoperability issues assuming multiple platforms in coexistence (i.e. how to ensure that ecosystems do not remain closed)

* May differ by exact model.

Platform covering full corporate bond life cycle

Issuance / Trading / Full life cycle / Retail distribution / Stand-alone

Potential path forward

Fragmentation, inefficient processes and limited liquidity in secondary markets make end-to-end transformations desirable in corporate bonds. However, this requires coordination and adaptation across a range of participants throughout the entire value chain, most of whom do not interact directly in existing markets (e.g. issuers, front and back-office staff from multiple business lines, infrastructure providers, et al.). Nevertheless, many participants and observers believe that a series of smart bond issuances by prominent corporates would significantly increase investor and issuer interest in such a platform.

Enablers

- Compared to equity markets, generating liquidity is less likely to be a significant impediment for bonds, since the alternative is the status quo of fragmented and generally illiquid markets
- The successful transition to digital operating models during the COVID-19 pandemic is likely to encourage greater openness among financial institutions to replacing manual correspondence with digital collaboration platforms
- Availability of CBDCs would likely prompt greater comfort with DLT among both infrastructure providers and market participants, as CBDCs would allow for atomic DvP settlement in central bank money

Impediments

- DLT-enabled bonds are seen by many issuers, investors and intermediaries as experimental, thereby limiting the willingness to be early movers in listing new bonds or investing in the limited supply of existing securities
- “Chicken and egg” problem: liquidity begets issuance, which begets liquidity, but without strong incentives to issue or invest in this market (vs. traditional markets), both will remain limited

Example firms/projects

HSBC, Temasek, SGX Digital bond issuance and life-cycle management	Status: successful pilot/ proof of value (Sept 2020)
SIX Digital Exchange End-to-end digital market infrastructure	Status: in production build
Bursa Malaysia/Labuan Financial Exchange (Project Harbour) End-to-end digital bond issuance, trading, and depository venue	Status: proof of concept

PROJECT SPOTLIGHT




SGX/Temasek Marketnode

Following a successful proof of value co-led by SGX, Temasek and HSBC (during which a digital, smart contract-based bond was issued and settled on DLT using HSBC's on-chain payments solution), SGX and Temasek announced the creation of a digital asset exchange focusing on the bond market. Partnering with bond issuance software provider Covalent Capital, the combined platform will be an end-to-end solution employing DLT and smart contracts for relevant value chain components (using Covalent's existing non-DLT digital issuance platform for book building).⁵²

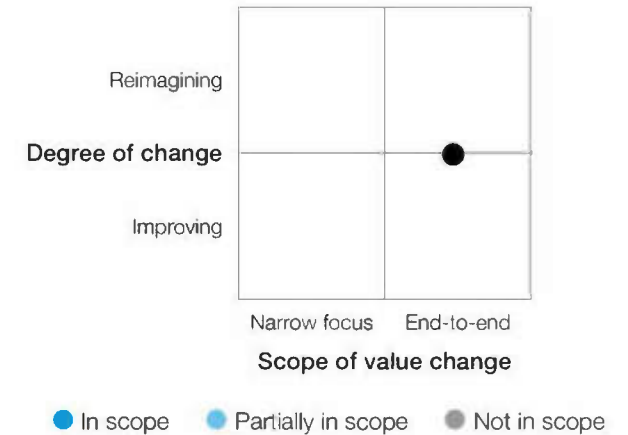
Retail bond issuance and distribution

Issuance / Trading / Full life cycle / **Retail distribution** / Stand-alone

Overview

Particularly in emerging markets, financial institutions and governments are developing solutions to facilitate retail investor access to corporate and government bonds. Since issuance and trading infrastructure have high fixed costs, bond investments often have equally high minimum ticket sizes and transaction costs for primary and

secondary markets. By tokenizing bonds and distributing them via a digital platform accessible by retail investors (through which bonds can be fractionalized and traded with instantaneous, low-cost settlement), issuers can expand access to a wider group of retail investors.



Value chain components in scope



Major changes from current state*

Establish a platform to facilitate both issuing bonds directly to retail investors and secondary market trading among retail investors, without costs associated with legacy infrastructure and/or intermediaries

Proposed benefits*

- Enable a larger population of retail investors to both own and trade bonds
- Potential to interact with broader financial and digital inclusion efforts (e.g. digital identity programmes)

Potential risks/challenges

Developments are likely to be limited to jurisdictions in which governments are taking an active stance in favour of DLT in financial markets

There may be regulatory/consumer protection issues to be addressed in terms of custody/cryptographic key management, fraud and privacy concerns

Example firms/projects

Philippines: Union Bank and Standard Chartered (tokenization platform for retail corporate bonds)	Status: proof of concept completed Dec 2020
Philippines: Union Bank and PDAx (Bonds.PH retail government bond distribution platform)	Status: in production build
Thailand: Bank of Thailand (government savings bond platform)	Status: production scheduled 2021

Potential paths forward

For jurisdictions with limited retail investor participation in bond markets, DLT will likely not offer a panacea. However, some governments and financial institutions may find that DLT provides a low-cost basis for establishing a retail bond market infrastructure without requiring too many intermediaries. In these jurisdictions, while most expect the DLT-based retail market to develop separately from wholesale markets, many believe that if there are significant cost savings from the new infrastructure, governments and issuers may push for the application of DLT to wholesale bond market infrastructures.

* May differ by exact model.

'Stand-alone' blockchain bond issuances

Issuance / Trading / Full life cycle / Retail distribution / Stand-alone

Overview

"Stand-alone" issuances of "blockchain bonds" have been an important means for financial institutions to test the underlying technology and prove its value. Most issuances have been arranged by one bank or a small syndicate, with a limited number of investors and limited secondary market trading. In these experiments, bonds have either been "mirrored" or simulated on a distributed ledger, or they have been fully issued on DLT as the official record. Across the board, they have proven the technical

feasibility of establishing a bond with terms codified in smart contracts and have clarified the various roles that are essential in managing a DLT-listed bond throughout its life cycle. While, in general, these tests have affirmed blockchain's potential ability to streamline and optimize the bond issuance process, they have also underlined the challenges of ensuring regulatory and legal compliance in uncertain regulatory environments, as well as the benefits and challenges of developing solutions collaboratively.

Notable issuances

Lead arranger	Issuer	Date	Comments
Commonwealth Bank of Australia (with RBC and TD Securities for 2019 issuance)	The World Bank ("Bond-I")	2018 and 2019	World Bank issued A\$110 million bond on blockchain, with life-cycle events managed through smart contracts. Follow-on transaction in 2019, with more investors and additional arrangers/market makers, allowed for secondary market transfer on-chain. ⁵³
JPMorgan	National Bank of Canada	2018	NBC issued a \$150 million one-year floating rate note, mirrored/simulated on Quorum blockchain, with several investors participating in the trial. ⁵⁴
Sberbank	MTS	2018	Sberbank placed a RUB 750 billion commercial bond for MTS, a Russian telecom company, using the National Settlement Depository's (NSD) blockchain, with the full life cycle managed through smart contracts. ⁵⁵
Santander CIB	Banco Santander	2019	Self-issuance of a \$20 million bond on public Ethereum; Santander Securities Services serves as tokenization agent and custodian (of cryptographic keys), with Santander CIB as dealer. All cash payments are tokenized. ⁵⁶
Société Générale	Société Générale SFH	2019	Self-issuance of €100 million covered bond on public Ethereum blockchain. ⁵⁷
BBVA	BBVA	2019	Structured €35 million green bond (earmarked for sustainability efforts) issued to MAPFRE using BBVA blockchain platform. ⁵⁸
Bank of China (BoC)	Bank of China (BoC)	2020	BoC completed the issuance of 20 billion yuan (\$2.8 billion) worth of bonds using its proprietary blockchain system. ⁵⁹

Securitized Products: summary

Securitized product markets are highly heterogeneous, given significant differences in the loans underlying mortgage-backed securities, asset-backed securities, collateralized loan obligations and other instruments. However, across the board, there are widely acknowledged inefficiencies associated with manual processes and limited trust in data between institutions. Beyond the challenges that are common across other securities markets, securitized products face a unique set of issues associated with the fact that these securities effectively bundle the cash flows and risks of a large number of underlying loans.

While most would agree that there is significant opportunity to better use technology across the value chain for securitized products, a number of observers and market participants believe that DLT may provide unique benefits to these markets. In particular, DLT-based solutions may enable all relevant participants in the value chain to access the same data on underlying loans in real time, thereby reducing the need to verify and audit data throughout the security life cycle.

Overview of asset class

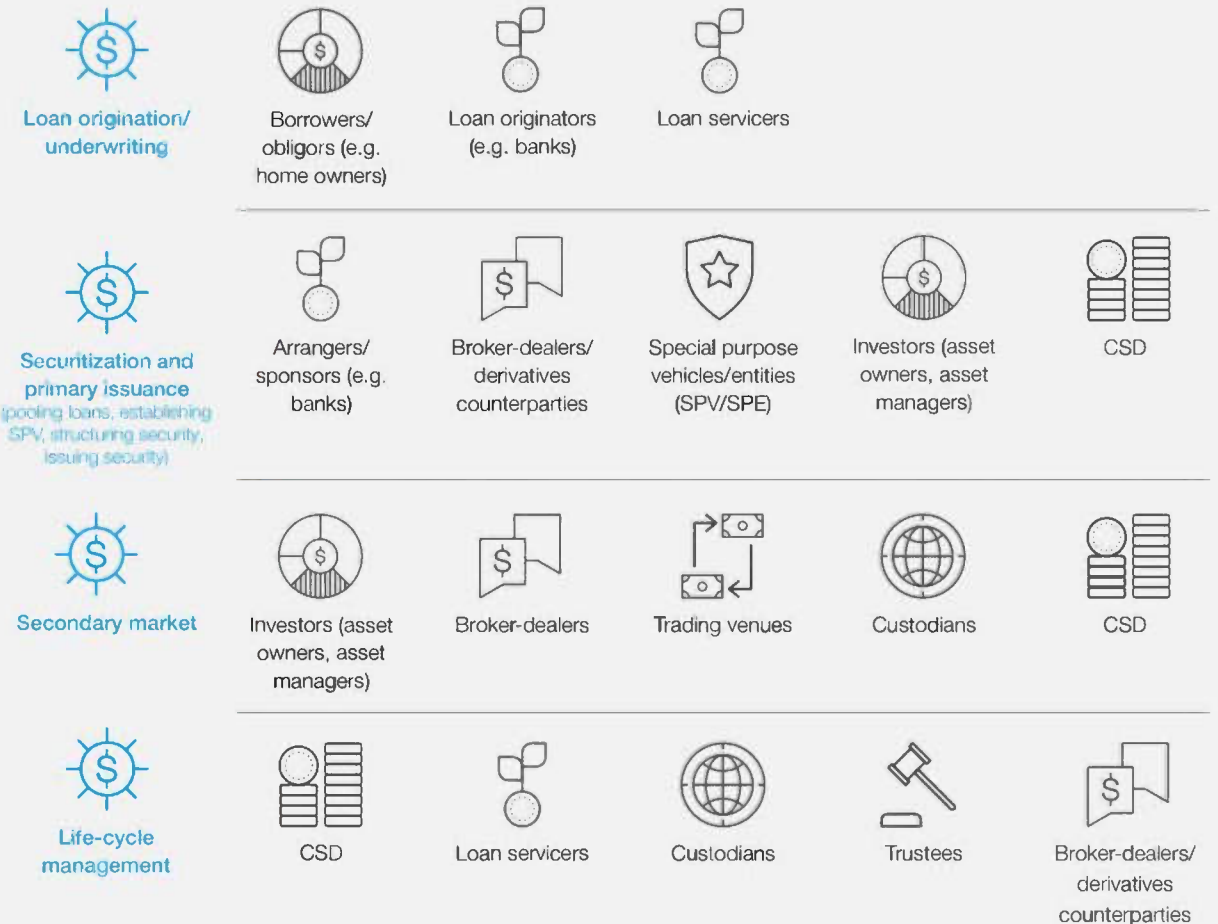
Market overview

Securitization is the process of converting the cash flows from illiquid financial credit assets into tradeable securities. As such, securitized products are highly diverse, but are generally categorized as mortgage-backed securities (MBS, consisting of both residential and commercial mortgage loans), asset-backed securities (ABS, consisting of non-mortgage consumer credit, such as credit cards and auto loans) and collateralized loan obligations (CLOs, consisting of corporate loans). Generally, these securities are issued by a bank or a non-bank originator, responsible for pooling the exposures, structuring the security and selling to investors. The US MBS market, by far the world's largest, stood at \$10 trillion at the end of 2019.⁶⁰ European MBS, ABS and CLO markets totalled \$1.2 trillion at the end of 2019.⁶¹

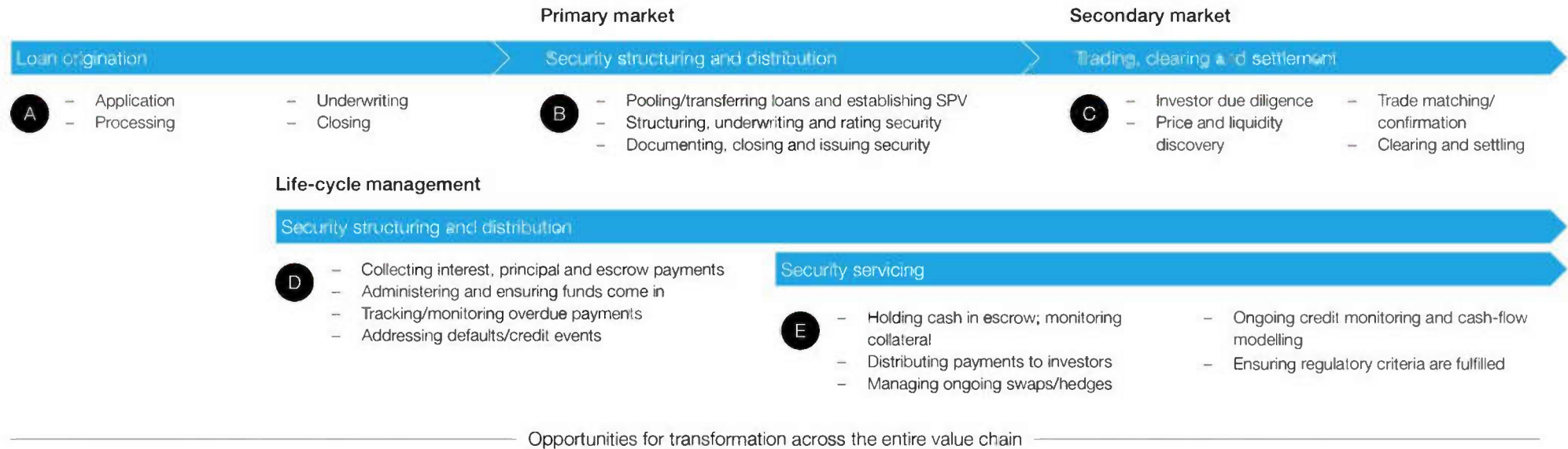
Key characteristics

While the core processes of consolidating loan exposures, structuring and issuing securities and secondary market trading are consistent across securitized asset classes, there are fundamental differences in the underlying loans and in secondary market liquidity and operations. However, across MBS, ABS and CLOs, there are similar inefficiencies associated with manual and duplicative processes, limited transparency of underlying loans and associated costs and delays.

The securitized product landscape is highly complex, consisting of participants in underlying loan markets, participants in the securitization process and primary market issuance, participants in the secondary markets, and entities involved in lifecycle management for both the loan and the security.



DLT in the securitized products value chain



Existing pain points

Across the value chain, inefficiencies today include:

- A** Origination and underwriting of underlying loans: long lead times; lack of data standardization (contract terms, credit profiles, collateral); highly paper intensive; decentralized information and storage; costly to access and reconcile data
- B** Security structuring: complex, manual and costly processes to evaluate, rate and pool loans, which is often duplicated across multiple parties; slow, opaque and manual settlement processes

- C** Trading: except in certain MBS, relatively shallow over-the-counter markets, with constraints in liquidity and significant market information asymmetry
- D** Loan servicing: manual process to monitor and collect payments; limited insights offered to investors; fragmented account management
- E** Security servicing: costly due diligence and research due to absence of single source of truth; time lags leading to out-of-date or imperfect information; manual/slow reconciliation (time lags between loan payments and investor distributions)

Potential DLT roles in securitized products

While many digitization efforts could reduce the inefficiencies in lending and securitization, DLT-based systems could provide unique benefits, such as:

- Creating an accepted single source of truth on loan data, thereby increasing transparency for all parties and limiting the need for duplicative audits across the value chain
- Reducing the time and/or level of manual processing required for settlement of trades, processing payments and other life-cycle events (via smart contracts)
- Reducing the need for manual reconciliations throughout the life cycle of the security

Summary of emerging use cases

1

End-to-end origination, securitization and servicing platform

What? Introduce a DLT-based platform enabling loan origination, securities issuance, exchange, settlement and servicing processes on one platform

Who? Led by third-party technology providers and/or bank consortia

Why? Eliminate the need for each party to reverify each individual loan at every step of different processes; improve transparency of underlying loans (improved risk management); reduce reconciliations and complexity in operations; potentially reduce capital required to settle trades

2

Tokenizing loans for servicing and data management

What? Create a digital representation of a loan on a DLT platform that can then be used to facilitate loan payments and data sharing

Who? Driven by technology providers to support loan servicers, investors and other participants in the value chain

Why? Eliminate the need for each party to reverify each individual loan at every step of different processes; improve transparency of underlying loans (improved risk management) and flexibility (loans can be brought on or off DLT at any point)

3

Improving security servicing through DLT

What? Develop a DLT-enabled tool to facilitate better and more efficient servicing of securitized products and underlying loans

Who? Led by trustees or other service providers involved in servicing securities

Why? Enable greater transparency of performance of underlying loans and to automate elements of security servicing

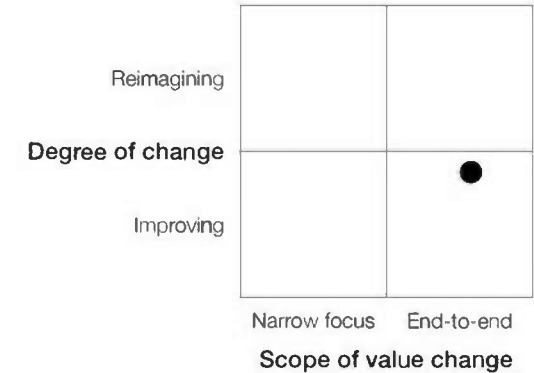
End-to-end origination, securitization and servicing platform

End-to-end / Loan servicing / Security servicing

Overview

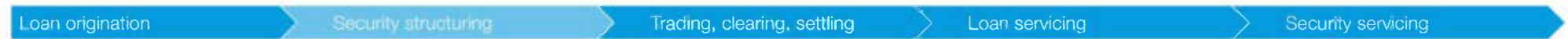
Given inefficiencies across the value chain for many securitized products, some firms have focused on end-to-end solutions, bringing together the loan origination, securities issuance, exchange, settlement and servicing processes on one platform. While not all relevant applications and processes will necessarily be built on a distributed ledger, the basic premise is to create a single source of truth on the underlying assets (data, terms and cash flows) that is connected to a single source of truth

on the securities, accessible by all relevant parties to improve processes associated with trading and managing the life cycle of securities. While focused on delivering end-to-end value, the platform can be designed to integrate with other systems for processes that would not necessarily benefit from a distributed ledger or would require transforming an additional complex ecosystem (e.g. an initial loan issuance or exchange).



● In scope ● Partially in scope ● Not in scope

Value chain components in scope



Major changes from current state*

- Loans are originated on a DLT system, or loan data is brought onto the chain immediately after origination (using a standard data model); all downstream transactions are based on this loan data and associated smart contracts
- Securities are created as digital assets on a distributed ledger, enabling both a shared source of truth on the security (e.g. terms, ownership) and programmability of securities from issuance (replacing paper-based manual processes)

Proposed benefits*

- Eliminate the need for auditing/verifying individual loan files at every step for every party (e.g. loan warehousing/sales, credit enhancements, primary market, trading)
- Transparency of underlying loans for all parties at all times, enabling investors to better understand risk
- Reduce complexity in operations and/or operational burdens associated with reconciliation activity, thereby reducing transaction costs for all parties
- Potential to reduce capital required to fund settlement
- Streamline or automate all processes associated with coupon and principal payments, clearing and settling, and/or maintaining regulatory compliance

Potential risks/challenges

To benefit, all participants need to acknowledge the accuracy of the underlying loan terms with limited or no auditing; this will require governance and upfront verification by multiple parties, and, depending on the jurisdiction, could require regulatory approval

* May differ by exact model.

End-to-end origination, securitization and servicing platform

End-to-end / Loan servicing / Security servicing

Potential path forward

Given the limited liquidity and inefficient, manual processes across the value chain, there is significant potential for end-to-end transformation in some securitized product markets. Since secondary markets are largely fragmented and over-the-counter, a small, minimum-viable ecosystem of relevant institutions could realize value and drive interest among investors, which in turn could drive greater demand for loans “originated” on DLT among securitized product issuers. With significant diversity in securitized product markets, however, some are unlikely to adopt any end-to-end digital solutions without pressure from key institutions (e.g. agency-backed MBS markets in the US) or are unlikely to benefit significantly from an end-to-end solution (e.g. CLOs according to many industry participants).

Enablers

- Markets with greater data standardization (in the terms of underlying loans) – or ability to impose standardization on a limited ecosystem of participants – will be more easily digitized
- It may be easier to build a minimum viable ecosystem for securities whose underlying loan originations involve a smaller network of participants
- Integrations between digital asset trading venues (and potentially off-chain trading venues) could create a larger investor base, reducing the likelihood that limited demand on any individual end-to-end platform limits issuance

Impediments

- In highly complex markets with heterogeneous underlying assets, end-to-end digitalization will be difficult, and potentially of limited value (e.g. CLO markets, whose underlying corporate loans are often highly bespoke due to both borrower and investor demands)

Example firms/projects

Figure Technologies

DLT-enabled mortgage/ HELOC lending, securities issuance, trading and servicing platform

Status: live in production (ongoing lending, with two securitizations completed)

Vanguard, Citi, BNY Mellon, State Street, in partnership with Symbiont⁶²

DLT-enabled platform for ABS issuance, settlement, custody, and servicing (loans onboarded after origination)

Status: successful pilot announced in June 2020

PROJECT SPOTLIGHT

Figure/Provenance securitizations

Figure Technologies has developed an integrated platform for originating mortgages and home equity loans, securitizing loans and distributing/exchanging securities, using its permissioned blockchain Provenance. In 2020, Figure completed two securitizations, detailing the efficiencies all parties realized in two white papers. These efficiencies included the use of automation through smart contracts (for loan compliance, warehousing and servicing), the use of stablecoins to speed up cash payments and, most significantly, the transparency and data certainty for all parties, limiting the need for subsequent audits.⁶³

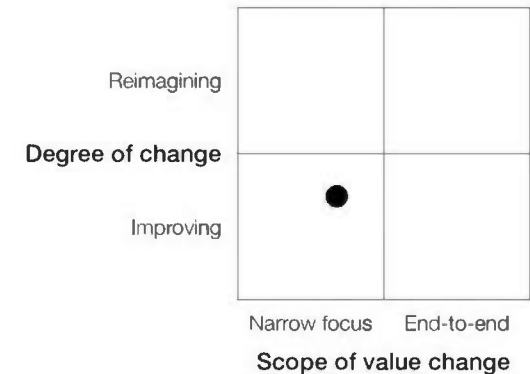
Tokenizing loans for servicing and data management

End-to-end / Loan servicing / Security servicing

Overview

One approach to addressing the lack of transparency at the loan level is to create a digital representation of each loan that can then be used to facilitate loan payments and data sharing. Rather than originating loans directly on a distributed ledger – which could be challenging given the fragmentation in participants in underlying loan markets – a tokenized version of the loan is created after origination that then becomes the single source of truth for the loan.

Parties involved in a securitization, subsequent investors in the securities and loan servicers are then able to access verified data on the underlying loans without each party necessarily having to audit the full loan pool at every step. While the shared data source still creates downstream benefits throughout the life of the loan, this approach is not focused on applying DLT to address challenges with securitization or the securities market infrastructure.



Value chain components in scope



Major changes from current state*

- Underlying loans are “onboarded” to a DLT-based platform after origination, which becomes the single source of truth on the underlying loans for all parties (e.g. investors, servicers, borrowers)
- While borrowers still interact with their servicers directly, their payments are recorded by the servicers on the distributed ledger, ensuring accurate data on loan performance

Proposed benefits*

- Reduce the need for auditing/verifying individual loan files at every step for every party (e.g. loan warehousing/ sales, credit enhancements, primary market, trading)

- Transparency of underlying loans for all parties at all times, enabling investors to better understand risk
- Loans can be brought on or off DLT at any point in their life, depending on the interests of the owner/servicer

Potential risks/challenges

To benefit, all participants need to acknowledge the accuracy of the underlying loan terms with limited or no auditing; this will require governance and upfront verification by multiple parties, and depending on the jurisdiction, could require regulatory approval

Despite not being end-to-end, benefits would still require bringing a relatively large ecosystem to the platform, potentially limiting uptake

Example firms/projects

Liquid Mortgage
(focused on US mortgage market, but applicable for other loan markets)

Status: live in production

* May differ by exact model.

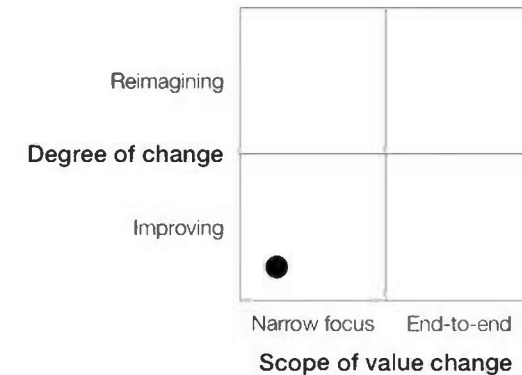
Improving security servicing through DLT

End-to-end / Loan servicing / Security servicing

Overview

A number of market participants are focused on developing DLT-enabled tools to facilitate better and more efficient servicing of securitized products and underlying loans. While these approaches could create efficiencies across the value chain, the focus on a relatively narrow slice of services has the potential to enable faster development of a minimum-viable ecosystem of participants. These approaches vary somewhat, but the

basic premise is for the party responsible for servicing the security and reporting to investors – generally the trustee of the special purpose vehicle that holds the underlying assets – to use DLT both to ensure greater transparency of performance and to automate elements of servicing.



Value chain components in scope

● In scope ● Partially in scope ● Not in scope



Major changes from current state*

- Approach 1: create a DLT-based platform for originators, servicers, trustees and investors with digital/smart contract representations of loan terms (e.g. origination and servicing guidelines)
- Approach 2: create a DLT-based platform to connect trustee and servicer for managing ongoing servicing

Proposed benefits*

- Ensure transparency and shared source of truth on loan ownership and performance in the event of defaults or other adverse events, thereby reducing the potential for disputes and/or litigation
- Achieve better investor transparency (e.g. faster and more accurate trustee reports) without having to bring investors directly onto a shared platform

Potential risks/challenges

Could be difficult to achieve validation/consensus on loan terms and other data (such that smart contracts will be accepted) if not built into the issuance/ securitization process

A proliferation of “single sources of truth” could lead to a return to relying on reconciliation between multiple data sources, thereby limiting the operational efficiencies achieved

Example firms/projects

WSFS Institutional Services⁶⁴ Status: prototype in development

Automate trustee reporting for ABS (including loan-level details) and payment calculations

Wilmington Trust⁶⁵ Status: prototype in development

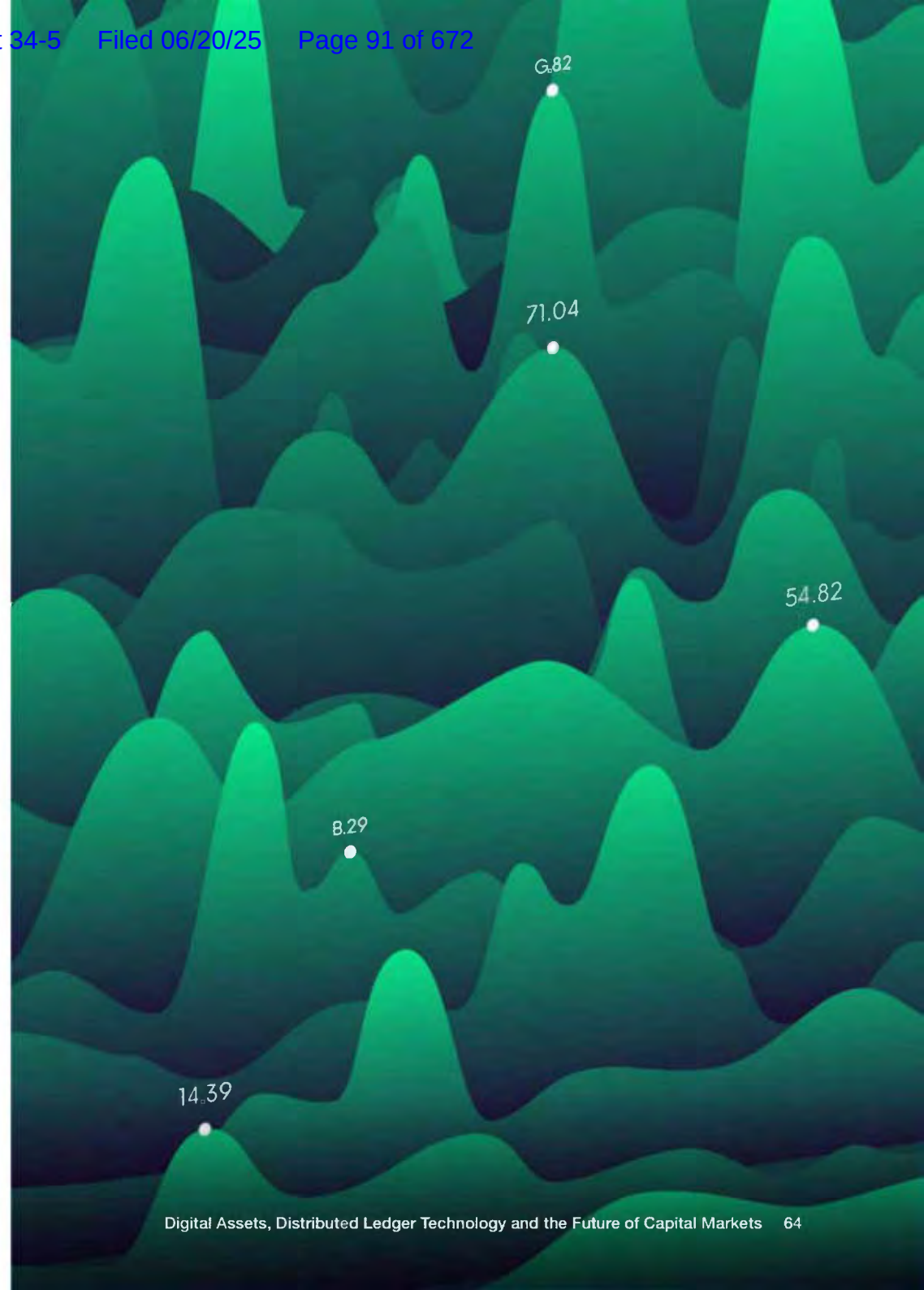
Focus on US MBS; DLT used to connect loans to origination/ servicing guidelines to automate reviews for violations

* May differ by exact model.

Derivatives: summary

Managing derivatives contracts is complex and involves coordinating activities across several parties. While the industry has moved somewhat towards digital solutions, many operations are hampered by inefficiencies, most notably around the need to reconcile position-related data on an ongoing basis. As a result, a number of market participants and service providers have developed or explored a range of DLT-based solutions to address key inefficiencies and risks, with some already live in the market. These solutions allow for shared sources of truth and mutualized processing across ecosystems or within institutions, including:

- Establishing a shared platform for managing post-trade life cycle of derivatives across counterparties
- Replacing post-trade infrastructure with a DLT-based system (in the case of markets with existing central infrastructures)
- Establishing a platform for institutions to manage their margin- and collateral-pledging workflows across all of their derivatives counterparties
- Creating a platform for mutualizing the data and workflow for finalizing derivatives trades



DERIVATIVES

Overview of asset class

Market overview

Derivatives – both forward commitments and contingent claims – are an essential tool for risk management and cash-flow smoothing for investors, corporates and financial institutions. As of year-end 2019, the notional amount of outstanding over-the-counter derivatives globally stood at \$560 trillion,⁶⁶ whereas the gross market value of these contracts was \$11.6 trillion.⁶⁷ The notional principal of exchange-traded futures and options stood at \$96 trillion.⁶⁸ Interest rate derivatives dominate derivatives markets, representing more than three-quarters of contracts, followed by foreign-exchange-linked derivatives. While the volume of equity- and credit-linked derivatives is lower, they are essential tools for many investors, with a notional outstanding amount in the trillions of dollars.

Key characteristics

Derivatives are traded either on exchanges or over-the-counter (OTC). While exchange-traded derivatives are always centrally cleared, OTC derivatives may be settled bilaterally or cleared through a central counterparty. Exchange-traded derivatives and cleared OTC derivatives tend to follow standardized contract terms, whereas uncleared OTC derivatives are generally more bespoke. While exchanges have long employed electronic trading, OTC derivatives trading has increasingly moved towards electronic platforms. ISDA, which administers the industry-standard master agreement used in many OTC derivatives contracts, has developed the Common Domain Model (CDM) as a common digital representation to be used across potential digital transformations in the asset class.⁶⁹

	Loan servicing	Trading	Clearing and position management	Settlement, payment and delivery
Listed/ exchange-traded	Order originated with broker-dealer and routed to exchange	Order matching on exchange	<ul style="list-style-type: none"> Central novation and multilateral netting (or bilateral netting) of contracts by clearing house Reconciliation of trades Daily margining calculations and collateral pledges managed by clearing house Managing trading party defaults Position and trade reporting 	<ul style="list-style-type: none"> Clearing house generates settlement instructions for payments/asset transfers (if necessary) For credit derivatives: life-cycle event processing
Cleared –over-the-counter (OTC)	Order originated with broker-dealer, potentially routed to other dealer through inter-dealer broker (including offsetting contracts used to cancel existing contracts)	Bilateral trading between broker-dealer and counterparty (often using electronic or multilateral OTC marketplace for common derivatives)	<ul style="list-style-type: none"> Trading parties and derivatives dealers manage open contracts Potential for bilateral netting Position and trade reporting 	<ul style="list-style-type: none"> Trading parties initiate payments or asset transfers (if necessary)
Uncleared OTC			<ul style="list-style-type: none"> Trading parties and derivatives dealers manage open contracts Potential for bilateral netting Position and trade reporting 	<ul style="list-style-type: none"> Trading parties initiate payments or asset transfers (if necessary)

Existing pain points

- Institutions maintain separate data siloes, requiring ongoing reconciliation and causing substantial errors
- Manual processing associated with continuous valuation and maintenance and reporting of ownership records
- Manual processing associated with managing margin obligations across systems/depositories
- Global failure rate for OTC derivatives of 2%, representing significant cost to the industry⁷⁰

Potential DLT roles in derivatives

- Create a single source of truth on derivatives contracts (post-trade) that can be used to manage derivatives position and life cycle
- Automate manual processes and verifications across institutions using smart contracts

Summary of emerging use cases

1

Platform for OTC derivatives post-trade life cycle

What? Platform for maintaining a shared source of truth accessible by all relevant parties on derivatives contracts across the post-trade life cycle, with smart contracts to manage life-cycle activities

Who? Financial institution consortia and/or third-party technology providers, with network effects from integrating more counterparties

Why? Replace manual, independent bilateral clearing and position management processes with a mutualized infrastructure and workflow; reduce the need for ongoing reconciliation while also reducing errors, discrepancies and complexity

2

Replatforming existing infrastructure on DLT

What? Replacing existing shared derivatives infrastructure (e.g. trade data warehouse and life-cycle processing system) with a DLT-based system, creating a shared source of truth across parties

Who? Led by existing infrastructure provider, but likely to require operational changes by all clearing participants

Why? Reduce operational cost and complexity by eliminating reconciliation activity and transitioning to a modern infrastructure

3

Platform managing collateral for cleared derivatives

What? Platform that provides real-time visibility into an institution's margin requirements across derivatives central counterparties and automates the collateral pledging workflow across CCPs

Who? Led primarily by individual custodians, but requires integration with derivatives clearing houses

Why? Increased operational efficiencies stemming from the end-to-end automation of collateral workflows and, potentially, optimizing collateral and cash balances through faster payments and capital deployment

4

Platform for exchange-traded derivatives trade life cycle

What? For buy-side participants and custodians, streamline the process of executing exchange-traded derivatives by creating a shared data platform for calculating broker fees and automating trade matching and enrichment

Who? Financial institution consortia and/or third-party technology providers, with network effects from integrating more counterparties

Why? Minimize trade breaks stemming from data discrepancies, enabling greater end-to-end automation

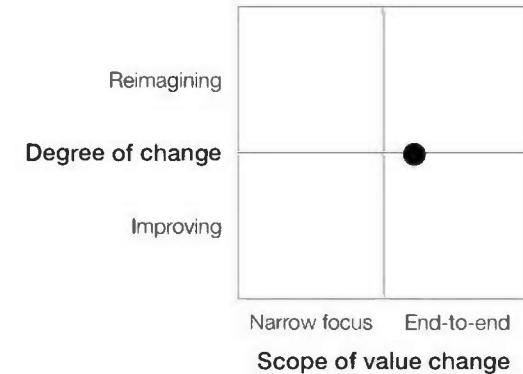
Platform for OTC derivatives post-trade life cycle

OTC post-trade / Replatforming / Collateral management / Trade life cycle

Overview

A number of market participants are focused on developing DLT-enabled tools to facilitate better and more efficient servicing of securitized products and underlying loans. While these approaches could create efficiencies across the value chain, the focus on a relatively narrow slice of services has the potential to enable faster development of a minimum-viable ecosystem of participants. These approaches vary somewhat, but the

basic premise is for the party responsible for servicing the security and reporting to investors – generally the trustee of the special purpose vehicle that holds the underlying assets – to use DLT both to ensure greater transparency of performance and to automate elements of servicing.



Value chain components in scope

● In scope ● Partially in scope ● Not in scope



Major changes from current state*

- Trades booked digitally to platform using standardized contract terms, verified by parties
- Platform serves as a single source of truth on derivatives positions, instead of separate data sources maintained by each party (with verification via email/phone)
- Daily valuation calculations and event processing conducted automatically based on shared position data and shared reference data, thereby minimizing the occurrence of discrepancies and reducing the need for reconciliation

Proposed benefits*

- Reduce the likelihood of errors and discrepancies in trade terms and valuation calculations, which likely also reduces the incidence of trade failures
- Potential to reduce complexity in operations and/or operational burdens associated with reconciliation activity, thereby reducing operational expenses and potentially transaction costs for all parties
- Greater transparency of derivatives positions for all parties, including transparency of calculation logic

Potential risks/challenges

- Given the reliance on manual reconciliation to identify errors, the magnitude of change management required may be substantial
- Parties will need new, robust mechanisms for verifying contract terms as trades are booked and smart contracts established

* May differ by exact model.

Platform for OTC derivatives post-trade life cycle

OTC post-trade / Replatforming / Collateral management / Trade life cycle

Potential path forward

Given the highly inefficient alternatives in several OTC derivatives classes, many experts expect specific markets to see a significant transition towards DLT-based platforms. However, others see greater standardization as an end in itself, where traditional technology solutions can be used to increase efficiency without significant transformation to the market. Since the CDM is technology-neutral, this debate is likely to persist. Key questions remain on whether (and how) DLT platforms will integrate with other systems and processes. For example, regulatory reporting is viewed as a potentially easy win for streamlining or automating. There is also the possibility of integrating with payment, collateral management and securities settlement systems in order to automate more of the value chain (including margin and collateral posting and settlement events).

Enabler

- The roll-out of the ISDA Common Domain Model – including smart contract-based derivatives contracts representations developed by Digital Asset and other technical standards developed with market participants and service providers – is likely to serve as a tailwind for digitalization in OTC derivatives markets (though the transition might be slower than expected)
- Adoption of DLT-based systems for collateral management and securities financing may encourage greater openness to DLT solutions for derivatives (assuming some degree of interoperability)

Impediments

- Lack of clarity on regulatory jurisdiction (due to uncertainty about data domiciling) may limit adoption
- Uncertainty about interoperability between DLT systems and between legacy and new systems may slow implementation
- A proliferation of derivatives-focused post-trade platforms might lead to slower uptake, as institutions need to adjust complex business processes across multiple derivatives classes and platforms

Example firms/projects

Axon Equity Swap Platform⁷¹

Shared distributed platform for managing equity swaps, currently used by consortium of 15 major buy- and sell-side firms

Status: live in production

Fragmos Chain⁷²

Shared platform for managing OTC derivatives post-trade processes

Status: in development

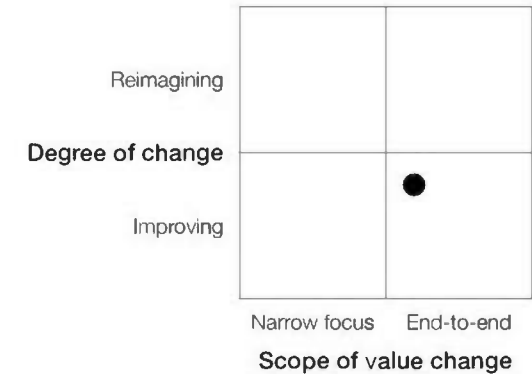
Replatforming existing infrastructure on DLT

OTC post-trade / Replatforming / Collateral management / Trade life cycle

Overview

At least one major infrastructure provider is currently migrating a component of central derivatives infrastructure to a DLT-based system (DTCC's Trade Information Warehouse, for credit default swaps). While markets for standardized derivatives with existing centralized record retention and asset servicing infrastructures (e.g. CDS) are generally more efficient than others, a distributed

ledger system could enable parties to further streamline operations and reduce costs. In the case of DTCC's TIW, the centralized database on CDS contracts will transition to a distributed ledger system, with the possibility to manage life-cycle events automatically with smart contracts. In this case, DLT is one element of a broader upgrade to a more modern, cost-effective infrastructure.



Value chain components in scope

● In scope ● Partially in scope ● Not in scope



Major changes from current state*

- Establish a shared distributed ledger for derivatives contracts, ensuring all participants have an identical copy of relevant data on an ongoing basis
- Automate and share workflows across institutions using smart contracts, for life-cycle/credit events, ongoing clearing/netting, and payment calculations

Proposed benefits*

- Increase transparency for all participants, potentially facilitating better risk management
- Potential to eliminate operational burdens associated with reconciliation activity, or further reduce complexity in operations, thereby reducing operational expenses and potentially transaction costs for all parties

Potential risks/challenges

- Challenges associated with moving an entire market to a new infrastructure, where transition may be limited by specific institutions
- Challenges associated with integrating with other critical infrastructure/data systems

Example firms/projects

DTCC Trade Information Warehouse Replatforming⁷³
 In partnership with R3, Axoni and IBM, DTCC is replacing the functionality of the TIW, the primary global infrastructure for CDS contracts, with a DLT database and smart contracts

Status: in production build, scheduled to go live 2022–2023

* May differ by exact model.

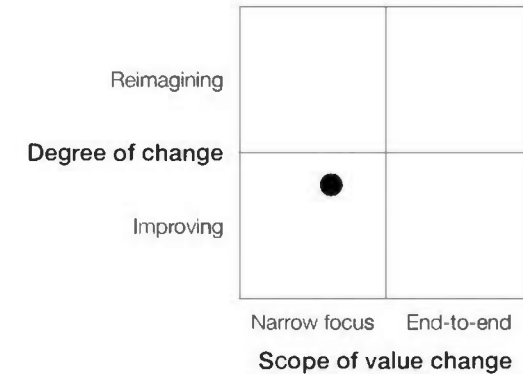
Platform for managing collateral for cleared derivatives

OTC post-trade / Replatforming / Collateral management / Trade life cycle

Overview

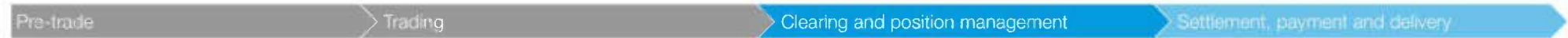
Several institutions are developing solutions that use DLT to enable real-time visibility of margin requirements and automation of the collateral workflow across central counterparties. While traditionally brokers and custodians need to manually coordinate across a range of different systems to facilitate margin payments – a costly and time-consuming set of processes – a DLT-based system can allow for faster, synchronized processing across

institutions. These solutions are narrowly focused on solving the challenges of collateral and margining, but they could potentially integrate with other platforms to create a shared digital record of all aspects of a derivative transaction post-trade.



Value chain components in scope

● In scope ● Partially in scope ● Not in scope



Major changes from current state*

- Centralize institution’s visibility of collateral/margin obligations across derivatives clearing houses
- Further automate margining and collateral workflows using smart contracts
- Integrate collateral/payment instructions for derivatives central counterparties directly into collateral and treasury optimization systems

Proposed benefits*

- Potential for significant operational efficiencies stemming from end-to-end automation of collateral workflows

- Better optimization of collateral and cash balances through faster payments and capital deployment, potentially reducing the need to prefund margins
- Reduce risks and costs associated with manual processing

Potential risks/challenges

- While individual institutions can implement it (without the entire market), efficiencies are tied to being able to integrate as many central counterparties as possible onto the platform
- Speed of payments and collateral transfers is still limited by existing rails even if data is visible and instructions sent in real-time

Example firms/projects

Baton Systems, in partnership with JPMorgan, Citi, SGX and other institutions⁷⁴
 Platform focused on automating margin and collateral workflows with derivatives clearing houses (using integrations into existing treasury systems)
 Status: live in production (JPMorgan); in production build (Citi, SGX)

Bolsa de Valores de Colombia, in partnership with Contrato Marco⁷⁵
 Platform focused on automating margin and collateral workflows for OTC derivatives
 Status: in development

* May differ by exact model.

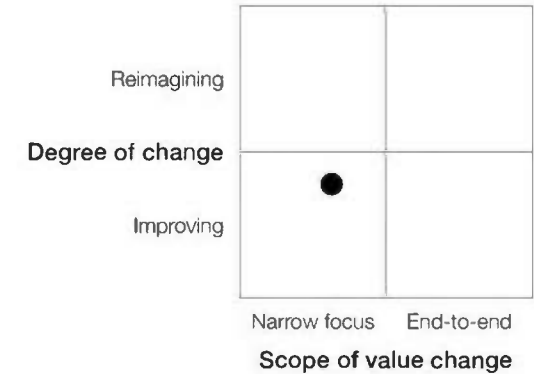
Platform for exchange-traded derivatives trade life cycle

OTC post-trade / Replatforming / Collateral management / Trade life cycle

Overview

Despite operational advantages compared to OTC derivatives, buy-side participants and custodians still face challenges associated with processing and executing exchange-traded derivatives. At least one financial technology company is developing a solution focused on avoiding trade breaks – which require manual reconciliation and investigation – by creating a shared data platform so that trading fees can be

calculated in real time across participants, trade matching and enrichment can be automated in real time and participants can share a distributed ledger for trade capture. While such a platform would benefit from network effects, it does not require the entire market to move (e.g. one asset manager and a custodian could use the platform to realize the proposed benefits).



Value chain components in scope

● In scope ● Partially in scope ● Not in scope



Major changes from current state*

- Trade capture occurs on a shared ledger, minimizing the need to match trades across disparate systems
- Broker trading fees are calculated on the platform using shared data in real time
- Trade matching and enrichment on same day (or in real time), with concurrent processing by all parties

Proposed benefits*

- Potential to significantly reduce the incidence of trade breaks, thereby reducing the cost of investigating and reconciling fails
- Increase transparency for counterparties and intermediaries in trades
- Potential to reduce risk via same-day trade matching, enrichment and clearing

Potential risks/challenges

- While there are clear benefits to a single source of truth on trade life-cycle data, it will be necessary to effectively integrate with post-trade systems (DLT-based or traditional)

Example firms/projects

STACS Mercury Platform
Platform for real-time management of exchange-traded derivatives, currently in use by BNP Paribas Security Services and Eastspring⁷⁶

Status: live in production

* May differ by exact model.

Securities financing: summary

Securities financing transactions – repurchase agreements and securities lending – have emerged as an area to which distributed ledger technology may be particularly well suited. These transactions are often operationally complex, generally involving an exchange of collateral, cash and some margin. They also tend to be conducted in a relatively narrow time frame and to be relatively low-margin lines of business. As such, there is an interest in solutions that:

- Ease the operational burden associated with conducting transactions
- Reduce the time required for settlement, as well as the risk
- Allow for better collateral management and mobility

DLT and smart contracts use cases have been developed that use the features of the technology to achieve these ends, without requiring a complete end-to-end market transformation (e.g. issuance of digital securities). As such, many market participants see the digitalization of these collateral-based transactions as an enabler of broader market digitalization in future, as institutions realize benefits while developing comfort with the technology.

Overview of securities financing transactions

Repurchase agreements

Market overview

A repurchase agreement (or repo) is a form of short-term loan collateralized by securities (most commonly, US Treasury bonds). In a repo, securities are sold in exchange for cash, with an agreement to repurchase the securities at a later time. Most repos are short-term, with the majority being overnight transactions.⁷⁷ The average daily volume outstanding for US repos is more than \$4 trillion, making the transactions central to many institutions' short-term funding.⁷⁸

Key characteristics

The repo market is generally split into bilateral and tri-party repo. In bilateral repos, broker-dealers directly exchange cash and securities with counterparties (e.g. asset managers, hedge funds or financial institutions). Bilateral repos can be centrally cleared or uncleared. In tri-party repos, a clearing bank or other clearing house serves as an intermediary between the two parties, handling the collateral selection and valuation, margining and processing. While repo deal flow primarily takes place telephonically, there is growing adoption of electronic solutions.⁷⁹

Existing pain points

- Institutions lack centralized visibility of their available collateral, which may lead to suboptimal allocation
- Generally inflexible in terms of settlement times, and the timing and frequency of netting
- Fragmented, manual and inefficient workflows between institutions to facilitate the exchange of collateral
- Lack of transparency between institutions increases collateral requirements, fees and late delivery charges

Securities lending

Market overview

Securities lending involves the owner of specific securities lending them to another party in exchange for a fee, with the loan generally being collateralized by other securities or by cash. As of January 2021, the aggregate volume of securities on loan globally was estimated at €2.4 trillion, with €24.2 trillion of lendable assets available through securities lending programmes.⁸⁰ Generally speaking, securities lending allows asset owners to earn additional return on assets held long-term, while enabling a range of institutions to meet specific needs.

Key characteristics

Securities lending is generally facilitated by third-party securities lending agents, primarily custodian banks but including a range of other institutions.⁸¹ These institutions provide services to asset owners looking to lend their securities. On the borrowing side, broker-dealers generally intermediate on behalf of clients.

Existing pain points

- Rigid restrictions on available windows for transferring assets, often complicated by time-zone differences, with added difficulties for transferring assets between CSDs in different jurisdictions
- Limited visibility of use of lent assets (limited understanding of collateral reinvestment risk)
- Fragmented, manual and inefficient workflows between institutions to facilitate the exchange of collateral

Summary of emerging securities financing use cases

1

DLT platform for repurchase agreements

What? Platform for tokenizing and immobilizing collateral to be used in repo transactions, executed via smart contracts

Who? Led by technology providers or banks, serving all repo participants (e.g. broker-dealers, banks, tri-party agents)

Why? Enable repos with shorter duration (e.g. intraday vs. overnight terms), eliminate failed transactions, reduce need for manual processing and reconciliation and ensure greater transparency of life cycle

2

Tokenizing loans for servicing and data management

What? Platform for swapping baskets of securities across depositories and/or jurisdictions, without requiring actual transfer of securities

Who? Led by technology provider, custodians and/or depositories, with need for a network of custodians, depositories and banks

Why? Enable better optimization of collateral holdings, because securities can be exchanged in real time, at any time of day, at low cost and without additional operational complexity

3

Replatforming securities lending infrastructure

What? Replace infrastructure for securities lending with distributed ledger network, creating a single source of truth for participants

Who? Can be led by existing central infrastructure providers (e.g. central counterparties) or other parties

Why? Reduce the need for reconciliation of transaction data, thereby creating operational efficiencies and reduction in risk

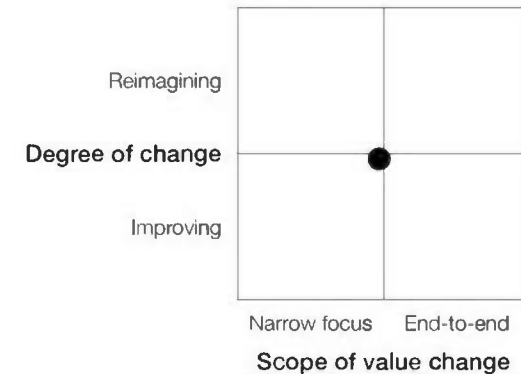
DLT platform for repurchase agreements

Repo platform / Securities swaps / Infrastructure

Overview

Despite operational advantages compared to OTC derivatives, buy-side participants and custodians still face challenges associated with processing and executing exchange-traded derivatives. At least one financial technology company is developing a solution focused on avoiding trade breaks – which require manual reconciliation and investigation – by creating a shared data platform so that trading fees can be calculated in real time across participants, trade matching and enrichment can be automated in real time and

participants can share a distributed ledger for trade capture. While such a platform would benefit from network effects, it does not require the entire market to move (e.g. one asset manager and a custodian could use the platform to realize the proposed benefits).



Major changes from current state*

- Collateral (eligible securities) are onboarded to the platform; digital representations of collateral are created
- By securely immobilizing the collateral at the custodian using smart contracts, the need to actually transfer collateral between parties is eliminated
- Establish a single source of truth on eligible or available collateral within an institution
- Establish a single source of truth on status of repo transactions throughout the life cycle
- Mutualize workflows across institutions; automate processes through smart contracts

If digital cash is used, payment leg is completed atomically and instantaneously

Proposed benefits*

- Eliminate the need for reconciliation between institutions
- Reduce operational burden/costs by automating the full repo life cycle
- Reduce (or eliminate) the potential for disputes and/or failed transactions
- Better optimize collateral allocation due to immobilization and transparency
- Potentially improve overall market liquidity and lower the cost of secured financing

Introduce the ability to complete repos intraday, creating a new intraday secured financing option

Potential risks/challenges

If parallel systems/platforms are employed as a DLT platform is implemented, there is the potential for added operational complexity for some institutions, introducing a new source of operational risk

* May differ by exact model.

DLT platform for repurchase agreements

Repo platform / Securities swaps / Infrastructure

Potential path forward

The core questions for DLT-based repo platforms are about how they will interact with a broader shift in market infrastructure towards digital securities and cash. Would wide uptake of a DLT-based repo platform hasten the move towards a future in which a broader range of asset classes are native digital assets on distributed ledgers? Would usage of these systems in turn build comfort with the technological, legal and regulatory certainty relating to how DLT-based transactions and contracts work and expectations about flexible and lower-risk settlement? Or would the broad use of such a platform deliver enough operational improvements that core market infrastructures no longer feel overly pressured to innovate?

Enablers

- Repo markets are fairly concentrated, so a limited number of participants are needed for a minimum-viable ecosystem
- Intra-company repos are used widely to allocate collateral and liquidity across internal legal entities, which could represent a “testing ground” for bilateral and tri-party repos for some institutions

Impediments

- “Chicken and egg” problem: liquidity begets liquidity, so it is essential that early uptake of a new platform/product is strong

PROJECT SPOTLIGHT

Broadridge: DLT Repo

Broadridge has worked with Digital Asset to develop a DLT-based repo platform for clients (broker-dealers and sell-side firms). The platform has been built to accommodate both intra-company repo and bilateral repos, with the idea of firms building comfort with the system while building a network for bilateral repos among existing repo clients. The platform does not use digital cash for the cash legs of the repos, instead integrating with existing payment systems (with the possibility to use on-chain cash in the future). Given the operational efficiencies, better liquidity and collateral management and reductions in risk, Broadridge estimates all parties will realize cost savings almost immediately, while requiring minimal changes to implement. Following pilots with clients, the platform is expected to launch in 2021.⁸²

PROJECT SPOTLIGHT

JPMorgan Chase Onyx: Intraday Repo

JPMorgan Chase has developed an intraday repo offering, as the first application of its Onyx digital assets platform. By using digital cash built into the Onyx platform, both legs of the repo can be settled instantaneously, thereby making it possible to conduct repos intraday. JPMC serves as the “collateral token agent”, responsible for creating, immobilizing and transferring the tokenized ownership interest of securities still held at the tri-party agent or custodian. Intraday repo opens up a secured intraday funding source that did not previously exist. Following internal pilots and tests with Goldman Sachs and BNY Mellon (as a tri-party agent), the platform is expected to launch in 2021.⁸³

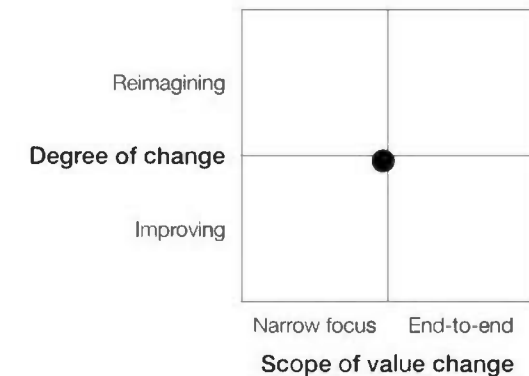
DLT platform for securities swaps across collateral pools

Repo platform / Securities swaps / Infrastructure

Overview

Despite operational advantages compared to OTC derivatives, buy-side participants and custodians still face challenges associated with processing and executing exchange-traded derivatives. At least one financial technology company is developing a solution focused on avoiding trade breaks – which require manual reconciliation and investigation – by creating a shared data platform so that trading fees can be

calculated in real time across participants, trade matching and enrichment can be automated in real time and participants can share a distributed ledger for trade capture. While such a platform would benefit from network effects, it does not require the entire market to move (e.g. one asset manager and a custodian could use the platform to realize the proposed benefits).



Major changes from current state*

- Custodians create digital representations of securities, with baskets “held” by a trusted third party and a distributed collateral registry accessible across participants (with data controls)
- Collateral baskets to be used in swaps are created and immobilized, with swaps occurring at a specified day/time on ledger (while underlying collateral stays with custodians)

Proposed benefits*

- Enable firms to better optimize securities holdings at precise points in time, minimizing the balance sheet cost of satisfying regulatory ratios
- Reduce intraday credit exposures and/or intraday capital requirement for traditional collateral transfers

- Ensure better operational controls and transparency
- Reduce (or eliminate) the potential for fails
- Potentially finance more illiquid assets

Potential risks/challenges

Will be essential to ensure that all parties – custodians/tri-party agents and underlying asset owners – adapt to the platform as a single source of truth on collateral ownership

If platform is used for narrow/single use within institution, could introduce additional complexity in institution-wide collateral management

PROJECT SPOTLIGHT

HQLA^x

HQLAX is a technology provider that has developed a securities lending platform to enable institutions to seamlessly swap the high-quality liquid assets needed to meet the liquidity coverage ratio, enabling institutions to better optimize their holdings. The platform has onboarded most major European custodians/tri-party agents, including Euroclear, JPMorgan, BNY Mellon, Citi, Clearstream and BNP Paribas. Several banks have conducted tests or live swaps using HQLAX, including ING, UBS, Credit Suisse and Goldman Sachs.⁸⁴

* May differ by exact model.

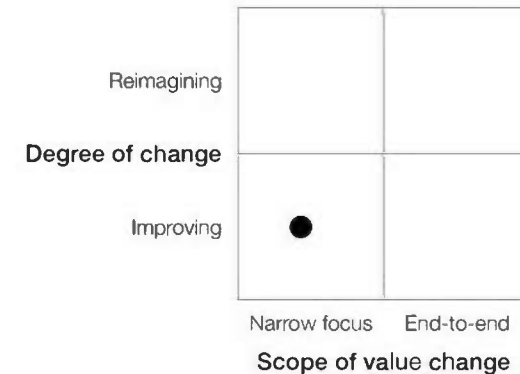
Replatforming securities lending infrastructure with DLT

Repo platform / Securities swaps / Infrastructure

Overview

Some infrastructure providers are developing DLT-based solutions to digitize operations for traditional securities lending contracts. In one case, a derivatives clearing house, which serves as a central counterparty in securities lending transactions (e.g. loans of stocks), is replacing the underlying infrastructure for settling cleared securities lending transactions with a permissioned distributed ledger network. This network will be governed

– and initially operated – by the clearing house. In another approach, a stock exchange is developing a central securities lending platform where one did not exist previously. These DLT-based infrastructures will allow all clearing participants to have a single source of truth with real-time visibility of securities lending contracts, reducing the need for manual reconciliation and enabling broader improvements to operations.



Major changes from current state*

- Underlying infrastructure for settling cleared securities lending will be transitioned to DLT (or a new securities lending platform established)
- Participants who run a network node will have access to a single source of truth on stock loans

Proposed benefits*

- Greater transparency of transactions in real time
- Potential to reduce complexity in operations and/or operational burdens associated with reconciliation activity, thereby reducing transaction costs for all parties
- Potential for interoperability with other derivatives or securities infrastructure/systems

Potential risks/challenges

There may be challenges with ensuring clearing participants provide real-time accurate information on securities available for loans, given other markets will still be running on traditional infrastructure and processes

Example firms/projects

OCC Stock Loan Program	Status: in production build
Tel Aviv Stock Exchange Blockchain Securities Lending Platform ⁸⁵	Status: in production build
JPX Stock Lending and Collateral Management Platform ⁸⁶	Status: ongoing pilot

PROJECT SPOTLIGHT

Options Clearing Corporation (OCC)

OCC's Stock Loan Program allows its clearing members to borrow/lend equities (which are ultimately transferred through the DTC) in which it serves as the central counterparty. In 2020 it enlisted Axoni to develop a distributed ledger network for cleared stock loan transactions, through which clearing members could access a real-time single source of truth on securities lending activities and contracts. Following a proof of concept in 2019 that included JP Morgan, Bank of America, BlackRock and others, the platform is expected to go live in 2022.⁸⁷

* May differ by exact model.

Asset management: summary

Asset management is central to the capital markets ecosystem, representing a large share of investment dollars globally. In addition to being very actively involved in the broader markets that may be transformed by DLT and other technologies, asset managers themselves – and their service providers – face inefficiencies and other challenges for which distributed ledgers and smart contracts may offer solutions. While they vary greatly, some are focused on:

- Streamlining the client onboarding and fund share issuance process
- Improving data sharing across specific ecosystem participants
- End-to-end transformation of “back office” asset management operations

While asset managers have also increasingly offered cryptocurrency-based products, this section focuses on solutions aimed at improving operations and client services across traditional fund products.

Over time, as additional financial assets are tokenized or issued digitally, the asset management industry may transform further. Potential innovations could include tokenized fund shares tied directly to underlying asset pools via smart contracts and replacement of traditional fund structures with fully customizable portfolios.

Overview of asset management landscape

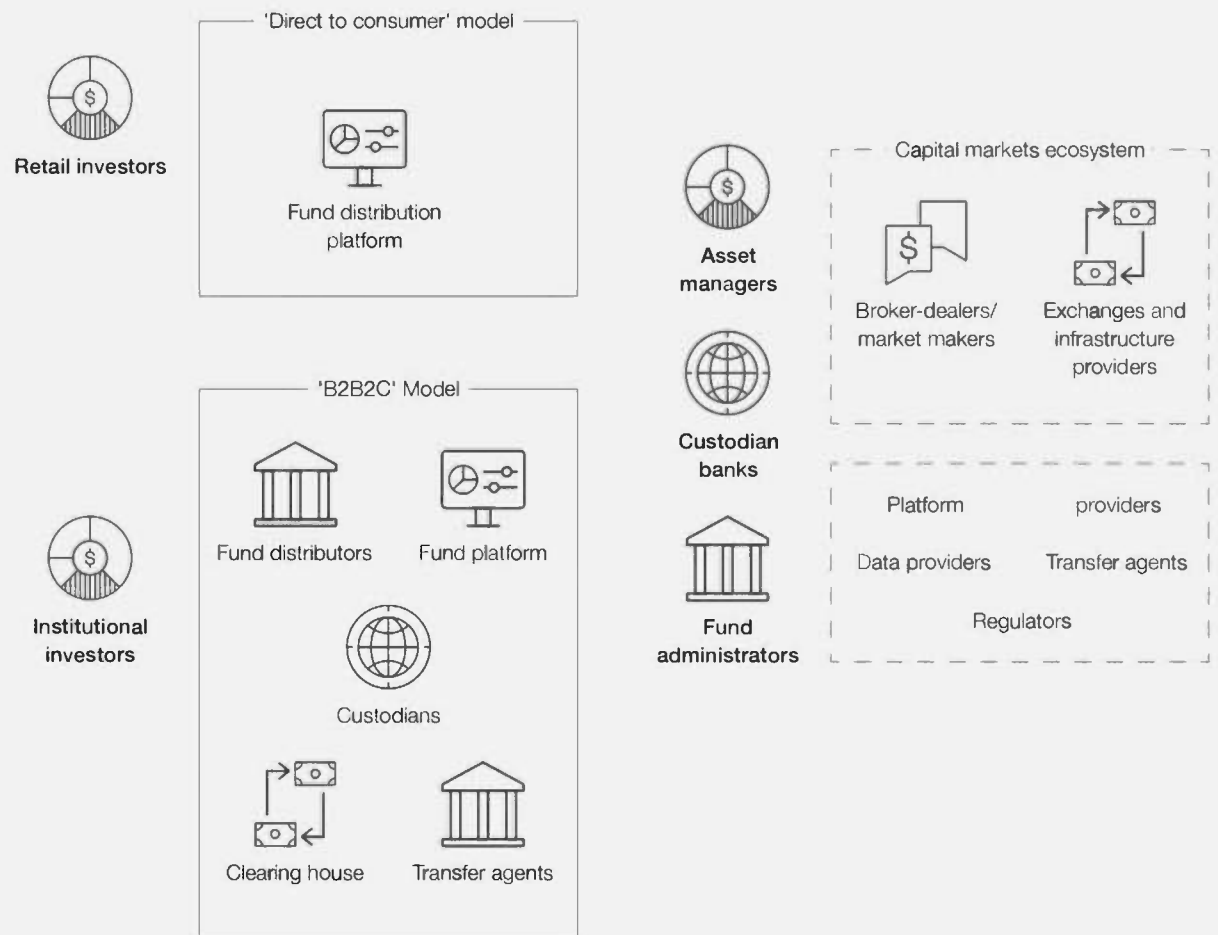
Market overview

Asset managers invest funds on behalf of retail and institutional clients, offering a range of fund products geared at different client segments. Funds may be defined by the asset classes or subclasses they invest in, by the investment strategies they employ and/or by the investor base able to participate in them. At the end of 2019, assets under management by asset managers totalled \$89 trillion globally, with significant growth over the preceding decade. Given the scale of assets invested by asset managers, they are core to the capital markets. Despite strong growth, the asset management industry faces a set of structural challenges brought on by fee compression and mounting cost pressures.⁸⁸

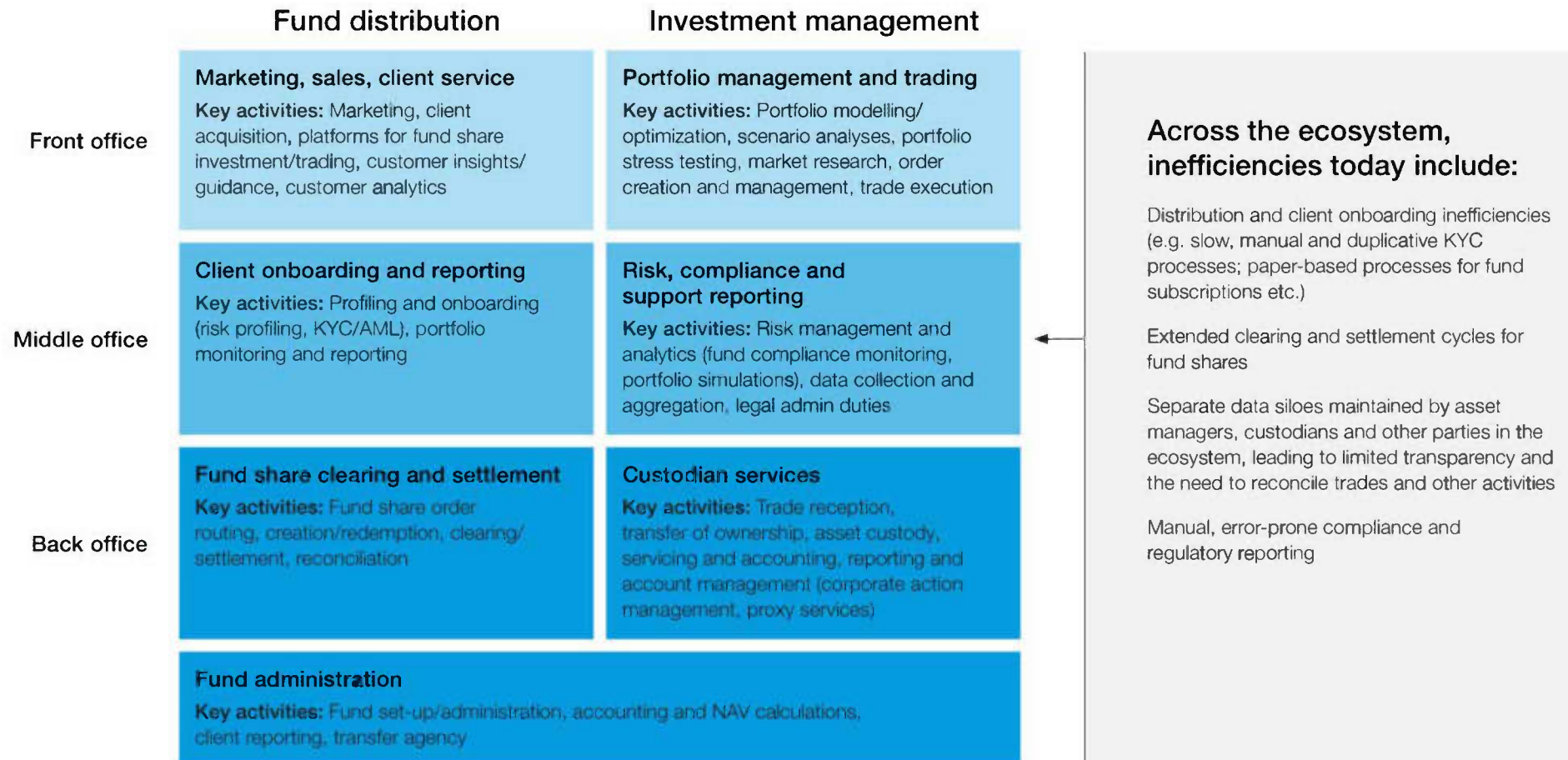
Key characteristics

The asset management industry is diverse, with significant variation in the size of firms and their product offerings. Generally speaking, investors buy shares in one or several funds, either directly or through intermediaries. Funds invest in public or private markets, relying on broker-dealers and market makers as trading counterparties. Custodian banks clear and settle transactions on behalf of asset managers, and hold these assets in custody, while also providing value-add services on top (e.g. securities lending and cash management).

The asset management landscape is complex, with significant differences across regions. At a high level, the ecosystem supports investors' purchasing and selling of fund shares, and asset managers' investments in financial markets, with a range of parties providing services:



DLT in the asset management value chain and ecosystem



Summary of emerging DLT use cases in asset management

Given the central role of asset managers in allocating capital globally, asset management firms and the ecosystems that service them are likely to be affected by any major digitization of specific markets or asset classes. Faster or more flexible trade settlement, shared sources of truth on securities or derivatives transactions and operational simplification – these changes and others would all have implications for fund managers, custodians and fund administrators. For example, a shared, real-time source of data on all underlying portfolio holdings could greatly simplify the

processes associated with fund accounting and net asset value calculations. Moreover, new digital-native asset classes or products are likely to offer new product opportunities to asset managers and their service providers.

Beyond use cases predicated on broader market digitization, a range of institutions are developing solutions designed to address the challenges, inefficiencies and risks unique to asset and fund management. These use cases include:

Use case	Summary*	Potential benefits and challenges	Example firms
DLT-based fund distribution and register platform	DLT-based distribution platforms focused on streamlining the operations associated with fund distribution, linking together the various institutions involved via a single source of truth – e.g. automating fund register management and fund transaction processing, improving client onboarding (including sharing of KYC/AML verifications across network participants) and enabling secure data sharing for other elements of processing	<p>Benefits</p> <ul style="list-style-type: none"> – Reduce inefficient, manual and/or redundant processes, potentially reducing costs for end investors – Speed up access to fund investment for end investors – Potential for enhanced liquidity in secondary markets <p>Challenges</p> <ul style="list-style-type: none"> – May be challenging to onboard a minimum-viable set of participants, particularly with multiple networks 	<p>FundsDLT:⁸⁹ a Luxembourg-based start-up, owned by Clearstream, Credit Suisse, LSE and Natixis, has created a DLT platform for improving efficiency across fund transaction processing. Status: live</p> <p>Allfunds Blockchain:⁹⁰ partnered with ConsenSys to create a DLT platform that aims to streamline communication in the fund distribution value chain. Status: in development</p> <p>Calastone Distributed Market Infrastructure:⁴⁹¹ platform aiming to streamline and connect participants and elements of the fund transaction process via DLT. Status: live</p> <p>IZNES:⁹² platform for subscriptions and redemptions of European funds, compatible with different distribution channels, focuses on transaction processing at the fund-unit level. Status: live</p>

*May differ by exact model.

Summary of emerging DLT use cases in asset management

Use case	Summary*	Potential benefits and challenges	Example firms
Investor-facing end-to-end platform for tokenized funds	Consumer/investor-facing, end-to-end platform for tokenized funds. Includes tools for fund origination, client onboarding, fund distribution (including back-end processes), fund trading and some elements of fund administration	<p>Benefits</p> <ul style="list-style-type: none"> – Potential for a wider investor base for some funds, increasing access and fund liquidity – Streamline operations for funds, particularly valuable for small or private funds with less complex operations, potentially lowering costs <p>Challenges</p> <ul style="list-style-type: none"> – A new distribution model may require significant client education (not specific to DLT-based platforms) – May be challenging to onboard larger funds reliant on a broader set of ecosystem partners 	<p>Figure Digital Fund Services:⁹³ Figure Technologies, a US-based financial technology company, has used the Provenance blockchain to offer an end-to-end blockchain solution for digital fundraising and ongoing fund management.</p> <p>Status: live</p>
End-to-end fund distribution, administration and servicing network	DLT-based solution to enable fund creation, fund administration and fund servicing, connecting all relevant parties through a shared source of truth. The goal is to streamline all processes associated with managing fund operations by mutualizing workflows across relevant parties via smart contracts, based on a shared source of truth for participants across the fund life cycle	<p>Benefits</p> <ul style="list-style-type: none"> – Potentially reduce inefficient or redundant processes and reconciliation, possibly reducing costs for end investors – Immediate settlement on net asset value availability – Improved compliance and regulatory reporting – Increased transparency for asset managers and investors <p>Challenges</p> <ul style="list-style-type: none"> – May be challenging to onboard a minimum-viable set of participants given the breadth of activities covered – Data needs to be standardized across a wide ecosystem 	<p>FundAdminChain:⁹⁴ A UK-based start-up, founded by buy-side and DLT experts, in collaboration with R3, is building a DLT-platform to integrate the various fund management servicing functions on one platform.</p> <p>Status: in development</p>

*May differ by exact model.

Enablement use cases: summary

While many institutions are focused on directly transforming specific securities and derivatives markets, others are developing technology solutions or infrastructure to support digitization across the capital markets. Still others are developing technology solutions in adjacent areas in the financial services ecosystem. Collectively, these use cases may be enablers of transformation in the capital markets. These include:

- Products developed in areas adjacent to the capital markets, but upon which many capital markets operations rely (e.g. wholesale payments)
- Solutions that equip institutions to adapt to a distributed ledger technology environment (e.g. institutional custody for digital assets)
- Tools that allow institutions to take full advantage of the potential benefits of this technology (e.g. digital identity and document sharing)

These use cases do not fit neatly into asset class buckets, and in many cases are essential elements of solutions explored elsewhere in the report.



Wholesale payments: facilitating capital markets digitalization

Since most capital markets transactions involve a cash component, almost all capital markets processes and systems have some form of integration with wholesale payments systems. With one of the promises of DLT being the ability to settle securities trades and other transactions atomically – instantaneous delivery vs. payment (DvP) – integrations with DLT-based payment systems, or other real-time cash settlement systems, will be essential to realizing this benefit.

To date, institutions across the public and private sectors have explored payments solutions that could integrate with securities settlement systems and other market infrastructure, with experiments and live transactions proving a range of models as viable. While this report does not go into great detail on these developments, they tend to fall into one of several categories:

Wholesale stablecoins

Developed by individual firms or consortia, these instruments are a digital token entirely backed by cash reserves. While a number of stablecoins now exist in different currencies, at least two are designed specifically for high-value wholesale transfers between financial institutions, including for the purpose of securities settlement:

- JPM Coin: enables instantaneous payments between JPMorgan clients on a DLT network, with integrations with other JPM DLT products/services⁹⁵
- Fnality: consortium of 15 financial institutions building a network of local currency DLT-based payment systems backed by central bank reserves⁹⁶

Integrations with existing systems

Public- and private-sector participants have built mechanisms for integrating DLT or token-based securities with traditional account-based wholesale payment systems. These include tools for sending payment messages from DLT-based platforms and direct integrations with payments systems:

- SWIFT Global Payments Innovation (gpi): platform that will enable DLT-based platforms to initiate payments on traditional payments systems⁹⁷
- Direct interface with central bank systems: some central banks are developing ways to allow DLT-based systems to interface with core payments systems. For example, one of the features of the Bank of England's new real-time gross settlement (RTGS) system will be some level of interoperability with DLT-based systems.⁹⁸ Project Helvetia, between the Swiss National Bank, BIS and SIX, proved the feasibility of linking DLT platforms to the existing payment system for settlement⁹⁹

Wholesale central bank digital currencies (CBDCs)

Several central banks are experimenting with both retail and wholesale CBDCs, with a number of retail CBDCs currently in production globally. Among the central banks exploring wholesale CBDCs for use in securities settlement are the Banque de France, the Hong Kong Monetary Authority, the Monetary Authority of Singapore, the Swiss National Bank and the Bank of Thailand. While experiments have proven that it is possible to settle DLT-based securities trades in central bank money using existing payments systems, many believe that wholesale CBDCs will provide market participants with greater comfort in the underlying technology, and therefore serve as a critical enabler for wider adoption and scalability.

Custody services for digital assets

Given the fundamental differences between digital assets and traditional assets, the concept of “custody” may, in some ways, be redefined. While one of the early claims about a DLT-based capital markets ecosystem was that service providers such as custodians would be disintermediated, the growing institutional investor interest in bitcoin and other cryptocurrencies has made it clear that not only do asset managers and investors rely on custodians to meet regulatory requirements and manage risk, but they will also continue to expect a range of value-add services on top of the standard custody role. The main question now revolves around what custody will look like, from both an operational and a technical perspective.

Since digital assets are essentially digital bearer instruments – meaning that ownership of the cryptographic key is considered ownership of the asset – the way a custodian handles digital assets will differ from how traditional assets are custodied. From the physical systems that must be built to safeguard assets (e.g. “cold”, offline storage of keys) to the digital integrations that ensure that custodians and their clients actually benefit from the unique single source of truth offered by DLT, financial institutions are developing custody solutions that build on their relationships of trust with clients.

PROJECT SPOTLIGHT

BNY Mellon: digital assets platform

In February 2021, BNY Mellon – the world’s largest asset servicer – announced the development of a client-facing digital custody and administration platform for both traditional and digital assets. The platform will allow clients to safeguard, transfer and manage the life cycle of their digital and traditional assets on one consolidated platform, building upon BNY Mellon’s existing frameworks for cybersecurity, regulatory compliance and broader risk management. The platform will have value-add services built in, including securities lending, collateral management, cash management and risk management tools. It will be designed to integrate with a range of solutions built by external technology partners, and over time BNY Mellon aims to expand the capabilities offered.¹⁰⁰

PROJECT SPOTLIGHT

Pyctor: distributed custody

Developed by ING Bank in collaboration with several industry partners, Pyctor is an institutional-grade custody and asset transfer infrastructure for digital assets, including assets issued on the major public and private distributed ledgers. Designed for use primarily by custodians, the platform is built with regulatory compliance and a robust legal framework at its core. The platform is built as a private, distributed ledger, with validating nodes hosted by participating institutions, thus offering a decentralized approach to digital asset custody. The focus is currently on managing institutional digital asset wallets for custodians, as well as managing smart contracts on behalf of securities issuers.¹⁰¹

Conclusion

DLT presents both an opportunity and a threat to traditional capital markets institutions

DLT is not a panacea for the capital markets, but harnessing its unique capabilities could address major inefficiencies and challenges.

While there are many considerations in assessing whether DLT is the best available technology for particular use cases,¹ there are certain circumstances in which DLT may offer uniquely powerful benefits:

- **Substantial redundancy in low-value-add tasks:** DLT may offer particularly valuable benefits in markets or transactions where the lack of a shared source of truth requires multiple institutions to devote resources to tasks associated with data verification. For example, in securitized product markets, all actors in the value chain must independently verify and audit the loans underlying a security; a shared source of truth eliminates the need for additional complete audits throughout the life cycle.
- **Unnecessary complexity and counterparty risk:** Some intermediaries play an essential role in guaranteeing trust in capital markets, but in some cases, existing market structures require multiple firms to take on significant counterparty credit risk in the intermediation chain. In many use cases, DLT

and smart contracts enable the exchange of assets without the need for additional complexity, thereby limiting risk and cost for all parties.

A few conditions have emerged as critical enablers for successful DLT use cases:

- **Possibility for standardization:** DLT use cases are most valuable when enabling shared sources of truth across ecosystems, so it is no surprise that market-wide standardization of contracts and data fields is an important enabler for DLT adoption. Even in asset classes or transaction types where common standards have not been accepted across the market, the possibility of introducing broad standards is a necessary condition for most use cases.
- **Minimum-viable ecosystem:** In order to get off the ground, any use case needs a set of relevant participants on board from inception. For many use cases, the need to reach agreement across a larger number of actors has limited the ability to test solutions and bring them to market. Increasingly, firms are shifting from market-wide, consortium-led models to approaches with a smaller set of participants committed to testing and eventually adopting the solution if economically and technically worthwhile.

Capital markets firms must continue to hone their strategies around this technology

Across the capital markets, executives need a deeper understanding of: 1) how DLT can be used; 2) how different applications of DLT led by different parties may ultimately affect aspects of their business or operations; and 3) what role their firms should play in building, supporting or challenging DLT-based solutions. While different institutions will face different challenges, a general framework for this strategy should include:

Defensive positioning

Firms must understand where they currently stand in the value chain for different markets, whether and how those positions may be threatened by DLT-based solutions and whether they wish to maintain those positions. While the approach will vary depending on the type of market and institution, firms should explore whether to join existing initiatives, partner with other financial firms to develop solutions or build solutions on their own.

Offensive positioning

Firms should explore where significant inefficiencies exist that could be addressed by DLT-based solutions or where new products may be enabled by features of this technology. After assessing whether there is white space or opportunity in the current competitive landscape, they can explore paths to developing solutions independently or collaboratively with relevant firms.

CONCLUSION

DLT is beginning to address real challenges, but there is no agreed-upon path for market-wide adoption

DLT is moving from experimentation to commercialization across asset classes, value chains and jurisdictions...

In a range of proofs of concept and live experiments, DLT has proven capable of addressing core inefficiencies in the capital markets, including both operational inefficiencies and balance sheet management limitations.

While this technology offers a consistent set of benefits, firms are building solutions that take very different approaches to solving market challenges: some are end-to-end solutions reinventing the entire value chain, while others aim to improve existing processes.

Reflecting growing comfort with some jurisdictions' frameworks for regulation and the legal certainty of smart contracts, firms have started to bring DLT use cases to market.

...but market participants are still far from adopting this technology at scale

Shifting value pools

DLT solutions offer opportunities for automation and the potential to shift roles in the capital markets ecosystem, which will likely lead to value migrating among participants and service providers, across the buy-side and sell-side and between incumbent players and new entrants. This has led to both general uncertainty about the technology for many incumbents, and a complex patchwork of initiatives reflecting very different end-state visions.

Network effects

Most DLT use cases attempt to establish ecosystems that enable participants to realize the benefits of shared data; as such, network effects are significant. Without a coordinated approach among market participants – either to use a particular platform, or to enable interoperability between platforms – individual platforms may struggle with attracting both securities issuers and investors.

Parallel infrastructures

In some cases, a DLT-based solution may introduce new costs and risks, given the need to run parallel operations to support multiple infrastructures. Without clear roadmaps to harmonizing operations – or solutions that allow relevant parties to bridge new and old systems operationally – many firms may be less willing to adopt DLT solutions at scale in existing asset markets, preferring instead to focus on those without legacy infrastructures.

“The coming years are likely to see increasing digitization of markets, including more DLT use cases going live. Nevertheless, there is still little market-wide agreement on how DLT will ultimately be used and whether it will fundamentally reshape all elements of the capital markets.”

CONCLUSION

Fundamentally transforming markets will require new ways of thinking and working across the industry

Today's capital markets are rife with industry-wide inefficiencies and limitations. In the long term, DLT-enabled solutions may or may not be at the core of addressing these challenges. However, the emergence of these solutions – and the competitive pressures from new entrants and migration of value pools – presents

an opportunity to fundamentally reimagine how the capital markets operate, perhaps a once-in-a-generation opening. Making progress on these challenges will require action, collaboration and innovative thinking from many parties, regardless of which technologies are ultimately used.



Standardization

Global industry associations and standard-setting bodies must continue to develop common market-wide data standards, model contracts and other taxonomies, in partnership with representative industry actors and technology service providers. Industry-wide efforts to introduce and adopt standards and replicable models will help reduce inefficiencies and help ensure that firms and markets will be able to make the best technology choices available. Adoption of standards is likely to continue as an enabler for DLT and smart-contract-based solutions, but broader use of standards in more asset classes and transaction types is also likely to have significant efficiency benefits regardless of what technologies are used.



Breaking down siloes

Innovative capital markets firms must work outside of traditional organizational siloes to ensure that they are able to deliver the kinds of technology-enabled products and services that deliver real value to clients. Front office vs. back office, technology vs. business, fundamentally different systems for different asset classes: these siloes have developed in line with economic realities, regulation and technical limitations, but they likely limit firms' ability to explore truly transformational opportunities. At an industry level, they contribute to the challenges of coordinating around a common vision.



Regulatory engagement

Many regulators have shown an openness to digital experimentation in the capital markets. Regulators should continue to fine-tune approaches that encourage innovation while mitigating risks to markets and investors – including setting guardrails that help the industry consolidate on future visions – and they should attempt to mitigate the risk of global fragmentation by working together at a global level. As new solutions with very different risk profiles are developed, regulators must be open to rethinking traditional frameworks aimed at regulating both institutions and activities. As new regulatory standards are developed, firms must be proactive and transparent in engaging regulators early in transformation efforts.

CONCLUSION

Open questions and future research agenda

There are many open questions as firms continue to navigate the uncertain future of capital markets technology

Investor demand

- Will institutional and retail investor interest in cryptocurrencies translate into demand for digital-native securities? Will growth in DeFi applications spill into the mainstream capital markets?
- Will investors expect a fundamentally different experience with digital securities (vis-à-vis traditional securities markets)?
- How will banks and other intermediaries ensure that this demand reaches issuers?

Regulatory questions

- How will DLT-based technology solutions interact with data privacy and localization policies? How can solutions be built to ensure data privacy considerations are maintained without limiting the global reach essential to today's capital markets?
- How can regulators work together to ensure that fragmentation in approaches to DLT regulation does not limit innovation or the development of global markets?

Global divergences

- Will jurisdictions with less developed and complex markets continue to be early adopters of DLT-based solutions?
- How will firms with global operations apply lessons learned in different markets?

Path forward

- How will firms effectively manage parallel operations for different infrastructures and begin sunseting legacy systems?
- How will the potential emergence of DLT-based CBDCs and other payment systems shift how firms view DLT in the capital markets?

While this report focuses on developments in today's public capital markets, there are other areas where further ecosystem-wide exploration is needed

Private capital markets

While this paper touched on developments in private markets (e.g. developments in markets for private equity tokens), open questions remain around how these markets will adapt to DLT and other technologies. Looking ahead, as private markets continue to grow in importance, there are many questions about how DLT may contribute to a blurring of some lines between public and private markets.

Sustainable finance

Green bonds, carbon credit markets and other opportunities for linking sustainability-related data to financial instruments will all be increasingly important as the capital markets help finance the transition to net-zero economies. While there has been discussion about the potential use of DLT to facilitate these activities and products, this is an area ripe for further dialogue and analysis.

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Case 1:24-cv-01858-ACR Document 34-5 Filed 06/20/25 Page 128 of 672

DeFi Protocol Risks: the Paradox of DeFi¹

By Nic Carter² and Linda Jeng³

Abstract

Decentralized Finance (or “DeFi”) is growing in volume and in importance. DeFi promises cheaper and more open access to financial services by reducing the costs and risks of using centralized intermediaries. DeFi also holds the promise of interoperability across blockchains that could help tear down financial sector silos, greatly promoting innovation and building vibrant financial ecosystems. However, DeFi is not without its challenges, which are understudied. This article does not seek to provide a comprehensive list of DeFi but to help readers conceptually understand the drivers behind the risks inherent in DeFi. Many of the risks described above stem from the decentralized nature of blockchains. The goal of automating the delivery of financial services and reducing human dependencies also has the congruent effect of reducing oversight and control. Disintermediating traditional intermediaries reduces high fees and entry friction, but also creates new opportunities for new types of intermediaries. This article discusses some of the new types of risks introduced by DeFi that are inherent to blockchain systems along with traditional types of financial risks in DeFi that manifest in new ways: (i) interconnections with the traditional financial system, (ii) operational risks stemming from underlying blockchains, (iii) smart contract-based vulnerabilities, (iv) other governance and regulatory risks, and (v) scalability challenges. In an effort to remove humans and automate as much as possible through smart contracts, DeFi has introduced or amplified these risks. The growth of DeFi will depend on its ability to navigate and build compatibility with traditional finance and on how laws and regulations respond. Perhaps the biggest challenge of all is that the DeFi ecosystem continues to grow while its underlying base layer (public infrastructure such as Bitcoin or Ethereum) faces growing pains. As DeFi grows in importance and becomes more mainstream, policymakers and industry representatives need to better understand the economic and policy consequences of these new types of risks in order to build regulatory approaches and risk management practices that can support and facilitate a healthy and robust DeFi ecosystem and, ultimately, the financial stability of the greater financial system and real economy.

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1. Introduction

On February 16, 2021, the price of Bitcoin crossed \$50,000 for the first time, doubling its value in less than two months.⁴ Earlier in the year, a string of announcements by a number of Wall Street banks and traditional financial firms, including Bank of New York Mellon, Mastercard, and Blackrock, proclaimed that they would begin working with bitcoin. The companies Square and Tesla made splashes by investing a combined total of nearly \$2 billion USD in bitcoin.⁵ Meanwhile, Square's and PayPal's retail customers now buy an amount equivalent to a majority of the new supply of bitcoin entering the market each day.⁶ Visa also unveiled a bitcoin and crypto plan to be launched later in 2021.⁷ Crypto is becoming mainstream and is here to stay.

Decentralized finance (or "DeFi") is typically understood by crypto users and enthusiasts as platforms and protocols that seek to replicate existing financial services by using crypto/blockchain technology with limited centralization. CoinDesk defines DeFi as: "an umbrella term for a variety of financial applications in cryptocurrency or blockchain geared toward disrupting financial intermediaries." Fabian Schär defines it more specifically as "an open, permissionless, and highly interoperable protocol stack built on public smart contract platforms, such as the Ethereum blockchain."⁸

Central banks and financial regulators presently do not view the crypto market as being large enough to pose a significant threat to global financial stability.⁹ However, this assessment does not discount the need for regulators, industry and academics to understand (1) what are the new emerging risks of DeFi and (2) how DeFi may be impacting the transmission of traditional financial risks. Crypto markets are not insignificant and can no longer be discounted as small. For example, at the time of writing, DeFi projects on Ethereum hold collateral having the value

⁴ Vigna, Paul & Ostroff, Caitlin. "Bitcoin Trades Above \$50,000 for First Time" *Wall Street Journal* (Feb. 16, 2021). <https://www.wsj.com/articles/bitcoin-trades-above-50-000-for-first-time-11613479752>

⁵ Son, Hugh. "Feeling the heat from employees, Wall Street banks get closer to adopting bitcoin" *CNBC* (Feb. 12, 2021). <https://www.cNBC.com/2021/02/12/bitcoin-banks-closer-accepting-cryptocurrency-asset-class.html>

⁶ Rooney, Kate. "Square and PayPal may be the new whales in the crypto market as clients flock to buy bitcoin" *CNBC* (Nov. 24, 2020). <https://www.cNBC.com/2020/11/24/square-and-paypal-emerge-as-whales-in-the-crypto-market.html>

⁷ Bambrough, Billy. "Visa Reveals Bitcoin and Crypto Banking Roadmap Amid Race to Reach Network of 70 Million" *Forbes* (Feb. 3, 2021). <https://www.forbes.com/sites/billybambrough/2021/02/03/visa-reveals-bitcoin-and-crypto-banking-roadmap-amid-race-to-reach-network-of-70-million/?sh=7cc0664b401c>

⁸ Fabian Schär, "Decentralized Finance: On Blockchain- and Smart Contract-Based Financial Markets," *Federal Reserve Bank of St. Louis Review*, Second Quarter 2021, pp. 153-74. <https://doi.org/10.20955/r.103.153-74>. See also, Buterin, Vitalik. "A Next-Generation Smart Contract and Decentralized Application Platform." 2013; https://blockchainlab.com/pdf/Ethereum_white_paper-a_next_generation_smart_contract_and_decentralized_application_platform-vitalik-buterin.pdf.

⁹ Financial Stability Board. "Crypto-asset markets: Potential channels for future financial stability implications" (Oct. 10, 2018). <https://www.fsb.org/wp-content/uploads/P101018.pdf>

of around \$50 billion.¹⁰ As we will discuss below, crypto markets are becoming highly interconnected with the traditional financial sector. In time, DeFi could become a significant, if not the predominant, type of financial system, platformizing to varying extents the traditional financial sector. In the meantime, we need to take on the challenge of identifying and assessing the unique features of DeFi and what risks DeFi pose to the financial system.

i. Evolution of DeFi Movement to DeFi

DeFi comprises several components and continues to evolve quickly: (1) the public base layer with the digitally native token, (2) software protocols that codify agreed rules, (3) smart contracts that implement financial logic (i.e., execute transactions once specific conditions are met), and (4) stablecoins backed by reserves held at banks. In this chapter, we look at the various components of the DeFi universe with a particular focus on software protocols (aka. DeFi/DeFi protocols). DeFi protocols are automated systems deployed on a public blockchain, typically Ethereum, whereby users can take advantage of liquidity supplied by many counterparties in order to engage in asset swaps or acquire leverage, without dealing with a centralized financial counterparty.

After a call for crypto regulation by France and Germany,¹¹ the G20 Ministers of Finance and Central Bank Governors instructed the Financial Stability Board (FSB) to assess its work and the work of standard-setting bodies on crypto-assets. The FSB concluded that crypto-assets “did not pose a material threat to global financial stability” at the time of assessment but that crypto-assets would require “vigilant” monitoring.^{12,13} However, the FSB’s approach focused on potential transmissions of risk to traditional financial sectors. We argue that, as DeFi becomes mainstream, regulators and industry will need to quickly get up to speed on how DeFi operates and what are its inherent risks for users and the real economy.

After the introduction in Section 1, Section 2 provides historical background on the evolution of DeFi. The main body of this chapter, Section 3, identifies and attempts to categorize DeFi risks into five main buckets. As we explore these crypto-centric risks, we keep in mind how these new risks compare to the traditional credit, liquidity, counterparty, market and operational risks, and how our understanding of these traditional risks could be applied to DeFi. How these traditional financial risks manifest themselves in DeFi may differ somewhat from traditional financial

¹⁰ “Defi: Value Locked by category” The Block. Accessed April 12, 2021.

<https://www.theblockcrypto.com/data/decentralized-finance/total-value-locked-tvl>

¹¹ <https://www.telegraph.co.uk/technology/2018/02/09/france-germany-demand-bitcoin-clampdown/>

¹² Financial Stability Board. “Crypto-asset markets: Potential channels for future financial stability implications” (Oct. 10, 2018). Accessed April 11, 2021. <https://www.fsb.org/wp-content/uploads/P101018.pdf>

¹³ Financial Stability Board. “Crypto-assets: Report to the G20 on work by the FSB and standard-setting bodies” (16 July 2018). Accessed April 11, 2021. <https://www.fsb.org/wp-content/uploads/P160718-1.pdf>

sectors. Section 4 concludes and provides a preliminary analysis of what these crypto-based risks and vulnerabilities could mean to the global financial system.

2. Definitions

DeFi blockchain projects include decentralized exchanges (or “DEXs”), lending platforms where central intermediaries are not needed to hold funds and transactions occur on a peer-to-peer basis through automated processes,¹⁴ and decentralized applications (or “dApps”).¹⁵ One definition of DeFi is “the movement that leverages decentralized networks to transform old financial products into trustless and transparent protocols that run without intermediaries.”¹⁶ Another defines DeFi to mean where it “expands the use of blockchain from simple value transfer to more complex financial use cases.”¹⁷ And as mentioned earlier, another more specific definition is “an open, permissionless, and highly interoperable protocol stack built on public smart contract platforms, such as the Ethereum blockchain.”¹⁸ Many argue that DeFi is a form of finance that uses blockchain and does not rely on traditional central intermediaries, such as banks, stock exchanges or broker/dealers.

DeFi has been rapidly evolving since the introduction of first generation bitcoin to the emergence of second generation stablecoins and the use of initial coin offerings (ICOs) to fundraise. These DeFi projects in theory can become active ecosystems, even alternatives to traditional financial systems, by leveraging smart contracts and decentralized asset custody to replace costly, traditional intermediaries.¹⁹ Most DeFi projects are built on Ethereum, and many credit Ethereum’s easy-to-program platform for enabling the explosion in DeFi projects. As of March 2021, 87% of 5,727 ICO-funded DeFi projects have been built on Ethereum.²⁰

Researchers Chen and Bellavitis have identified four main categories of DeFi projects: (i) decentralized exchanges (DEXs), (ii) decentralized lending and borrowing, (iii) programmable decentralized derivatives, and (iv) automated financial processes.²¹ Each of these categories

¹⁴ *Supra*.

¹⁵ See, <https://ethereum.org/en/developers/docs/dapps/>

¹⁶ <https://defiprime.com/>

¹⁷ Hertig, Alyssa. “What is DeFi?” Coindesk (Sept. 18, 2020, updated Dec. 17, 2020).

<https://www.coindesk.com/what-is-defi>

¹⁸ Schär (2021), *supra*.

¹⁹ Qian, DJ. “Defi’s Rise is Inevitable, and Fusion is Driving this Evolution of Conventional Finance” Bitcoin.com (Aug. 10, 2020). <https://news.bitcoin.com/defis-rise-Defi's-Rise-Is-Inevitable,-and-Fusion-Is-Driving-This-Evolution-of-Conventional-Finance-Sponsored-Bitcoin-News-is-inevitable-and-fusion-is-driving-this-evolution-of-conventional-finance/>

²⁰ www.icobench.com. Accessed March 1, 2021.

²¹ Chen, Yan & Bellavitis, Cristiano. (2020). “Blockchain Disruption and Decentralized Finance: The Rise of Decentralized Business Models.” *Journal of Business Venturing Insights* 13 (June 2020). 10.1016/j.jbvi.2019.e00151.

possesses a set of risks, but they share some common features. They all leverage decentralized infrastructure and smart contracts. Smart contracts, however, are not legal contracts. They are software protocols that live “on chain” to automatically implement a procedure, legal contract or business practice.²²

Why use smart contracts? Why use DeFi at all? The benefits of automated delivery of financial services by smart contracts are attractive. The transparency offered by blockchain technology provides efficient auditing of solvency and proof of reserve. Decentralization and the process of unbundling financial services can remove expensive traditional intermediaries – making finance more equitable. The use of smart contracts can also reduce execution risk. DeFi could allow for more open and cheaper access to financial services, reducing costs and risks from using centralized intermediaries. DeFi also holds the promise of interoperability across blockchains. This borderlessness of DeFi can help tear down financial sector silos, greatly promoting innovation and building vibrant financial ecosystems.

DeFi is not without its challenges, though. It introduces new types of risks, discussed below in Section 3. The promise of interoperability offered by DeFi has led to a concentration of nearly all DeFi projects on the blockchain Ethereum - a new form of concentration risk. Ironically, in the mission to remove humans and automate as much as possible, other risks have been either introduced or amplified, including the challenge to maintain code security. The growth of DeFi will also depend on its ability to navigate and build compatibility with traditional finance. It will also depend on how national and state laws and regulations evolve. Perhaps the biggest challenge of all is that the DeFi ecosystem continues to grow while its underlying base layer (public infrastructure such as Bitcoin or Ethereum) faces growing pains, manifesting in high fees.

3. Risk Factors in DeFi

The DeFi system is predicated on the notion of extreme transparency in which anyone can effectively see everyone else’s transactions (although larger entities have found ways to be anonymous by using popular analytics tools, such as pseudonymity and privacy enhancing features). Extreme transparency offers tremendous potential for disintermediating traditional financial intermediaries and automating delivery of financial services. But extreme transparency also provides ample opportunities for exploitation. At its core, DeFi depends on shared, public databases with public read access and unfettered write access – provided the entity adding an

https://www.researchgate.net/publication/337111343_Blockchain_Disruption_and_Decentralized_Finance_The_Rise_of_Decentralized_Business_Models

²² See definition: “Smart contracts’ is a term used to describe computer code that automatically executes all or parts of an agreement and is stored on a blockchain-based platform.”

<https://corpgov.law.harvard.edu/2018/05/26/an-introduction-to-smart-contracts-and-their-potential-and-inherent-limitations/>

entry in the blockchain pays a sufficient fee. Anyone with knowledge of these systems, an internet connection, and sufficient tokens to pay for fees can deploy a smart contract that any other user can subsequently engage with in a permissionless manner. Smart contracts are software protocols that live “on-chain” – they are publicly available for anyone to engage with, audit, or scrutinize. This open access to smart contracts vastly increases the scope for financial innovation, as developers, for instance, are not limited by financial institutions requiring permission to engage with their APIs. Inevitably, this also introduces new forms of risk, as there are no required professional or licensing qualifications restricting who can deploy, manage, or engage with smart contracts.

A general objective shared by DeFi practitioners is stripping human discretion from financial contracts, and encoding the rules for behavior into highly automated, publicly available systems. In practice, however, human discretion remains. DeFi systems must be deployed, governed, and upgraded, and face occasional bugs or exploitative interactions with other protocols. They also run on public blockchains, which face similar issues – and occasionally require human intervention, too. As such, the core DeFi protocols tend to retain some level of human involvement from controlling entities. This is a means to mitigate risks when they emerge, but it also poses a potential threat to these systems if the administrators themselves are compromised, malicious, or somehow co-opted.

Some risk factors and exploits are analogous to those evident in existing financial products, like market risk, the manipulation of an underlying price to interfere with a derivative – one of the most frequent forms of attack against DeFi protocols, and frontrunning transactions through fee upping and quant models. Others are completely novel and idiosyncratic to the asset class, like protocol-level reorganizations to invalidate prior transactions, validators reordering transactions to extract value from on-chain marketplaces, or ‘flash loans’ giving attackers unlimited free leverage.²³

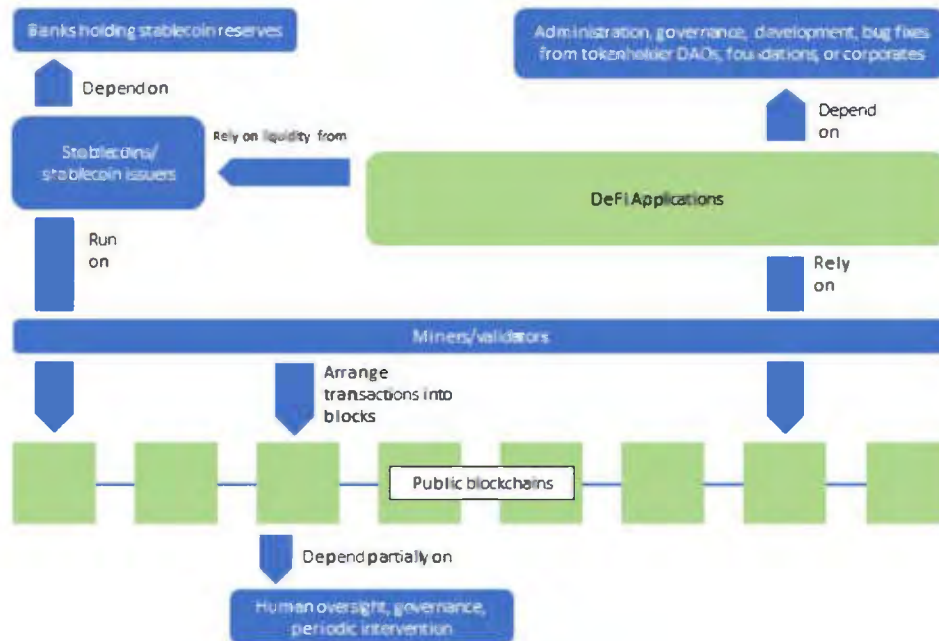
We divide our discussion of DeFi risk factors into five general buckets:

- (i) interconnections with the traditional financial system,
- (ii) operational risks stemming from underlying blockchains,
- (iii) smart contract-based vulnerabilities,
- (iv) other governance and regulatory risks, and
- (v) scalability challenges.

²³ There has been a series of flash loan attacks in the past year. Most recently as of time of writing, PancakeSwap, a yield-farming aggregate (value lost unknown) and bEarn.Fi, a cross-chain farming protocol (loss of almost \$11 million) suffered flash loan attacks. See, Crawley, Jamie “Flash Loan Attack Causes DeFi Token Bunny to Crash Over 95%” CoinDesk (May 20, 2021). <https://www.coindesk.com/flash-loan-attack-bunny-token>

The list of risks identified in this chapter is by no means exhaustive, but we attempt to outline the primary categories.

Figure 1. DeFi Protocols: Map of Interconnected Risks



Note: DeFi applications (e.g., MakerDao) rely on public blockchains (e.g., Ethereum, Bitcoin), which in turn rely on miners/validators to validate blocks of transactions as well as human oversight and governance. DeFi protocols are subject to governance, administration and maintenance. They rely on liquidity from stablecoins backed by reserves held at banks. (Green: decentralized, blockchain-based. Blue: centralized)

i. Interconnections with traditional financial system

a. Banks holding reserves backing stablecoins

While DeFi aspires to create a parallel and independent financial system based on code rather than legal enforcement, key components of the DeFi system rely in practice on traditional financial market infrastructure. The most critical nexus between the two systems can be found in stablecoins. These consist of dollar-denominated tokens circulating on public blockchains and, in principle, are backed by commercial bank dollars immobilized at financial institutions.

Stablecoins are useful for transactions in DeFi as they introduce fiat-denominated collateral into the open transactional context²⁴ of public blockchains. However, the vast majority of stablecoins derive their value from underlying dollar instruments and thus introduce a dependency on an issuer of the underlying instruments and the financial institution where the dollars are parked. At the time of writing, at least \$65 billion worth of stablecoins circulate on public blockchains, but only around \$3.1 billion consists of non-redeemable stablecoins issued against crypto-native collateral.²⁵ The remainder is fully dependent on an ongoing bank relationship and the promise of redeemability for the underlying instruments to be upheld.

Even some of the most purportedly decentralized stablecoins have introduced points of compromise. The MakerDAO system is a set of tools for issuing dollar-denominated tokens (named “Dai”, which is “soft-pegged” to the US dollar²⁶) in an automated way against an overcollateralized basket of other assets. Issuing dollar-denominated assets against crypto collateral within a smart contract is intended to insulate the token from the traditional financial system and potential points of compromise.

i. Market risk in stablecoins’ underlying collateral

In November 2019, MakerDAO introduced “non-native” forms of collateral backing the Dai to manage market volatility of ether (ETH).²⁷ Initially, all Dai were issued in an overcollateralized manner against the digitally-native cryptocurrency ether. Collateralizing against ether made the MakerDAO system more insulated from third-party liabilities, less interdependent with traditional finance and, thus, arguably more robust and resilient. Since ether is no one’s liability and its value is solely market-determined, it is arguably more suitable to back assets like Dai as long as its downside volatility is managed.

However, in November 2019, Maker diversified the portfolio of crypto-assets backing Dai in order to obtain a less volatile collateral, including the USD Coin (USDC), Tether (USDT), Wrapped Bitcoin (WBTC), and Basic Attention Token (BAT).²⁸ This collateral diversification introduced new risks. These new collateral types were not “liability-free” like ether, but in some cases the liability of a single issuer. As of the time of writing, \$1.06 billion worth, or 16 percent,

²⁴ ‘Open transactional context’ means public blockchain-based assets can be exchanged on a peer-to-peer basis worldwide with virtually no oversight. In practice, most stablecoin transactions happen on the internals of the transactional graph and do not involve the issuer (and are hence not exposed to KYC/AML). Keep in mind that most stablecoins refer to the USD as their unit of account, but others target alternative sovereign currencies.

²⁵ Coinmetrics, Dai and sUSD as the crypto-native stablecoins in question. Data current as of Apr. 12, 2021.

²⁶ “Busting MakerDAO Myths: Seven Misconceptions about Dai” (Nov. 11, 2020).

<https://blog.makerdao.com/busting-makerdao-myths-seven-misconceptions-about-dai/>

²⁷ *Id.*

²⁸ <https://daistats.com/#/>

of the \$6.5 billion collateral in the MakerDAO system represents the liability of a third party.²⁹ All of the assets in question can be frozen by entities administering these stablecoin systems, obviating the trustlessness of a portion of the MakerDAO system. For example, if the USDC governing consortium Centre were to freeze the \$332 million worth of USDC³⁰ held in the MakerDAO reserve, MakerDAO's ability to maintain the dollar peg of Dai could be compromised. Furthermore, while Centre's USDC has largely coexisted with DeFi, this status quo could be tested should a regulator apply pressure to Centre³¹ (primarily the founding members Circle or Coinbase) or the regulated financial institutions issuing USDC. Centre's blacklisting policy indicates that they would blacklist blockchain addresses in order "[t]o comply with a law, regulation, or legal order from a duly recognized US authorized authority, US court of competent jurisdiction, or other governmental authority with jurisdiction over Centre."³² Additionally, the banks holding reserves backing USDC could withdraw their support for the token issuer, as happened repeatedly with the stablecoin Tether.^{33 34} So the presence of liability-laden collateral in purportedly purely crypto-economic systems like Maker/Dai injects the potential for interference through regulatory oversight, commercial bank policy, or direct action from the stablecoin issuer itself.

ii. Sources of market illiquidity

As for the standard fiat-backed stablecoins, they now account for a significant share of liquidity for the major DeFi protocols. The top five DeFi protocols by USD-equivalent amount of collateral supplied – MakerDAO, Curve, Uniswap, Aave, and Compound – collectively host

²⁹ The assets in question included 'wrapped BTC', and the stablecoins USDC, USDT, GUSD, Paxos, TUSD. Data current as of Apr. 12, 2021.

³⁰ <https://duneanalytics.com/hagaetc/maker-dao---mcd>. Figures current as of Mar. 15, 2021

³¹ For example, the FATF may consider centralized stablecoin issuers to be Virtual Asset Service Providers (VASPs) and has suggested in their draft March 2021 guidance that member states impose additional disclosure burdens on VASPs facilitating 'unhosted' transactions (possibly capturing how stablecoin issuers operate). See p. 71, "Draft updated Guidance for a risk-based approach to virtual assets and VASPs" FATF (March 2021). <https://www.fatf-gafi.org/media/fatf/documents/recommendations/March%202021%20-%20VA%20Guidance%20update%20-%20Sixth%20draft%20-%20Public%20consultation.pdf>

³² [https://f.hubspotusercontent30.net/hubfs/9304636/PDF/Centre Blacklisting Policy 20200512.pdf](https://f.hubspotusercontent30.net/hubfs/9304636/PDF/Centre%20Blacklisting%20Policy%20200512.pdf)

³³ See, Attorney General of the State of New York. "Settlement agreement with Tether and Bitfinance" (July 2020). [https://ag.ny.gov/sites/default/files/2021.02.17 - settlement agreement - execution version.b-t signed-c2 oag signed.pdf](https://ag.ny.gov/sites/default/files/2021.02.17_-_settlement_agreement_-_execution_version.b-t_signed-c2_oag_signed.pdf)

³⁴ Tether is a controversial so-called stablecoin that was unable to substantiate its dollar reserves. Despite the unclear backing of its dollar reserves. Nonetheless, Tether is an important source of liquidity in crypto-finance. See, Attorney General's settlement with Tether (2020), *supra*. To comply with this settlement, Tether released for the first time in May 2021 a breakdown of its reserves composition. As of March 31, 2021, Tether's reserves were composed of 75.85% cash and equivalents, 12.55% secured loans, 9.96% in corporate bonds and precious metals and 1.64% in other investments, including digital currencies. Interestingly, 49% is backed by unspecified commercial paper. See, De, Nikhilesh. "Tether's First Reserve Breakdown Shows Token 49% Backed By Unspecified Commercial Paper" CoinDesk (May 13, 2021). <https://www.coindesk.com/tether-first-reserve-composition-report-usdt>

\$3.818 billion in USDC and \$1.06 billion in Tether (USDT) in deposits.³⁵ These figures represent 42 percent of outstanding USDC and 5.2 percent of outstanding USDT circulating on Ethereum.³⁶ These two stablecoins represent critical sources of liquidity for these various DeFi protocols. USDC represents 19.5 percent of collateral on the lending protocol Compound, and the USDC-ETH pair is the second-most liquid pair on the decentralized exchange Uniswap. These stablecoins are naturally exposed to the failure of the banks holding collateral reserves backing these two stablecoins. Historically, banking support for certain stablecoin issuers can be questionable, as evidenced by the disclosures found in a settlement agreement between Tether and the New York Attorney General’s office.³⁷ A bank insolvency, regulatory action, or issuer failure – likely causing the stablecoins in question to trade at a discount to par, as happened historically during confidence crises³⁸ – would impair the collateral and liquidity that powers these DeFi systems.

b. High interconnectedness: banking relationships with crypto trading firms

Aside from stablecoin banking, a handful of banks provide critical services to cryptocurrency firms. Historically, only a small number of U.S. banks, including Silvergate Bank, Signature Bank, and Metropolitan Community Bank, have actively pursued clients in the DeFi space. These banks represent critical points of centralization for the crypto industry. A disruption or an insolvency among any one of these banks would adversely affect whole swathes of the cryptocurrency industry.

Perhaps the bank with the greatest concentration of the crypto industry, Silvergate Bank is a California state-chartered bank based in San Diego that turned its focus to the cryptocurrency industry in 2013 and now provides banking services to firms active in this space. Their flagship product is the Silvergate Exchange Network (SEN), which enables real-time USD transfer between its clients, which are largely centralized crypto exchanges and institutional investors.³⁹ Acquiring banking services has been so challenging for crypto exchanges and firms that

³⁵ Maker: <https://duneanalytics.com/hagaetc/maker-dao---mcd>, Curve <https://www.curve.fi/totaldeposits>, Uniswap <https://info.uniswap.org/home>, Aave <https://aavewatch.com/>, Compound <https://compound.finance/markets> (As of March 15, 2021)

³⁶ Based on figures: 9 billion USDC circulating and 20.41 billion USDT_eth circulating (Source: Coin Metrics). (As of March 15, 2021)

³⁷ NY Attorney General Letitia James. Press Release: “Attorney General James Ends Virtual Currency Trading Platform Bitfinex’s Illegal Activities in New York” (Feb. 23, 2021). <https://ag.ny.gov/press-release/2021/attorney-general-james-ends-virtual-currency-trading-platform-bitfinexs-illegal>

³⁸ For instance, when Wells Fargo withdrew its support for Tether in spring 2017 and convertibility was temporarily suspended, (<https://bitcoinist.com/bitcoin-trading-at-a-premium-on-bitfinex-and-poloniex/>) Tether traded as low as 92 cents on the dollar (Coin Metrics data)

³⁹ Silvergate Capital Corporation Investor Presentation (January 2021). https://s23.q4cdn.com/615058218/files/doc_presentations/2021/01/Silvergate-Capital-Investor-Presentation-January-2021.pdf

Silvergate has become a key nexus connecting traditional banking and the digital currency industry. As of 4Q2020, Silvergate boasted \$5.5 billion in total assets on their balance sheet and \$5.03 billion in cryptocurrency deposits.⁴⁰ Their SEN transfer network processed \$59.2 billion in intra-bank transfer volume in the fourth quarter,⁴¹ providing an alternative settlement means for crypto firms looking to settle the USD fiat leg of crypto-fiat trades. While a small number of more mature crypto firms are able to obtain banking relationships with the largest banks in the U.S.,⁴² most firms active in the virtual currency industry rely on Silvergate and its peers, which are relatively small community banks, to settle the USD fiat leg of crypto-fiat trades and for banking services. Any instability or cessation of banking in this cohort could cripple the crypto industry, as crypto exchanges, brokerages, and OTC desks would have to scramble to find alternative sources of USD fiat liquidity. More recently, Facebook-backed Diem announced that Silvergate will be the exclusive issuer of the Diem USD stablecoin in a sudden about-face from a cross-border payments strategy to a US-centric approach.⁴³ This partnership with Facebook's Diem only further augments the U.S. crypto industry's exposure to Silvergate.

c. Retail exposure: consumer fintech apps

DeFi has begun to cross the threshold to mainstream consumer fintech apps, thus moving beyond an audience of high-tech early adopters. A number of retail crypto exchanges have begun serving as interfaces for DeFi protocols, effectively reducing the frictions involved in getting access to DeFi – and exposing retail users to their benefits and risks. Now there are publicly traded firms that depend on the functionality of smart contracts and may well have user funds deposited with them.

Consumer fintech apps now make crypto highly accessible to retail investors who may not fully understand what they are trading. The popular retail-facing brokerage Coinbase, which boasts 56 million verified users as of their Q1 2021 quarterly filing,⁴⁴ has begun to embrace DeFi, positioning themselves among other things as an interface to these blockchain protocols. For instance, Coinbase details their growing proximity to and engagement with the decentralized interest rate swap protocol Compound in its Form S-1:

⁴⁰ Silvergate Capital Corporation 4Q20 Earnings Presentation (Jan. 20, 2021). https://s23.g4cdn.com/615058218/files/doc_financials/2020/q4/Ex.-99.2-SI-4Q20-Earnings-Presentation-1.20.2021.pdf

⁴¹ Silvergate SEN Network Transfer Volume (Quarterly) Q42018 - Q4 2020.

<https://www.theblockcrypto.com/data/crypto-markets/public-companies/sen-transfer-volume>

⁴² Palmer, Daniel. "JPMorgan Bank Takes on Coinbase, Gemini as Its First Crypto Exchange Customers" Coindesk (May 12, 2020). <https://www.coindesk.com/coinbase-gemini-first-crypto-exchange-customers-jpmorgan-bank-report>

⁴³ Diem Association. "Partnership with Silvergate and Strategic Shift to the United States" (May 12, 2021). <https://www.diem.com/en-us/updates/diem-silvergate-partnership/>

⁴⁴ Coinbase First Quarter 2021 Announcement. <https://investor.coinbase.com/news/news-details/2021/Coinbase-Announces-First-Quarter-2021-Estimated-Results-and-Full-Year-2021-Outlook/default.aspx>

Our relationship with Compound began in 2018 when Coinbase Ventures invested in Compound Labs, Inc., the DeFi pioneer behind the Compound protocol. Coinbase was also an early adopter of Compound, supplying USDC liquidity to the protocol in 2019 and allowing Coinbase Wallet users to access Compound directly starting in early 2020.⁴⁵

A number of other cryptocurrency brokers, custodians, and lenders have begun to see themselves as interfaces to DeFi protocols, in addition to their core businesses.

Binance, one of the largest spot and derivatives exchanges for cryptocurrencies, has reported a 24 hour trading volume of \$80 billion on January 4, 2021⁴⁶ and has over 350,000 BTC and 3.6 million ETH held on deposit on behalf of clients.⁴⁷ This large cryptocurrency exchange has now openly embraced DeFi, providing not only a centralized brokerage and exchange experience, but a number of passthrough products enabling users to participate in decentralized protocols through its Binance Earn⁴⁸ suite.

Additionally, the Swiss fintech firm Taurus Group has integrated the lending and borrowing Aave protocol⁴⁹ into its infrastructure, permitting institutional clients to access liquidity on the DeFi protocol.⁵⁰ This presages a possible scenario where fintechs or financial institutions start to put client assets in DeFi protocols in order to take advantage of attractive interest rates,⁵¹ which are generally higher than returns on cash held at banks (although they offer fundamentally different risk profiles).

d. Corporate exposure: corporate treasuries

Lastly, some corporations are obtaining direct exposures to native cryptocurrencies on their balance sheet, either as an alternative treasury asset (as with Microstrategy, Square, or Tesla) or

⁴⁵ Coinbase Global, Inc. Form S1 Registration Statement. (filed with the SEC on Feb. 25, 2021).

<https://www.sec.gov/Archives/edgar/data/1679788/000162828021003168/coinbaseglobalinc-1.htm>

⁴⁶ Binance reported daily trading volume of \$80 billion in 24-hour trade activity on Jan. 4, 2021. See, Haig, Samuel. "Binance hits record high of \$80B in daily volume as crypto markets surge" Cointelegraph (January 5, 2021). <https://cointelegraph.com/news/binance-hits-record-high-of-80b-in-daily-volume-as-crypto-markets-surge>

⁴⁷ CoinMetrics data. Data retrieved Mar. 15, 2021

⁴⁸ See, <https://www.binance.com/en/earn#flex-item>

⁴⁹ Aave is a "decentralised non-custodial liquidity market protocol" in which users can provide liquidity to earn an interest rate, or borrow against their assets in either an overcollateralized manner or undercollateralized with a flash loan. <https://docs.aave.com/faq/>

⁵⁰ Akhtar, Tanzeel. "Digital Assets Firm Taurus Integrates Aave Protocol to Improve Banking Access to DeFi" Coindesk (Mar. 8, 2021). <https://www.coindesk.com/digital-assets-firm-taurus-banking-access-defi-aave-partnership>

⁵¹ See, <https://defirate.com/lend/>

in preparation to actually use the tokens to transact on the protocol directly. This presages more engagement from public corporations with these shared infrastructures. The Chinese smartphone firm Meitu Inc. acquired 15,000 ETH (worth \$22m at the time of purchase), citing its potential utility in future transactions on the Ethereum network:

[T]he Ether purchased would become the gas reserve for the Group's potential dAPP(s) to consume in the future, as well as being used as consideration for investing in blockchain-based projects that take Ether as consideration.⁵²

Meitu indicated in their disclosure that they were considering launching Ethereum-based dApps, and would thus require a reserve of ether in order to transact on the Ethereum network.

While interactions between traditional firms and DeFi systems have been historically sparse, growing evidence suggests that integration is taking place. The earliest adopters were crypto exchanges exchanging crypto-assets with traditional assets and providing passthrough services to DeFi protocols. More interactions are emerging between banks servicing crypto businesses, transacting on these networks directly and increasingly with other firms looking to benefit from the assurances of public blockchains. More recently, Visa announced their intention to engage with DeFi directly, enabling the settlement of transactions with USDC on the Ethereum network.⁵³ As DeFi comes to offer more modes of transactions, firms like Meitu may come to have an interest in using these DeFi networks directly. Such corporate firms will need to assess their risk exposures to a protocol's smart contracts and underlying cryptocurrency and blockchain (discussed below). They will also need to assess how they may even pass these risks on to their customers and business partners.

ii. Operational risks stemming from underlying blockchains

DeFi applications ultimately rely on public blockchains for settlement and contract resolution. The most popular base layer, as measured by liquidity for such applications, is Ethereum with around \$46 billion worth of collateral (composed of various crypto-assets and stablecoins) being employed in Ethereum-based smart contracts.⁵⁴ A number of other blockchains now host DeFi applications and are eyeing Ethereum's lead.

⁵² Meitu, Inc. Voluntary Announcement: Purchase of Cryptocurrencies (Ether and Bitcoin) (Mar. 7, 2021). (https://corp-static.meitu.com/corp-new/92016878a68bac4ad8121e906eae6687_1615115628.pdf)

⁵³ Visa. "Digital currency comes to Visa's settlement platform." (Mar. 29, 2021). <https://usa.visa.com/visa-everywhere/blog/bdp/2021/03/26/digital-currency-comes-1616782388876.html>

⁵⁴ Gross Value Locked and Net Value Locked (Ethereum DeFi). Accessed April 12, 2021. <https://www.theblockcrypto.com/data/decentralized-finance/total-value-locked-tvl/true-value-locked-and-total-value-locked>

The orderly operation of these applications relies critically on these base layer blockchains functioning, which cannot always be guaranteed. Transacting parties internalize novel risks, which may have no analogues in traditional finance where messaging and settlement systems are governed by single entities or bodies (like SWIFT, The Clearing House, or the Federal Reserve with Fedwire). Instead, public blockchains are largely decentralized settings where validators are compensated for assembling transactions into blocks and are expected to do so honestly based on economic incentives.⁵⁵ As there are no central administrators in these systems, the responsibility for evaluating the risk of relying on these infrastructures effectively falls on the end users, applications, and new types of intermediaries involved in the DeFi systems.

a. Consensus failures

Consensus – the construction, approval and distribution of blocks of transaction across distributed ledgers – on these blockchains is, however, not a given. While the largest and most robust blockchains such as Bitcoin and Ethereum experience virtually no outages, outages are not completely unheard of. Bitcoin infamously had two major “rollbacks” in 2010⁵⁶ and 2013⁵⁷ when a significant number of blocks, and hence transactions, were unrecorded or essentially reversed. Collectively, around 15 hours’ worth of transactions were removed over the course of those two events.

Ethereum is arguably more fragile to outages since most users do not run nodes but instead rely on service providers like Infura to query and index the blockchain and broadcast transactions. When these service providers experience downtime, as was the case with Infura during an unplanned chain split in 2020,⁵⁸ intermediated transactions ground to a halt.

b. Underlying protocol interventions

Blockchains are not immune to politics, as they are, after all, governed by the humans that establish their rules. Most infamously, in 2016, Ethereum leadership coordinated the selective removal of balances from the blockchain after a particularly large DeFi application called “The DAO” was hacked and exploited.⁵⁹ Ethereum leadership deemed it necessary to intervene on the

⁵⁵ For more reading about economic incentives, see, Auer, Raphael, Cyril Monnet and Hyun Song Shin. “Permissioned distributed ledgers and the governance of money” BIS Working Papers No 924 (January 2021). <https://www.bis.org/publ/work924.pdf>

⁵⁶ Coopahtroopa, Cooper. “YFI Minting Ownership” (Jul. 2020). <https://gov.yearn.finance/t/yfi-minting-ownership/155>

⁵⁷ Andresen, Gavin. “March 2013 Chain Fork Post-Mortem” (Mar. 3, 2020). <https://github.com/bitcoin/bips/blob/master/bip-0050.mediawiki>

⁵⁸ Khalili, Joel. “Massive Ethereum outage forces crypto exchanges to block withdrawals” techradar.pro (Nov. 11, 2020). <https://www.techradar.com/news/massive-ethereum-outage-forces-crypto-exchanges-to-block-withdrawals>

⁵⁹ Siegel, David. “Understanding the Dao Attack” Coindesk (Jun. 25, 2016, updated Dec. 17, 2020). (<https://www.coindesk.com/understanding-dao-hack-journalists>)

Ethereum blockchain due to the large fraction of outstanding ether locked in the faulty DAO contract. Some Ethereum community members rebelled against the arbitrary changes and supported the original Ethereum chain. The intervention caused a hard fork in the blockchain, as two versions of Ethereum came to exist in tandem (with the original, but less widely adopted, version ultimately being called “Ethereum Classic”). This is an example of a contract failure ultimately affecting the underlying protocol itself and demonstrating that certain critically large applications can take on a systemic nature within protocol politics. At the time of the exploit, The DAO contract accounted for 15 percent of ether outstanding at the time. While Ethereum leadership have not intervened to remediate subsequent hacks and failures, one might imagine that if a popular contract with a similar threshold of ether was breached, it might call them into action at the blockchain level once again. In the case of the DAO, Ethereum’s future switch to Proof of Stake was cited as justification for rolling back the exploit (which would have granted a presumably hostile actor a large share of the outstanding ether, and hence a significant role in the future of the network under a Proof of Stake regime). Other less critical bugs or exploits have not met the seriousness threshold to merit a rollback, even when those affected lobbied Ethereum leadership.⁶⁰

While the post-DAO hard fork of Ethereum is generally seen as a prudent move, it constituted, on strict terms, a violation of property rights and brought into question the settlement assurances of the blockchain. On Ethereum, there is no legal adjudication – knowledge of a private key is tantamount to ownership. Thus, under the protocol rules, the entity that exploited the DAO was the rightful owner of the ether in question, and those rules were overridden to “bail out” depositors in the DAO contract.⁶¹ Such interventions could be helpful for obtaining recourse when catastrophic failures or bugs occur, but they also introduce subjectivity and arbitrariness into the settlement process.⁶²

c. Proof of Work (PoW) consensus failures

⁶⁰ In the case of the Parity hack, Parity asked for (and were denied) a hard fork to undo the loss of 513k Ether. See <https://www.businessinsider.com/ethereum-price-parity-hack-bug-fork-2017-11>

⁶¹ Please note that holders of Ethereum Classic on the original blockchain kept their property rights but not the funds stolen in the DAO attack. Arruñada, Benito, Prospects of Blockchain in Contract and Property (February 23, 2020). See, Pompeu Fabra University, Economics and Business Working Paper 1696, 2020, Available at SSRN: <https://ssrn.com/abstract=3543137> or <http://dx.doi.org/10.2139/ssrn.3543137>

⁶² Settlement in the blockchain is a complex issue for blockchain systems and involves a combination of both operational and legal risks. In traditional finance, a number of operational and legal frictions are baked into the settlement process in both payments and trading, such as time, central intermediaries, and/or contractual agreements. These frictions, which also act as risk mitigation, do not often have analogous features on blockchains. Note also that the settlement process differs significantly between UTXO- vs account-based blockchains.

More straightforwardly, smaller blockchains can be exploited when miners believe they are not sufficiently compensated. When miners gain sufficient hashpower,⁶³ they can coordinate consensus attacks, of which a subset is known as reorganization attacks or “51 percent attacks”. These attacks consist of exploits in which validators employ their privileged access to transaction ordering to extract some value from the blockchain. These consensus attacks generally take place on Proof of Work (PoW) blockchains because such blockchains provide relatively low compensation thresholds to miners, making validator attacks more economically plausible. Often, these attacks occur in the presence of general-purpose computing hardware, which can be borrowed or rented.⁶⁴

As an example, in early 2021, validators on the Verge blockchain rolled back 200 days of data, effectively invalidating months of transactions.⁶⁵ These reorganizations of blocks can be used to omit certain transactions that were presumed settled, including deposits credited by an exchange. Thus, reorganizations are often tools for the fraudulently misleading merchants or crypto exchanges into believing that there is a valid deposit, which is then ultimately excluded from the ledger. Indeed, both the Ethereum Classic⁶⁶ and the Bitcoin Gold⁶⁷ blockchains have suffered multiple such protocol-level attacks, some of which were used to successfully defraud crypto exchanges. DeFi applications rely on the base layer blockchains to settle and clear transactions, so the application stack is compromised when the underlying blockchain malfunctions.

Both Ethereum and Bitcoin currently rely on PoW, so they are theoretically exposed to these kinds of attacks. However, Ethereum and Bitcoin offer incredibly large security budgets,⁶⁸ making an attack extremely expensive and likely impractical. Additionally, Bitcoin is mined with bitcoin-focused hardware (known as “Application-Specific Integrated Circuits” or ASICs) that cannot be repurposed for use in general computing or for most other crypto networks, so miners would have less incentive to attack the Bitcoin blockchain and destroy what gives their Bitcoin ASICs value. Moreover, as Bitcoin ASICs are essentially the physical embodiment of future cash

⁶³ “Hashpower” of “hashrate” refers to “the total combined computational power that is being used to mine and process transactions on a Proof-of-Work blockchain, such as Bitcoin and Ethereum (prior to the 2.0 upgrade).” See, <https://www.coindesk.com/what-does-hashrate-mean>

⁶⁴ Note: a 51% attack allows malicious actors to unrecord or prevent the recording of transactions, but not to fraudulently generate new transactions that they cannot otherwise digitally sign. Of course, ordering and recording of blocks can be powerful tools nonetheless, particularly for crypto-finance.

⁶⁵ Mapperson, Joshua. “Verge of disaster: 200 days transactions wiped from blockchain,” Cointelegraph (Feb. 16, 2021). <https://cointelegraph.com/news/verge-of-disaster-200-days-transactions-wiped-from-blockchain>

⁶⁶ Shen, Muyao. “Crypto Investors Have Ignored Three Straight 51% Attacks on ETC,” Coindesk (Sept. 8, 2020). <https://www.coindesk.com/crypto-51-attacks-etc>

⁶⁷ Nelson, Danny. “Attempted 51% Attack on Bitcoin Gold Was Thwarted, Developers Say” Coindesk (Jul. 10, 2020). <https://www.coindesk.com/attempted-51-attack-on-bitcoin-gold-was-thwarted-developers-say>

⁶⁸ On a trailing seven day basis, Bitcoin offers miners an average of \$60m/day, and Ethereum is offering miners \$48m/day (Source: Coin Metrics, as of Apr. 12, 2021).

flows in bitcoin over the ASIC's useful lifetime, miners are strongly incentivized to support the long term value of the Bitcoin blockchain.⁶⁹

Similarly, a large share of the value of the high-end graphics processing units (GPUs) used to mine ether derives from the value of ether itself,⁷⁰ so miners attacking the Ethereum blockchain would be depreciating their own equipment in doing so. For blockchains such as Bitcoin with a capped issuance, questions remain over the long run viability of PoW when Bitcoin becomes a network based solely on transaction fees. Various studies have identified the potential instability or insufficiency of a fee-based PoW market environment.⁷¹

d. Miner extractable value (MEV)

Nevertheless, reorganizations of blocks (or 51 percent attacks) are only one class of a broader set of validator-based exploitations known as “miner extractable value” (or MEV).⁷² First introduced by researchers Daian et al (2019),⁷³ the term MEV refers to the value that validators (the entities assembling transactions into blocks) or third parties can extract from transacting users by frontrunning them and selectively reordering transactions.⁷⁴ MEV is made possible due to the innate transparency of Ethereum transactions, their utility in on-chain exchanges, and the possibility of gaining priority by outbidding other users (or simply reordering transactions if you are the miner). MEV can be thought of as somewhat analogous to a hedge fund paying for order flow in order to trade against uninformed or retail flow.

⁶⁹ Note: there could be a risk of state action. For example, Chinese authorities could take control of a significant chunk of bitcoin mining. <https://blog.lopp.net/are-chinese-miners-threat-bitcoin/>

⁷⁰ It is helpful to think of the hardware used to mine blockchains as a physically-instantiated bundle of call options for the underlying token gradually unlocking over the useful lifetime of the hardware.

⁷¹ See, Carlsten, Miles & Harry Kalodner, Matt Weinberg, and Arvind Narayanan. Working Paper: “On the instability of Bitcoin without the block reward.” PrincetonEconomics (Oct. 2016).

<https://economics.princeton.edu/working-papers/on-the-instability-of-bitcoin-without-the-block-reward/>.

See also, Budish, Eric. “The Economic Limits of Bitcoin and the Blockchain” University of Chicago Booth School of Business, (Jun. 5, 2018) <https://faculty.chicagobooth.edu/eric.budish/research/Economic-Limits-Bitcoin-Blockchain.pdf>, and Auer, Raphael. “The doomsday economics of ‘proof-of-work’ in cryptocurrencies” VOXeu/CEPR (Mar. 8, 2019). <https://voxeu.org/article/doomsday-economics-proof-work-cryptocurrencies>

⁷² Because not all entities extracting value in this manner are miners, MEV is sometimes styled as “Maximal Extracted Value”

⁷³ Daian, P., Goldfeder, S., Kell, T., Li, Y., Zhao, X., Bentov, I., Breidenbach, L., Juels, A. “Flash Boys 2.0: Frontrunning, Transaction Reordering, and Consensus Instability in Decentralized Exchanges” (Apr. 10, 2019). <https://arxiv.org/abs/1904.05234>

⁷⁴ Flashbots defines MEV as “the total value that can be extracted permissionlessly (i.e. without any special rights) from the re-ordering, insertion or censorship of transactions within a block being produced. As miners currently have the ultimate say on transaction ordering and inclusion in Ethereum, they can be seen as the most powerful player in this game [...] MEV exists on any blockchain and layers where there is a party responsible for transaction ordering (eg. validators, rollup providers).” Flashbots.net, “FAQ”. Accessed Apr. 13, 2021. <https://explore.flashbots.net/faq>

As the complexity of transactions increases, more frontrunning and risk-free arbitrage opportunities emerge. Thus, the vast majority of observed MEV takes place on Ethereum, and largely relates to transactions occurring on automated market maker (AMM) exchanges – where users can frictionlessly swap assets by engaging with pools of liquidity. AMMs offer users guaranteed liquidity on exchanges, albeit at the potential cost of efficient execution. According to Flashbots.net, a lower bound of \$369 million worth of MEV has been harvested by validators (or arbitrage bots) since January 2020.⁷⁵ This represents a net drag on users, which end up financing the MEV through slippage on their trades. Effectively, MEV can be understood as similar to a rake at a casino.

Most researchers consider MEV endemic to blockchains – like Ethereum – where transactions on decentralized exchanges or DEXs (including DEX platforms employing Automated Market Makers, such as Uniswap) are transparent. If the parties engaged in frontrunning materially degrade users’ transactional experience, the logic of transparent DeFi could be called into question. While some analysts contend that MEV represents an alternative subsidy to miners or validators,⁷⁶ permitting blockchains to function at a lower level of issuance or fees, researchers Qin, Zhou and Gervais have highlighted how aggressive MEV poses a threat to consensus. In their estimate, “[the] biggest danger lies in the willingness of miners to extract and compete over MEV, which would increase the stale block rate and consequently aggravate the risks of double-spending and selfish mining.”⁷⁷ Stale blocks and double spending reduce the predictability of the base layer and introduce uncertainty into settlement finality, impairing the assurances of crypto-economic protocols.

In an attempt to mitigate the protocol-level harms of MEV, Ethereum developers have proposed an Ethereum node client that codifies MEV and allows miners to auction off their rights to reorder transactions within a block, delegating the process of finding risk-free arbitrage to specialized third parties.⁷⁸ This would turn MEV into an explicit part of the compensation structure for miners, reduce the protocol instability caused by the current adversarial state of MEV, and increase fairness in mining by allowing less sophisticated miners to cheaply monetize MEV. Other researchers, unconvinced by the codification of MEV, have proposed alternative solutions, such as fair transaction ordering, or the encryption of transactions between the

⁷⁵ <https://explore.flashbots.net/>. Accessed Apr. 12, 2021.

⁷⁶ As of Apr. 12, 2021, 58 percent of Ethereum hashrate is associated with pools auctioning off the rights to reorder transactions via the Flashbots protocol. Effectively, these miners are selling the rights to specialists who extract economic rent by engaging in frontrunning trades. See, Flashbots Transparency Report - March 2021 (Apr 12). <https://medium.com/flashbots/flashbots-transparency-report-march-2021-d3930b4b98a9>

⁷⁷ Qin, K., Zhou, L., and Gervais, A. “Quantifying Blockchain Extractable Value: How dark is the forest?” (Jan. 22, 2021). arXiv.2101.0555==v3 [cs.CR] 22 Jan 2021 <https://arxiv.org/pdf/2101.05511.pdf>

⁷⁸ See, Floersch, Karl. “MEV Auction: Auctioning transaction ordering rights as a solution to Miner Extractable Value” ethresear.ch (Jan. 2020). <https://ethresear.ch/t/mev-auction-auctioning-transaction-ordering-rights-as-a-solution-to-miner-extractable-value/6788> and <https://ethresear.ch/t/flashbots-frontrunning-the-mev-crisis/8251/1>

broadcast and execution stage.⁷⁹ Due to the downsides associated with broadcasting transactions to a global mempool,⁸⁰ privately-mined transactions are becoming more popular. Effectively, this involves routing transactional data to miners directly in a manner reminiscent of dark pools. At the time of writing, over 75,000 Ethereum transactions have been sent directly to miners⁸¹ rather than being broadcast to the network in the conventional manner.

At present, MEV appears to be a fundamental feature of data-rich blockchains that facilitate transparent on-chain exchange. Transparent queuing systems for pending transactions combined with the ability to outbid and displace a transaction inevitably yields exploitation opportunities. Unlike a retail brokerage like Robinhood selling customer order flow,⁸² MEV extractors are not obliged to the individuals they are arbitraging. Thus, there are no natural limits to the exploitation of end users through MEV.

e. Validator Cartels

Non-PoW blockchains are not immune to protocol interventions at the validator level. One popular alternative to PoW is known as Proof of Stake, where the power to assemble transactions into blocks (and, in some cases, exert political power over the network) is a function of one's share of all protocol tokens held. In certain network arrangements, the number of validator slots is fixed, creating strong incentives to consolidate power and cartelize. Because validators are typically rewarded with fees or new issuance, the consolidation of power through vote-buying has been observed⁸³ in Proof of Stake blockchains, such as EOS (which maintains 21 slots for validators). Such measures allow validators to consolidate power, granting them eventual control over which transactions can be included in the final ledger. If validators are fixed and free market competition for blockspace is snuffed out, the censor-resistance of the protocol properties would be at risk. Since DeFi is built on the assumption that the underlying financial infrastructure is neutral and unstoppable, such concentration of power in validators is a significant threat. An instance of validator collusion can be found on the STEEM network, where STEEM coins owned by blockchain entrepreneur Justin Sun were frozen after validators suspected his intentions to co-opt the network:

⁷⁹ Juels, Eyal, and Kelkar. "Miners, Front-Running-as-a-Service Is Theft," Coindesk (Apr. 7, 2021). <https://www.coindesk.com/miners-front-running-service-theft>

⁸⁰ The memory pool or mempool is a node's holding area for broadcasted but un-mined transactions. Transactions present in the mempool are transparent to anyone participating in consensus.

⁸¹ Etherscan, "Private Transactions." Data current as of Apr. 14, 2021. <https://etherscan.io/txs/label/private-transaction>

⁸² See, Roberts, Jeff John and Morris, David. Robinhood makes millions selling your stock trades ... is that so wrong?" Fortune (July 8, 2020).

<https://fortune.com/2020/07/08/robinhood-makes-millions-selling-your-stock-trades-is-that-so-wrong/>

⁸³ Dale, Brady. "EOS investors can't say they weren't warned." Coindesk (Oct. 3, 2018). <https://www.coindesk.com/vitalik-called-it-vote-buying-scandal-stokes-fears-of-eos-failure>

*Specifically, the witnesses were able to unilaterally lock out Sun after a simple majority vote passed 19 to 1. They had orchestrated the plan in a private Slack group, ran a software upgrade on the blockchain and froze the Tron Foundation CEO's funds.*⁸⁴

In this case, Sun fought back by enlisting custodial exchanges – which held large fractions of the supply of STEEM on behalf of users – to employ user deposits to vote in his favor and overrule the actions of the validators.⁸⁵ This illustrates how large cryptocurrency custodians and cryptocurrency deposit-taking institutions can take on vital roles as kingmakers in Proof of Stake systems. With Ethereum, the largest DeFi platform slated to transition to Proof of Stake, custodians holding large quantities of ether will have outsize control over the network and may be able to materially influence network outcomes. Thus far, crypto exchanges have generally not recused themselves from protocol interventions. Effectively, they act as principals rather than as agents when deploying client funds for on-chain votes.

f. Inflation bugs

Other more catastrophic protocol vulnerabilities abound, which can affect the DeFi applications built on top of them. One such risk is posed by inflation bugs, which inflate the supply of coins ahead of a pre-agreed or expected schedule.⁸⁶ As coins (minted in excess of the defined schedule) are issued and begin to circulate, recipients of these new coins have a strong disincentive to roll back the chain and undo the unexpected inflation. Inflation bugs are frequent and have affected many of the largest blockchain protocols – and in some cases, were not fully remediated. Blockchains that have witnessed material inflation bugs that were exploited include Bitcoin,⁸⁷ Bitcoin Private,⁸⁸ and Stellar,⁸⁹ as well as many other less notable cases.

⁸⁴ Copeland, Tim. "Steem vs Tron: The rebellion against a cryptocurrency empire" Decrypt (Aug. 18, 2020). <https://decrypt.co/38050/steem-steemit-tron-justin-sun-cryptocurrency-war>

⁸⁵ *Id.*

⁸⁶ Avan-Nomayo, Osato. "Inflation Bug Still a Danger to More than Half of All Bitcoin Full Nodes" Cointelegraph (May 19, 2019). <https://cointelegraph.com/news/inflation-bug-still-a-danger-to-more-than-half-of-all-bitcoin-full-nodes>

⁸⁷ See https://en.bitcoin.it/wiki/Value_overflow_incident

⁸⁸ CoinMetrics. "Don't Trust, Verify: a Bitcoin Private Case Study" Dec. 23, 2018. <https://coinmetrics.io/bitcoin-private/>

⁸⁹ Zmudzinski, Adrian. "Stellar Patched an Inflation Bug and Burned the Resulting 2.25 Billion XLM: Research" Cointelegraph (Mar. 27, 2019). <https://cointelegraph.com/news/stellar-patched-an-inflation-bug-and-burned-the-resulting-225-billion-xlm-research>

Other networks that have faced potential inflation bugs but were not known to have been exploited include Zcash⁹⁰ and Monero⁹¹ – a particularly insidious threat when privacy-focused chains are concerned, as the inflation is harder to detect on more opaque blockchains. Another Bitcoin vulnerability patched in 2018⁹² could have been used to create unexpected inflation but was not exploited. Since DeFi protocols are highly automated, run continuously, and operate with minimal (or in some cases, no) human oversight, inflation bugs on the underlying native protocols can significantly destabilize DeFi applications. Inflation bugs are among the most severe threats that blockchains face, and remediation often requires halting or rolling back the blockchain, which would impair the assurances of any smart contracts relying on the underlying blockchain. Recently, the DeFi-focused blockchain Kava was halted⁹³ to address a bug which was significantly overpaying planned distributions (known as ‘yield farming’).

iii. Smart contract-based risks

a. Technical vulnerabilities of smart contracts

Smart contracts as described earlier are not legal contracts. Instead, they are code that automates actions. These actions could be parts of native cryptocurrencies on public blockchains, such as bitcoin and ether, which can be understood as synthetic commodity money⁹⁴ – they are not guaranteed or backed by any third party and are not redeemable for anything, including fiat currency. Instead, they serve as ‘access’ tokens to the Bitcoin and Ethereum networks, respectively, and as a form of collateral and transactional medium within these networks.

For these native cryptocurrencies, it is fully possible to destroy, permanently immobilize, or render them unspendable. While some exploits (like the June 2016 DAO Hack on Ethereum⁹⁵ or the August 2010 Value Overflow Incident on Bitcoin⁹⁶) represent such an existential threat to the

⁹⁰ Hackett, Rober. “Zcash Discloses Vulnerability That Could Have Allowed ‘Infinite Counterfeit’ Cryptocurrency” *Fortune* (Feb. 5, 2019). <https://fortune.com/2019/02/05/zcash-vulnerability-cryptocurrency/>

⁹¹ Luigi1111 and Riccardo “fluffypony” Spagni. “Disclosure of a Major Bug in CryptoNote Based Currencies” *Monero* (May 17, 2017). <https://www.getmonero.org/2017/05/17/disclosure-of-a-major-bug-in-cryptonote-based-currencies.html>

⁹² Hertig, Alyssa. “The Latest Bitcoin Bug Was So Bad, Developers Kept Its Full Details a Secret” *Coindesk* (Sept. 21, 2018). <https://www.coindesk.com/the-latest-bitcoin-bug-was-so-bad-developers-kept-its-full-details-a-secret>

⁹³ Harper, Colin. “Kava Halted After Yield Farming Bug Discovered in Latest Release” *Coindesk* (Mar. 4, 2021). <https://www.coindesk.com/kava-halted-yield-farming-bug>

⁹⁴ See, Selgin, George, *Synthetic Commodity Money* (April 10, 2013). Available at SSRN: <https://ssrn.com/abstract=2000118> or <http://dx.doi.org/10.2139/ssrn.2000118>

⁹⁵ Siegel, Dan. “Understanding the Dao Attack” *Coindesk* (Jun 25, 2016). <https://www.coindesk.com/understanding-dao-hack-journalists>

⁹⁶ See, Value overflow incident. Accessed April 13, 2021. https://en.bitcoin.it/wiki/Value_overflow_incident

network that they have been remediated with recourse to social consensus (overriding the technical reality of the blockchain), the vast majority of exploits do not reach a critical threshold of importance. Therefore, users who interact with faulty smart contracts could risk losing all of their coins and are generally unable to obtain bailouts or recourse.

Perhaps the largest unremediated failure of a smart contract was the immobilization of 513,774 ether held in “multi-signature” (“multi-sig”) wallets written by Parity,⁹⁷ an Ethereum development organization. Common multi-sig setups involve 2-of-3 or 3-of-5 schemes; the former would allow outputs to be spent if valid signatures from any two of three predetermined keys were provided.

The multi-sig wallets were exploited by an anonymous user who triggered a function in a smart contract, effectively causing each wallet to self-destruct, irredeemably immobilizing the ether contained within. The newly-locked ether – equivalent to 0.52% of all the ether in circulation at the time – was worth \$174 million at the time of the hack and \$1.175 billion at the time of writing.⁹⁸ Because Ethereum and other smart contract-enabled blockchains are more expressive⁹⁹ and permit more complex transactional logic, such failures are unavoidable. In this case, the faulty multi-sig wallets were produced by an organization run by Gavin Wood, one of the cofounders of Ethereum and the inventor of Solidity (Ethereum’s dedicated programming language). The difficulty of writing a truly safe multi-sig contract illustrates the inherent risk involved in transacting with digital bearer assets on expressive – and hence, vulnerability-prone – base layers.

Moving beyond custodial risks, more complex interactions between smart contracts as required by DeFi protocols can introduce additional scope for potential vulnerabilities. DeFi is rife with purely technical vulnerabilities, owing to the complexity of interactive blockchain-based smart contracts and the difficulty of anticipating complete edge cases before deploying code. Smart contracts, once deployed, are cumbersome to upgrade, creating significant initial burdens on developers. In the case of certain irrevocable smart contracts - like Uniswap, developers have no ability to take down a smart contract once it is deployed. Upgrading such a smart contract would be a matter of deploying an alternative and persuading users to use it. As long as the underlying Ethereum blockchain remains intact, certain classes of smart contracts will remain operable regardless of administrator or user behavior. In certain other types of smart contracts, administrators can insert provisions into the code of their smart contracts so they can be upgraded, terminated, or deprecated. These code provisions grant developers additional discretion and recourse if there are bugs in deployed contracts. However, this has the externality

⁹⁷ Parity Technologies. “A Postmortem on the Parity Multi-Sig Library Self-Destruct” (Nov. 15, 2017). <https://www.parity.io/a-postmortem-on-the-parity-multi-sig-library-self-destruct/>

⁹⁸ Figures current as of April, 12, 2021

⁹⁹ The wider the set of computational concepts that can be expressed with base layer transactions the more expressive a blockchain is.

problems of potentially making administrators responsible for user funds as well as making the entities controlling the administrative keys a target for attackers.

Technical exploits are common: Werner et al (2021)¹⁰⁰ identified 21 such attacks on DeFi protocols between February to December 2020, costing users an aggregate of \$144.3 million (USD value at the time of exploit) – although in some cases, funds were returned by attackers.

These exploits are varied in their approach, taking advantage of reentrancy bugs, “transaction sandwiches,” logical bugs, and governance. In each case, however, attackers take advantage of the properties of DeFi: predictable algorithms managing large pools of capital with limited human oversight, built on blockchain rails. The rigidity of certain DeFi primitives, like Automated Market Makers, can facilitate many of these attacks. The natively on-chain nature of the collateral – in the case of ether – grants attackers the ability to withdraw their profits with no recourse. When the captured tokens include stablecoins or other assets that are the liability of a third party (such as exchange tokens), the tokens can be frozen.

b. Oracle attacks

One class of vulnerabilities deserving special attention relates to failures resulting from oracles. In DeFi, oracles are service providers that provide outside information to a smart contract. The most common usage of oracles is to transmit market prices, drawn from one or many exchanges, to a DeFi protocol that relies on outside pricing information. For example, protocols employing tokens as collateral would need to know the value (in standard terms like USD) of the pledged tokens and employ smart contracts that consume oracle-provided market information.¹⁰¹

A number of DeFi protocols rely on oracles, and the price inputs are critical to trigger liquidations, deleveraging, margin calls, and other forms of automated collateral management. Consequently, manipulation of oracles can be catastrophic for these protocols. It would be somewhat comparable to what would happen in traditional finance if Bloomberg were hacked and data were manipulated / could no longer be trusted.¹⁰² Due to the sensitivity of these protocols to deviations between the spot price of an asset and an index price (opening up riskless arbitrage opportunities), so-called ‘oracle attacks’ are among the most popular means of attack. Similar to strategies that involve manipulating the spot reference price for a derivative, oracle attacks involve manipulating the market price of collateral referenced by a DeFi protocol in order to create riskless arbitrage or to trigger liquidations.

¹⁰⁰ Werner, S., Perez, D., Lewis, G., Klages-Mundt, A., Harz, D., and Knottenbelt, W. “SoK: Decentralized Finance (DeFi) arxiv.org (Mar. 2, 2021). arXiv:2101.08778v2 [cs.CR] 2 mar 2021 <https://arxiv.org/pdf/2101.08778.pdf>

¹⁰¹ Note: oracle issues are not unique to crypto, but are harder to remediate because of transaction finality and lack of contractual priority among parties.

¹⁰² See <https://www.mas.gov.sg/-/media/MAS/resource/publications/fsr/FSR-2018.pdf> (box C).

As Liu et al (2020)¹⁰³ note, oracles introduce risk in a number of ways: their mechanics are opaque and unaccountable; they introduce critical nexuses of trust and dependency into DeFi, and malicious oracles can cause catastrophic harm. The authors find repeated operational failures in the methodological approaches to aggregating data across multiple exchange venues, introducing operational risks and producing poor outputs.

As pointed out by Werner et al (2021),¹⁰⁴ market dislocations at spot exchanges feed into oracles and affect DeFi systems built atop these price feeds. When the thinly-traded stablecoin Dai briefly traded at \$1.30 (it is typically pegged to \$1) on Coinbase, this unnaturally high premium was fed into the Compound protocol's price feed, leading Compound to automatically decree that a number of accounts were in default and programmatically deleverage and liquidate \$88 million worth of collateral.¹⁰⁵ These wrongful liquidations occurred because the protocol designers had assumed that Dai would not trade at a significant premium on referenced markets and, thus, did not have safety checks built in.

c. Excessive leverage: smart contract-based flash loans

Certain idiosyncratic features of DeFi introduce attack vectors that are entirely novel. Among these is the flash loan concept. Proposed in 2020 by DeFi lender Aave, the flash loan is an unsecured loan permitting a borrower to access an unlimited amount of liquidity (up to the size of the loan pool)¹⁰⁶ with a very low interest rate.¹⁰⁷ The catch is that the loan must be paid back within the same transaction that it is taken out. Since DeFi applications give rise to frequent arbitrage opportunities, such short-term loans allow individual parties with limited access to capital to obtain leverage and take advantage of mispricings as long as transactions can be executed atomically (i.e., simultaneously). As transactions on Ethereum can invoke many contracts synchronously, flash loans are a useful tool in inter-contract arbitrage, as described by Wang, et al (2021).¹⁰⁸

¹⁰³ Liu, B., Szalachowski, P., and Zhou, J. "A First Look into DeFi Oracles" arxiv.org (11 Dec 2020). <https://arxiv.org/pdf/2005.04377.pdf>

¹⁰⁴ Werner, et al (2021). <https://arxiv.org/pdf/2101.08778.pdf>

¹⁰⁵ Khatri, Yogita. "DAI price increase led to a massive \$88 million worth of liquidations at DeFi protocol Compound" The Block (Nov. 26, 2020). <https://www.theblockcrypto.com/post/85850/dai-compound-dydx-liquidations-defi>

¹⁰⁶ The Aave flash loan pool, as of Apr. 12, 2021, offers over \$2.5b worth of liquidity. See, <https://aavewatch.com/>

¹⁰⁷ Aave FAQ, "Flash Loans." Accessed Apr. 13, 2021. <https://docs.aave.com/faq/flash-loans>

¹⁰⁸ Wang, D., Wu, S., Lin Z., Wu, L., Yuan, X., Zhou, Y., Wang, H., and Ren, K. "Towards A First Step to Understand Flash Loan and Its Applications in DeFi Ecosystem" arxiv.org (Mar. 3, 2021). arXiv:2010.12252v2 [cs.CR] 3 Mar 2021 <https://arxiv.org/pdf/2010.12252.pdf>

Flash loans dramatically reduce the barriers to entry for potential attackers while increasing their leverage, and hence, the financial impact of their attacks on DeFi. Ever since their introduction, flash loans have become increasingly prevalent in DeFi attacks. Cao et al (2021) identified nine separate instances between February and December 2020 in which attackers successfully siphoned a total of \$49.58 million (USD value at the time of exploit) from DeFi protocols through flash loan-assisted exploits.¹⁰⁹ The largest of these, the Harvest Attack in October 2020, saw the attackers extract \$26 million from Harvest, using the Curve and Uniswap protocols while relying on a flash loan from Uniswap v2. While flash loans could be a helpful tool, they can be misused to dramatically empower would-be attackers by making trial and error costs cheap and granting near-unlimited leverage – provided that transactions can be constructed so that the loan is paid back instantly.

iv. Other governance and regulatory risks

a. Administrative key abuse

Many DeFi protocols retain the discretionary option for administrative teams or other entities to shut them down, upgrade them, pause the contract, and in some cases, drain user funds. There are a few exceptions, like Uniswap, which simply exists as deployed code on Ethereum that users can freely choose to interact with. The Uniswap contracts themselves cannot be paused by the developer team.¹¹⁰ The vast majority of protocols, however, do retain some form of a control feature, including kill switches. In some cases, critical smart contract decisions are delegated to the community of token holders (although in practice this collapses back to granting decision-making power to a small number of insiders and backers as voting weight is typically proportional to one's share of tokens held). Additionally, since tokens are generally available on the open market (which trades 24/7 on DEXs with no identity verification), an attacker could freely purchase or borrow tokens in order to influence a token holder vote. Thus, many projects for which token holder votes can influence the contract choose to retain de facto control by directly limiting the free float of tokens. As the St Louis Fed notes regarding admin keys, "If the keyholders do not create or store their keys securely, malicious third parties could get their hands on these keys and compromise the smart contract. Alternatively, the core team members themselves may be malicious or corrupted by significant monetary incentives."¹¹¹

A common practice in mitigating admin key risks is granting a consortium of delegates control over critical smart contract decisions by distributing power over key-related decisions into a

¹⁰⁹ Cao, Y., Zou, C. and Cheng, X. Shanghai Wanxiang Blockchain Inc. "Flashot: A Snapshot of Flash Loan Attack on DeFi Ecosystem" arxiv.org (Feb. 1, 2021). <https://arxiv.org/pdf/2102.00626.pdf>

¹¹⁰ Adams, H., Zinsmeister, N. and Robinson, D. "Uniswap v2 Core" White Paper. (Mar. 2020). <https://uniswap.org/whitepaper.pdf>

¹¹¹ Schär (2021), *supra*.

multi-sig setup. Some other controls exist, including enforced timelocks on key-related decisions as is the case with Yearn,¹¹² or by granting signatories a limited, pre-specified set of powers, as done by Synthetix.¹¹³

The existence of admin keys in the majority of high-profile, active DeFi projects raises a number of risks. Chiefly, these include key loss, insider theft of deposits, theft through extortion or hacks from outside parties, and regulatory pressure. In many setups, including that of Synthetix, contracts can be unilaterally frozen for a period by insiders as a precautionary ‘rapid response’ mechanism in the case of a hack or exploit. However, while merely pausing a contract does limited harm, it could adversely affect liquidity.

Ultimately, assets held in contracts mediated by admin keys should be understood as custodial rather than wholly sovereign interactions between users and a protocol. Adding more signatories to a multi-sig key setup simply means that user deposits are held in the custody of a consortium of insiders, rather than by one entity.

Research into the presence of admin keys is sparse because practices are constantly evolving. While major DeFi projects have made efforts to mitigate key man risk and eliminate critical points of centralization with regards to admin keys, independent researchers have nevertheless identified DeFi applications where administrators have unilateral control over user funds.¹¹⁴ Today, the major DeFi protocols Synthetix, Yearn, Dharma, SushiSwap, Badger, Harvest, and Ren – containing user deposits of \$10.58 billion collectively as of Apr. 12, 2021¹¹⁵ – maintain admin keys enabling a discretionary freeze of user funds.

While the power vested in admin keys varies, in some cases, anonymous individuals retain the right to siphon all liquidity allocated to contracts they administer. Notably, the anonymous admin behind Harvest Finance, which once held over \$1 billion in user deposits in its smart contract, can drain user funds encumbered only by a 12-hour timelock.¹¹⁶ Projects like these, while deployed on public chains, are dubiously decentralized, as they are functionally indistinguishable from centralized asset-taking institutions (albeit not regulated as such).

¹¹² Coopahtroopa, Supra. <https://gov.yearn.finance/t/yfi-minting-ownership/155>

¹¹³ Synthetix. “Synthetix Foundation Decommissioned” (Jul. 28, 2020). <https://blog.synthetix.io/synthetix-foundation-decommissioned/>

¹¹⁴ See, Blec, Chris. “The Trustlessness of DeFi’s Top 10 Richest Products” Surviving DeFi (Nov. 23, 2020). <https://survivingdefi.substack.com/p/the-trustlessness-of-defis-top-10> See also, Mapperson, Joshua. “How many DeFi projects still have ‘God Mode’ admin keys? More than you think” Cointelegraph (Sept. 25, 2020). <https://cointelegraph.com/news/how-many-defi-projects-still-have-god-mode-admin-keys-more-than-you-think>

¹¹⁵ See <https://defipulse.com/> Accessed April 12, 2021.

¹¹⁶ Blec, Chris. “Hunting Harvest’s Admin Key” Surviving DeFi (Oct. 23, 2020). <https://survivingdefi.substack.com/p/hunting-harvests-admin-key>

Some efforts exist to quantify and monitor the risks that users face from the existence of admin keys: the DeFi Watch project, for instance, is a crowdsourced community project that monitors the presence of admin keys in DeFi systems and evaluates their trustlessness.¹¹⁷

Disclosure of administrative powers by core teams, token holders, and other entities has been poor. For most projects, the scope of powers afforded by admin keys remains opaque, as the developers creating these contracts seek to avoid the perception that they have control over user balances.¹¹⁸

b. Governance attacks

As more blockchain-based projects aspire to transform corporate business models by undertaking a decentralized governance model, they introduce new risks. In practice, development teams have been sluggish to delegate genuine decision-making power over development decisions and system parameters for keys, which has meant that few governance attacks have been observed thus far. However, should regulators see through the veil of decentralization¹¹⁹ erected to obfuscate the true nexuses of control in DeFi protocols, they would see that certain development teams have sought to distribute governance power to holders of “governance tokens.” These governance tokens endow their holders with and often a claim – albeit, frequently a diffuse one – on cash flows or fees generated by these systems, as voting power over system parameters. Typically, these have been managed, limited experiences, whereby governance token holders could not vote to, for instance, fire the core development team or redirect funding from the core corporate entity or nonprofit managing the system.

As token holders assert themselves, however, and gain the capacity to be more activist investors, new classes of governance attacks emerge. Activists could elect to exploit DeFi systems to benefit token holders (through some established extractive mechanism) at the expense of the users of these systems.¹²⁰ One such attack, according to Gudgeon, et al (2020),¹²¹ permitted a governance attacker who gained control of the MakerDAO system to siphon off \$500 million worth of capital from the system (containing at the time \$702 million worth of collateral). As governance tokens become more available for short-term liquidity – in particular through flash loans (discussed above), activists can more easily exploit governance token votes to manipulate system parameters. The usage of flash loans to influence the outcome of governance votes has been empirically noted¹²² in the MakerDAO system.

¹¹⁷ See, <https://defiwatch.net/>

¹¹⁸ Walch, Angela. “Deconstructing ‘Decentralization’: Exploring the Core Claim of Crypto Systems” SSRN (Feb. 13, 2019). https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3326244

¹¹⁹ *Id.*

¹²⁰ See, LongForWisdom. “[Urgent] Flash Loans and securing the Maker Protocol” makerdao.com (Oct. 2020). <https://forum.makerdao.com/t/urgent-flash-loans-and-securing-the-maker-protocol/4901>

¹²¹ Gudgeon, L. Perez, D., Harz, D., Livshits, B., and Gervais, A. “The Decentralized Financial Crisis” arXiv.org (Feb. 19, 2020). <https://arxiv.org/abs/2002.08099>

¹²² LongForWisdom (2020).

As noted with the STEEM/Hive case study (mentioned above in the subsection on Validator Cartels), tokens held by exchanges on behalf of users have been employed to influence governance outcomes, in some cases against the wishes of these users. Large caches of governance-laden tokens sitting at exchanges could influence them to accept bribes in order to vote favorably on specific proposals or simply could be borrowed on an extremely short-term basis (likely not impairing the exchange's liquidity requirements) to swing a governance vote. For instance, exchanges would naturally look to monetize user tokens held on deposit via flash loans because the flash loans do not impair their ability to process withdrawals (because the term of flash loans is literally zero). Meanwhile, the borrower only needs to hold tokens for the duration of an on-chain vote in order to influence the outcome.

c. Tainted liquidity

At its core, DeFi envisions novel ways to undertake financial transactions. The cryptographic nature of digital assets permits increasingly sophisticated and intricate schemes for managing custody and transactional workflows. Bitcoin, for instance, offers a native multi-sig functionality, whereby transactions can specify advanced conditions required for an output to be spent. As of the time of writing, there exists a lower bound of 900,000 BTC (worth \$56 billion at the time of writing)¹²³ held in known multi-sig setups.¹²⁴

Thus, a novel class has emerged of custodians that maintain keys as a service, allowing individuals and entities engaging in self-custody to take advantage of the sovereign nature of holding one's keys while maintaining the possibility of recourse in the case of key loss. A common collaborative custody model involves a client holding a key in a "hot wallet," a third-party custodian holding one key, and a third key held for recovery, with two keys required for a valid spend.

Engaging in collaborative blockchain transactions, however, can cause custodians to incur liability from regulators such as the Office of Foreign Asset Control (OFAC). Indeed, BitGo, which provides key management as a service in multi-sig transactions, was sanctioned by OFAC for providing such services to clients in OFAC-sanctioned Crimea, Cuba, Iran, Sudan, and Syria.¹²⁵ Bitcoin payment processor BitPay also settled similar charges with OFAC.¹²⁶

¹²³ Figures current as of Apr. 13, 2021

¹²⁴ See, <https://txstats.com/dashboard/db/p2sh-repartition-by-type?orgId=1> Accessed April 13, 2021.

¹²⁵ https://home.treasury.gov/system/files/126/20201230_bitgo.pdf

¹²⁶ <https://www.coindesk.com/bitpay-to-pay-500k-to-settle-ofac-sanction-violation-charges>

Additionally, the Financial Action Task Force (FATF) recently clarified in their recently revised draft guidance on virtual assets¹²⁷ that parties administering keys in a multi-sig setup risk being considered virtual asset service providers (VASPs), which would subject these parties to surveillance and disclosure obligations, as well as to Travel Rule compliance requirements.¹²⁸ According to Coin Center, the FATF draft guidance breaks with policy precedent from the Financial Crimes Enforcement Network (FinCEN), which considers “only persons with ‘independent control’ over customer funds are treated as regulated money transmitters.”¹²⁹ The revised FATF draft guidance would dramatically increase the scope of covered parties.¹³⁰

DeFi in its current form is largely incompatible with such regulations. Since most decentralized contracts do not require any user identification beyond a valid blockchain address, there is virtually no emphasis on centralized compliance. Products facilitating on-chain swaps, like Uniswap, are simply blockchain contracts that permit users to collaboratively pool funds and make trades with no central intermediary.¹³¹ ¹³² The nature of these “peer-to-pool” systems is such that these contracts cannot meaningfully exclude any entity looking to participate in the pooling, which is open and freely participatory by definition.

Uniswap, in particular, relies on “liquidity providers” that contribute assets to a pool in exchange for fees. These are not designated entities; anyone can be a liquidity provider if they contribute assets to the pool. At the time of writing, Uniswap v2 boasted 84,000 active liquidity providers with 5,400 liquidity providers active in the most popular pair, UNI-WETH.¹³³ If some tainted liquidity, for instance emanating from an OFAC-sanctioned party or an illicit source, were to enter a Uniswap pool, regular users would effectively be undertaking a financial relationship with these prohibited parties. As currently deployed, the smart contract has no means to whitelist users or permission them *a priori*. The very nature of decentralized finance on public blockchains like Ethereum is to facilitate permissionless exchange, but this open access is generally incompatible with anti-money laundering/combating the financing of terrorism (AML/CFT) regulations as currently implemented in the U.S.

¹²⁷ FATF “Draft updated Guidance for a risk-based approach to virtual assets and VASPs” (March 2021). <https://www.fatf-gafi.org/media/fatf/documents/recommendations/March%202021%20-%20VA%20Guidance%20update%20-%20Sixth%20draft%20-%20Public%20consultation.pdf>

¹²⁸ See, Van Valkenburgh, Peter. “A quick analysis of FATF’s 2021 draft cryptocurrency guidance” Coin Center (Mar. 22, 2021). <https://www.coincenter.org/a-quick-analysis-of-fatfs-2021-draft-cryptocurrency-guidance/>

¹²⁹ *Id.*

¹³⁰ Specifically, the recent FATF draft guidance notes in para. 54 that “[t]his control [over client assets] does not have to be unilateral and multi-signature processes are not exempt” when evaluating whether an entity should be considered a VASP.”

¹³¹ For an introduction to Uniswap, see, Angeris, G., Kao, H., Chiang, R., Noyes, C., and Chitra, T. “An analysis of Uniswap markets” arxiv.org (Nov. 2019). <https://arxiv.org/pdf/1911.03380.pdf>

¹³² Note: Aave’s new permissioned pool is an exception.

¹³³ Source: <https://explore.duneanalytics.com/dashboard/uniswap-community> as of April 13, 2021.

d. Pseudo-equities - regulatory uncertainty

Transactions that involve lending, investment trading, and derivative exposure are regulated in traditional financial markets through the registration, licensing and examination of intermediaries that broker, custody, clear or otherwise facilitate such transactions. In DeFi, intermediaries are largely excluded in favor of transparent code, presenting regulators and policymakers with complicated decisions as to how to assess transactions (often bilateral) for which no clearly identified party may be regulated. These important issues regarding the regulatory uncertainty of the underlying commercial transactions that are conducted through DeFi protocols are beyond the scope of this paper. This sub-section, however, examines more specifically so-called ‘pseudo-equities’ and their inherent regulatory risks.

Despite considerable regulatory risks of issuing pseudo-equity tokens with little regard for the requirements of securities law, many DeFi protocols are administered by U.S.-based firms or nonprofits.¹³⁴ In many cases, these entities finance themselves through the issuance of a token that represents a claim on some cash flows produced by the system. These tokens have proven to be a meaningful financing vehicle for developing DeFi protocols. As the time of writing, the aggregate market capitalization of tokens in the “decentralized finance” space is \$85 billion, with Uniswap, Synthetix, and Compound (collectively having taken in \$12.29 billion¹³⁵ in allocated collateral) being the largest pseudo-equity tokens. Many of these DeFi tokens endow token holders with some rudimentary governance rights as well as either implicit or direct claims on cash flows generated through DeFi protocols. None of these pseudo-equity tokens backstopping DeFi are registered as securities, circulating instead on decentralized financial infrastructure like Uniswap (and in some cases, on centralized crypto exchanges). If securities regulators deemed such pseudo-equity tokens to be unregistered securities and pursued not only their issuers and promoters but also the venues upon which they trade, the financing and governance model of these DeFi projects would be significantly impaired. Additionally, numerous DeFi protocols subsidize their liquidity by issuing new units of pseudo-equity to end users. If these tokens were to be delisted and their liquidity and value suffered losses, the utility of these subsidized protocols would decline. These token incentives built into DeFi protocols are the equivalent of Uber compensating drivers for each mile driven with incremental units of Uber equity. As an example, the compensation for supplying the stablecoin USDC to the money-market protocol Compound is 6.71% annualized at the time of writing, supplemented by a 2.15% annualized payout in COMP terms to suppliers of USDC. The combination of the two is described as the ‘net rate’ for USDC by Compound.¹³⁶ If these incentives were to expire or be withdrawn, interest

¹³⁴ Precedent exists for SEC enforcement actions regarding U.S.-based entities administering smart contracts, including the case of EtherDelta, in which the founder administered frontend smart contracts governing token trading on the Ethereum network, is best known. The SEC considered EtherDelta an unregistered national securities exchange. See, <https://www.sec.gov/news/press-release/2018-258>

¹³⁵ Figures taken from <https://defipulse.com/>. Current as of April 12, 2021.

¹³⁶ <https://compound.finance/markets/USDC>

rates would look significantly less attractive, reducing the incentive for liquidity providers to put their capital at risk.

Virtually all DeFi protocols require oversight, bug remediation, technical and economic audits, governance stewardship, and leadership and direction from these administrative entities. Even if there are no corporations or firms officially underwriting these decentralized protocols, virtually all of these protocols have an entity, whether codified or not, effectively managing the protocol. The elimination of the pseudo-equity token as a viable financing mechanism would significantly impair the industry's ability to operate. It is possible, however, that corporations could create the majority of decentralized finance contracts and monetize them without the use of a token by directly charging rents for usage of the DeFi contract, or that anonymous developers could deploy these protocols to the blockchain.

v. Challenges associated with scalability

Scalability – the general process whereby public blockchains grow to handle an economically meaningful volume of activity and more transactional data without compromising their assurances – is held as one of the chief difficulties facing blockchains today. Adding more data to the final ledger trades off against the computational difficulty of operating a full node and staying current on the ledger. While no silver bullet solution to scalability of blockchain exists, since the basic security model of blockchains requires that all participants store a full copy of the state, various improvements have been proposed.¹³⁷

Approaches such as Bitcoin's Lightning Network envision a network of payment channels with only periodic final settlement to the Bitcoin layer itself.¹³⁸ Sidechains immobilize bitcoins (or other native units) and create a subledger whereby claims on those Bitcoins can circulate frictionlessly, effectively creating a new transactional space.¹³⁹ ¹⁴⁰ Sharding splits the state of the blockchain into parts, with nodes finding consensus on a subset of the final state, periodically

¹³⁷ For a more complete overview of scalability solutions, see Kim S., Kwon, Y., Cho, S. "A Survey of Scalability Solutions on Blockchain" 2018 International Conference on Information and Communication Technology Convergence (ICTC) (Oct. 17-19, 2018).
<https://ieeexplore.ieee.org/abstract/document/8539529>

¹³⁸ Poon, Joseph and Dryja, Thaddeus. "The Bitcoin Lightning Network: Scalable Off-Chain Instant Payments" Draft Version 0.5.9.2 (Jan . 14, 2016. <http://lightning.network/lightning-network-paper.pdf>

¹³⁹ Back, A., Corallo, M., Dashjr, L., Friedenbach, M., Maxwell, G., Miller, A., Poelstra, A., Timon, J., and Wuille, P. "Enabling Blockchain Innovations with Pegged Sidechains" (Oct. 22, 2014) (commit 5620e43).
<http://kevinrigger.com/files/sidechains.pdf>

¹⁴⁰ A "sidechain" is a subledger where transactions occur off-ledger, and are periodically settled to the base layer itself (blockstream paper on sidechains).

"Roll-ups" similarly involve performing computation off-ledger, then periodically posting the results of that computation to the blockchain itself.

reconciling with each other.¹⁴¹ ¹⁴² More creatively, rollups (primarily envisioned for computation-heavy blockchains like Ethereum) bundle transactions, moving computation on-chain, but retaining final transactional data on chain. The validity of these transactions is assured through zero-knowledge proofs or mechanisms known as fraud proofs.¹⁴³

The commonality around all these approaches is transactional parsimony, or the reduction of a transaction into as few final bytes as possible, since the costs associated with storing and processing transactional data is the chief externality of blockchain transactions. Unless radically new models for public blockchains are developed, the problem of scalability will be an inherent constraint, as it follows naturally from the requirement that nodes must ingest and verify the global state in order to become full participants on the ledger. Additionally, these approaches all generally aim to defer final settlement by distinguishing a payment or financial message and the settlement of that message or bundle of transactions. This deferred settlement mechanism will be familiar to anyone with knowledge of established payment systems, but public blockchains have only just begun to explore their implications.

As mentioned, public blockchains in their current form are effectively deterministic, single state environments¹⁴⁴ in which each peer must process each and every transaction in order to stay in sync in a trustless manner with the blockchain's current state. Both Bitcoin and Ethereum have committed to operational limits on the most data throughput that either system can handle, with Ethereum adopting a looser constraint. These limits roughly correlate with the number of transactions that consumer hardware can meaningfully process without falling behind. In order to prioritize transactions, both systems employ fees. Naturally, some classes of users are more willing to bear fees than others, with fee sensitivity generally being a function of the perceived importance of a transaction. The consequence of this approach means that, in their current format, heterogeneous demand requires that some applications are naturally priced out at any given time. Applications of Ethereum are varied, running the gamut from using stablecoins for remittances, to operating decentralized organizations, to minting non-fungible tokens that represent unique pieces of artwork, to financial use cases like obtaining programmatic leverage. Since all of these applications are competing for the same finite pool of blockspace, a burst of adoption for one use-case can degrade the experience of using another (due to the effect of fee

¹⁴¹ Schaffner, Tobias. "Scaling Public Blockchains: a comprehensive analysis of optimistic and zero-knowledge rollups" University of Basel (Jan. 14, 2021). https://www.unibas.ch/fileadmin/user_upload/wwz/00_Professuren/Schaer_DLTFinTech/Lehre/Tobias_Schaffner_Masterthesis.pdf

¹⁴² "Sharding" is a process whereby the ledger state is partitioned and transfers occur locally within the shard, and are periodically reconciled with the global state. Each model involves effectively partitioning state in order to gain transactional efficiency and subsequently reconciling it with the global ledger

¹⁴³ Schaffner, *supra*.

¹⁴⁴ 'Single-state' means that all participants share the same ledger. 'Determinism' is the property whereby the same inputs should always lead to the same outputs.

hikes on the market for blockspace). High fees have the effect of pricing out smaller transacting parties, who might deem an operation uneconomical if fees hit a certain threshold.

Due to relatively inelastic blockspace combined with volatile demand for blockchain resources, fees are highly volatile. For instance, on February 23, 2021, mean per-transaction Ethereum fees reached \$38 while mean Bitcoin fees reached the equivalent of \$25.¹⁴⁵ For comparison, in 2019, Bitcoin and Ethereum per-transaction fees averaged the equivalent of only \$1.24 and \$0.13,¹⁴⁶ respectively.¹⁴⁷ In addition to the general drag that fees introduce on transactional usage, blockchain congestion can facilitate specific attacks against DeFi protocols, which sometimes need to execute transactions within a specific period. On March 12, 2020, for instance, the MakerDAO system became insolvent as on-chain liquidations of ether were processed at the price of \$0 (instead of the market rate of \$120) per coin resulting from lagging liquidation engines, which could not get transactions processed in time due to high fees.¹⁴⁸ This caused a loss of \$8 million to holders of debt positions in the MakerDAO system and left the Dai stablecoin undercollateralized by \$4.5 million.

Additionally, as fees rise on blockchains, they price out certain classes of activity, especially more computationally expensive actions (particularly for blockchains like Ethereum where the cost to transact is a function of computational demand). This systematically prices out users with smaller balances and has the net effect of trapping funds held in accounts (or UTXOs, in the case of Bitcoin), stranding those assets. As fees rise on the base layer, retail users can no longer economically engage in DeFi operating on the base layer, affecting liquidity in decentralized exchanges.¹⁴⁹ In Bitcoin, a negative feedback loop between transactional usage and fees was evident in 2017-18, indicating that fees not only adversely affect users' affinity to transact, but they do so in an inherently unstable way, without finding equilibrium.¹⁵⁰

¹⁴⁵ Coin Metrics. Accessed Apr. 12, 2021. <https://network-charts.coinmetrics.io/>

¹⁴⁶ See, <https://bitinfocharts.com/comparison/ethereum-transactionfees.html>

¹⁴⁷ And for further comparison - wire transfer fees generally range from \$15-\$30. Credit card processing fees range from 1.43 to 3.5 percent of the transaction amount. For Venmo, zero transaction fees for transfers to linked bank account, debit card or Venmo account, but if Venmo users want to access cash earlier than 1-2 days, then instant transfers from Venmo to linked debit card requires a fee of 25 cents or 1% of the total transfer, whichever number is higher. <https://www.mybanktracker.com/news/wire-transfer-fee-comparison-top-10-us-banks> , <https://www.bankrate.com/finance/credit-cards/merchants-guide-to-credit-card-processing-fees/> , <https://www.credit.com/blog/the-app-your-kids-are-using-to-pay-people-back-venmo/>

¹⁴⁸ See, Eichholz, Liesl. "What Really Happened to MakerDAO" Glassnode.com (Mar. 17, 2020). <https://insights.glassnode.com/what-really-happened-to-makerdao/> See also, Blocknative. "Evidence of Mempool Manipulation on Black Thursday: Hammerbots, Mempool, Compression, and Spontaneous Stuck Transactions. (July 22, 2020). <https://www.blocknative.com/blog/mempool-forensics>

¹⁴⁹ Carter, Nic. "Public blockchain fee cyclicalities and negative feedback loops" medium.com (Oct. 5, 2020). https://medium.com/@nic_carter/public-blockchain-fee-cyclicalities-and-negative-feedback-loops-1620141a8a87

¹⁵⁰ More descriptive data regarding bitcoin fee dynamics can be found in Lehar, A. and Parlour, C. "Liquidity Demand and BitCoin Transaction Fees" (May 2019) (preliminary and incomplete). https://iwfsas.org/iwfsas2019/wp-content/uploads/2017/02/S4_P2.pdf

DeFi protocols depend critically on seamless interoperability as well as on composability.¹⁵¹ Gudgeon, et al (2020) stress the importance of composability on these systems: “Assets that are created in Maker, for example, can be used as collateral in other protocols such as Compound, dY/dX, or in liquidity pools on Uniswap.” Thus, mitigating the impact of base-layer fees by creating subledgers or deferred settlement processes like sidechains, rollups, or sharding does little to solve the problem at its core. Deferring settlement introduces efficiencies by engaging in periodic reconciliation with the base layer itself. However, DeFi as currently envisioned depends on funds being available on the base layer and contracts being able to seamlessly communicate and refer to each other. Thus, standard approaches to scaling appear to compromise the desirable qualities of DeFi and do not represent a panacea to the fee drag. It remains to be seen whether the standard approach to scaling blockchains – effectively mimicking the layered approach that characterizes established payments systems – can be made consistent with the desirable qualities of blockchains that distinguish themselves from these systems. If they cannot, then real estate on the base layer of blockchains with capped throughput will be reserved only for well-capitalized parties, which are able to outbid smaller users.

IV. Conclusion: “No Free Lunch”

The risks described in this chapter do not seek to provide a comprehensive list but to help readers conceptually understand the drivers behind the risks inherent in DeFi. Many of the risks described above stem from the decentralized nature of blockchains. The goal of automating the delivery of financial services and reducing human dependencies also has the congruent effect of reducing oversight and control. Disintermediating traditional intermediaries reduces high fees and entry friction, but also creates new opportunities for new types of intermediaries. These new types of intermediaries require the sufficient economic incentives and, thus, could be potentially more costly and risky than the monopoly rents extracted by today’s centralized intermediaries. Ultimately, this new host of intermediaries in a decentralized financial ecosystems could stymie the drive toward the twin goals of democratizing financial services: lowering cost and improving access.

External dependencies on traditional finance, namely banks, is another important source of risk as well as a transmission channel for risk. Although one of the goals of DeFi is to create a new kind of financial system without traditional intermediaries, the irony is that as DeFi struggles to make itself more useful in the real world, its dependency on the established financial system

¹⁵¹ Composability refers to the assurance that a transaction being proposed which calls multiple distinct contracts will execute, because each implies final settlement. [Gudgeon, et al](#) (2020) describe it as “the ability to build a complex, multi component financial system on top of crypto-assets” while [Wachter, Jensen and Ross](#) note that it limits the “role for central clearing counterparties in mitigating counterparty risk.” <https://arxiv.org/ftp/arxiv/papers/2102/2102.04227.pdf>

grows. Its reliance on traditional finance is not only a source of risk but can potentially serve as a transmission channel for risk between traditional financial and DeFi systems. DeFi leveraging stablecoins' backing by fiat or other financial liabilities is an excellent example of this type of risk. Another dependency is that the crypto industry still needs to bank with commercial banks in order to conduct the cash legs of their transactions.

DeFi is developing in a direction different than originally intended and, thus, it is coming full circle. The tools exist to wall off DeFi from the financial system, such as running everything on native tokens DAI or ETH for instance. However, the opposite is occurring. Relying on commercial banks for stablecoins (etc) is convenient and serves business needs.

Wholly new risks are introduced by DeFi stemming from the reliance on open protocols and the fact that the underlying infrastructure is un-owned. Removing the back office and human oversight results in many efficiencies, but they also introduce risks. Thus, it is up to the end user or contract administrator to monitor the risk of the protocols themselves, and many would not want the burden. These risks are amplified when financial primitives collide with automated, hard-to-intervene contracts. Here is where all the chaos in DeFi is really from - systems that are built to be scalable and automated but that are underspecified or not understood by their creators. In sum, blockchain technologies bring many benefits. But the tools or processes used to disintermediate or gain efficiency also have costs in recourse, reversibility, risk management, etc. – the 'paradox' of DeFi.

In spite of this 'paradox,' DeFi is achieving something truly novel: it is facilitating the business model experimentation and evolution in a very short time frame. While our traditional financial system has evolved over centuries to reach our current institutional arrangements (i.e., banks, financial markets, market participants, different types of regulation – each in response to past crises and mis-steps), DeFi is allowing for significantly more rapid institutional innovation and trial and error experimentation. There is a lot of error at the moment (lots of speculative bubbles, fraud, governance issues, etc.), but those innovations that persist over several years in such a fast-moving environment could be much more robust. As DeFi becomes more economically relevant, financial stability risks in DeFi could come not only from the links with the traditional financial sector but also from the risks within the DeFi sector itself. More research is needed to study how shocks in the DeFi sector can impact the greater financial system and the real economy. There's a greater need than ever to research this understudied but increasingly important area to help provide a better understanding of the evolution of financial services and the risks inherent in DeFi for industry, regulators and policymakers.

From: Nigro, Daniel
Sent: 2021-08-16T12:56:44Z
Subject: Markets Daily: Weakness: Foreign Policy, Slowdown in Chinese Growth, COVID Variant Dampening Demand, Herd Immunity Concerns; Crypto Rallying - Ethereum Jettisoning Miners, Moving to "Proof of Work"
Received: 2021-08-16T12:56:45Z

[Why Only a Shock Will Deter Risk-On Investors.pdf](#)
[Ex-Regulators Draw Top Pay to Help Firms Decode China Crackdown.pdf](#)
[Bye-Bye, Miners! How Ethereum's Big Change Will Work.pdf](#)
[Bye-Bye, Miners! How Ethereum's Big Change Will Work.pdf](#)
[The World May Never Reach Herd Immunity Against Covid-19.pdf](#)
[FT - Lenders offer cheap deals to Silicon Valley to compete with flood of venture capital - 08-16-2021.pdf](#)
[FT Opinion - The age of the ETF is looming - 08-16-2021.pdf](#)
[State Street, Firm Behind Wall Street's 'Fearless Girl' Statue, Is Vacating New York.pdf](#)
[FT - First to vaccinate and first to party, Israel now mulls lockdowns - 08-13-2021.pdf](#)
[SEC May Like Bitcoin Futures ETFs, but Investors Won't.docx](#)

Wall St. Breakfast Summary (Seeking Alpha) Equities have continued to churn higher through thin summer trading, supported by bumper results from the second-quarter earnings season. The major averages notched further record highs last week, before taking a day off this morning. At the time of writing, stock index futures are down 0.4%, though some were quick to point to a bit of nervousness being felt in the air. **COVID conditions:** The highly infectious Delta variant is taking a toll on the economic recovery in China, where fresh data on industrial, consumer and investment activity all missed forecasts. That likely means the world's second-largest economy continued to lose steam in August and the trend is only likely to worsen given the recent tightening in coronavirus restrictions there.

"Asia's low vaccination rates and low tolerance for community spread suggest it is the region most at risk economically from Delta," pointed out JPMorgan economist Bruce Kasman, but others are more concerned about the impacts or fallout that could be felt on business activity elsewhere.

Bitcoin (BTC-USD) continues to build on its recent momentum as crypto bulls return to the driver's seat. In fact, the total market value of cryptocurrencies rose above \$2T over the weekend following a heavy selloff in June and July. At one point, Bitcoin even dropped below \$30K - following a record high of over \$64K in April - and on Sunday it once again topped the \$48K level. Cardano (ADA-USD), the third-ranked cryptocurrency after Bitcoin and Ether (ETH-USD) climbed 47% over the past week, while Ripple (XRP-USD) and Dogecoin (DOGE-USD) are up 61% and 18% over the same period, respectively.

Crypto headwinds were seen over the summer due to headlines about Bitcoin's energy usage and a mining crackdown by regulators in China. The U.S. Senate also passed a massive infrastructure bill last week without any of the proposed amendments on crypto tax reporting that had delayed its passage. While the extensive supervision could be seen as a blow to the crypto community, others said it meant the government is getting serious about the burgeoning industry.

On the economic calendar: While no major releases are due out today, investors are preparing for some big data points later in the week. Monthly retail sales data for June will be announced tomorrow, Fed minutes will be released on Wednesday and Philly Fed on Thursday.

Futures at 8:45: Dow -0.4%. S&P -0.4%. Nasdaq -0.4%. Crude -2.8% at \$66.50 Gold +0.1% at \$1779.30. Bitcoin +1.2% at \$47318.

Ten-year Treasury Yield -3 bps to 1.27%

BMO Commentary: Treasuries rallied initially during the overnight session on the combination of disappointing Chinese data, the regime shift in Afghanistan, and growing apprehension regarding the prospects for achieving herd immunity against covid-19. With this backdrop, 10-year yields dipped as low as 1.245% and 30s reached 1.90% -- both are familiar levels that we continue to expect will serve as focal points for the balance of the summer and into the September 22 FOMC meeting. Constructive seasonals in the Treasury market have historically led to the low yield marks being established in early or mid-September; a tendency that we see no compelling reason to fade in the current environment. To be fair, our highest conviction bias is Treasuries won't selloff to the point that 1.42% in 10s is materially challenged. While 1.126% in 10s might be retested on fresh rounds of macro uncertainty, the broader theme will be consolidation as investors become habituated to the newly established lower rate plateau and recalibrated outlook expectations based on the incoming pandemic information. There is little question that US rates are back to trading the coronavirus.

The extent to which covid-19 will dictate the direction and outright level of Treasury yields is much different during this episode than it was in March 2020; if for no other reason than the development of several effective vaccines. That said, the experience with the delta variant has undermined any optimism that the pandemic will be over in 2021. The divergence in pandemic responses between the US and other nations has also contributed to a dimmer outlook for the global path toward the new normal. The round of disappointing data from China overnight speaks to the potential for additional fallout from the latest wave of the coronavirus; a concern only further reinforced as return to the office plans in the US are placed on hold. Given the success of the WFH transition over the last 18 months, it follows intuitively that a cautious approach toward in-person work would be implemented even if it comes with increased uncertainty that will reinforce lower yields.

The events of the weekend on the geopolitical front function as a reminder of the ongoing risks in that part of the world.

Moreover, the notion that responding to the coronavirus has been the dominating factor in many policy decisions throughout the pandemic resonates – even as geopolitical tensions have persisted. This question now becomes whether the delta variant will continue to keep the pandemic in the macro spotlight or will the realities of the rolling-variant risk soon be priced-in and investors move on to other flashpoints. Suffice it to say, this week will be instrumental in gauging the degree to which we see pandemic risks dominating the forward path of rates.

July's retail sales figure will be the data highlight of this week and with the control group measure expected to print in negative territory, it's difficult to be overly optimistic on the takeaway from tomorrow's report. In addition, the data is in nominal terms, so when incorporating July's inflation backdrop, the real numbers will potentially be all the more concerning for the pace of consumption early in the third quarter. That said, as July data the retail sales figures will be particularly dated given the delta concerns have only picked up in the last 3-4 weeks and therefore the impact on consumption patterns should have been minimal. The August series will be far more useful in evaluating the extent to which the latest wave of the pandemic has impacted spending. If the August University of Michigan sentiment index will serve as any guide, it's difficult not to be apprehensive on H2 at this stage. The bullishness seen in the Treasury market during the overnight session has been led by the 5 and 7-year sectors as investors' attention remains on liftoff timing as opposed to any concerns that recent developments will derail the Fed's tapering ambitions. Curve shape has been illuminating insofar as reflecting policy-error versus reflationary sentiment and this dynamic will remain in place in the week ahead.

In the week ahead, the Treasury market will test the sustainability of the new, lower yield range as the final weeks of August set in. We expect the mercury to increase more noticeably than US rates; a call that was reinforced by Friday's price action. With the July core inflation data incorporated into the outlook and the refunding effortlessly absorbed, there is little to argue for decidedly higher yields from here. We're assuming that the upper-bound of the new trading parameters for 10-year yields is the 1.42% peak from mid-July.

As we consider the extent to which growth during the second half is able to meet the Fed's 7.0% projections for the year, we cannot help but get a bit nervous; even if that might be our default. The strong jobs growth in July is encouraging, however the upside surely reflected hiring decisions made prior to the increase in covid-cases linked to the delta variant. This reality only serves to further emphasize the importance of evaluating the employment landscape based on the Sept-Nov data; a timeframe that was already in focus due to the expiration of the enhanced unemployment benefits that is now less than a month away.

The Fed has effectively signaled to investors that despite the transitory nature of the inflation seen thus far, tapering is on track with the needed conditions met. Powell has done an admirable job of separating the thresholds for scaling back asset purchases and the economic milestones required for the first rate hike. As such, the market has moved far beyond trading the tapering process and price action in the Treasury market is now a function of liftoff timing in 5s and the global recovery outlook in 10s and 30s. The 'new' monetary policy information on offer ahead of Labor Day will reiterate that tapering is on course even as the extended pandemic concerns weigh on sentiment.

This weakest U Michigan sentiment report since December 2011 has put the delta concerns into perspective as the release attributed the move to "the extraordinary surge in negative economic assessments also reflects an emotional response, mainly from dashed hopes that the pandemic would soon end." While characterizing the move as an 'emotional response' might have been an attempt to detract from the sharp decline; we'll argue that the 'emotions' underlying consumer behavior are, in fact, the primary driver. Clearly the notion of retail therapy has been lost somewhere in the translation. Said differently, if inflation can spiral upward on expectations of higher future prices, surely real consumption is vulnerable to concerns the population will live with the risk of 'rolling variants' for the foreseeable future.

The shift in consumer confidence serves as a level-setting data point as it's the first glimpse at the magnitude of the potential impact on the real economy from pandemic's extra innings, as it were.

The meaningful price response to July's employment NFP release hints that perhaps Treasuries' indifference toward the data may be waning. While we are of the mind a true return to a fundamentally driven trading environment will need to wait until the autumn, July's retail sales will nonetheless be topical in the week ahead. The control group will provide valuable context on the state of spending as the second half got underway. This is particularly relevant following Q2's somewhat underwhelming 6.5% QoQ SAAR print, and an ongoing expansion that will need to rely on robust domestic consumption. While to date there has been relatively little in terms of reintroduction of restrictions on in person commerce, this does not preclude delta variant concerns from influencing the timeline on a return to more widespread pre-pandemic behavior. If in fact the peak pace of growth was pulled forward into the first half, we are left to ponder the needed influence to see a more material acceleration from current levels. Even if the price response to retail sales is muted, the data will nonetheless inform the strength of spending to start the third quarter.

At this stage in the cycle the Fed's tapering announcement is widely assumed to take place before the end of the year with the actual process to begin early in 2022. QE's influence has been readily observable via still-suppressed real yields and financial conditions that are holding in effectively record-easy territory. However, there will be one longer-lasting consequence for the front end as a result of the Fed's balance sheet expansion; the amount of reserves in the system promise to stay elevated. During 2019 when the process of normalizing the balance sheet triggered a reserve-scarcity surge in funding costs, the implementation of reserve management bill and repo operations demonstrated the fallout of a balance sheet rundown that ran too far. The implementation of the standing repo facility will help preclude a similar pickup in funding volatility whenever reserves begin to

decline this cycle, but given the lessons learned in the Fed's last attempt at balance sheet normalization, we suspect they will be more comfortable with larger holdings for longer in this cycle. Hardly an issue that will be discussed until after liftoff but funding food for thought if nothing else. - Ian Lyngen and Ben Jeffery

Fed Officials Weigh Ending Asset Purchases by Mid-2022 (WSJ – Nick Timaros is thought to be a “mouthpiece” of the Fed)

Reducing bond buying sooner could provide more flexibility to raise interest rates if inflation stays high and unemployment falls rapidly and yet...**There's growing support within the Fed to announce the tapering of bond purchases in September** (CNBC, Ling Yu)

Why Only a Shock Will Deter Risk-On Investors: Mohamed El-Erian (Bloomberg, attached) Conditioned by the Fed and three new mantras, investors are anchored in the expectation of never-ending stock index records.

The Delta Variant Is Already Leaving Its Mark on Business (WSJ) The Covid-19 variant is damping demand and raising costs after a spring and summer that seemed to promise a rapid recovery

The World May Never Reach Herd Immunity Against Covid-19 (Bloomberg, attached)

- Delta variant is moving the goalposts for ending the pandemic
- Covid-19 may be present in the world for a century - or longer

First to vaccinate and first to party, Israel now mulls lockdowns (FT, attached – Ling Yu) One of the most vaccinated nations in the world is a test case for how Delta will play out. So far, it's not pretty

Bye-Bye, Miners! How Ethereum's Big Change Will Work: QuickTake (Bloomberg, attached) Perhaps the most important is the jettisoning of the “miners” who track and validate transactions on the world's most-used blockchain network. Miners are the heart of a system known as proof of work.

Crypto market tops \$2 trillion for the first time in nearly 3 months as bitcoin rallies (CNBC, Ling Yu)

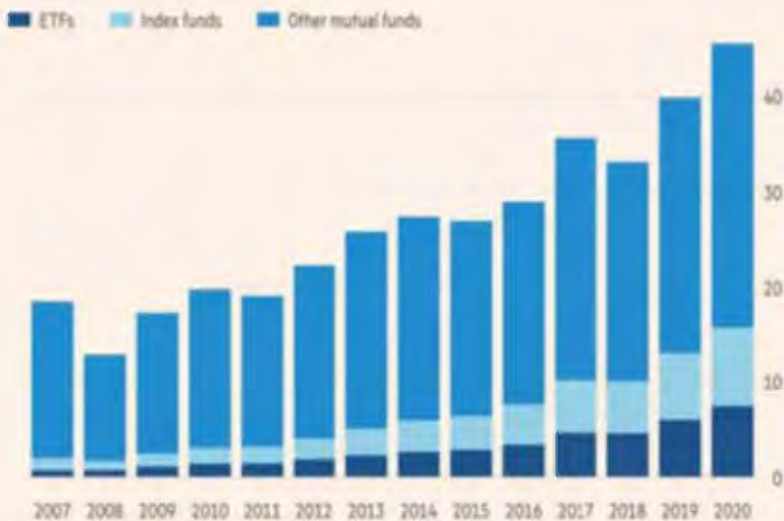
- * Bitcoin topped \$48,000 over the weekend, its highest level since mid-May, but pared some of those gains on Monday.

SEC May Like Bitcoin Futures ETFs, but Investors Won't (Ignites/FT, attached – Ling Yu)

Lenders offer cheap deals to Silicon Valley to compete with flood of venture capital (FT, attached – Ling Yu) Venture debt providers struggle to strike deals in bumper year for selling equity

The age of the ETF is looming (FT, attached – Ling Yu) Exchange traded funds are much more than just passive index-trackers

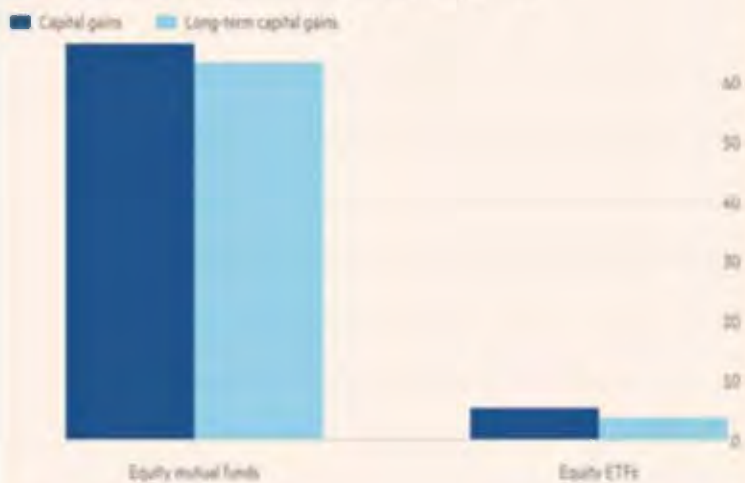
Global assets under management (in trillions of dollars)



Source: Morningstar Direct
© FT

US mutual funds incur capital gains more often than ETFs

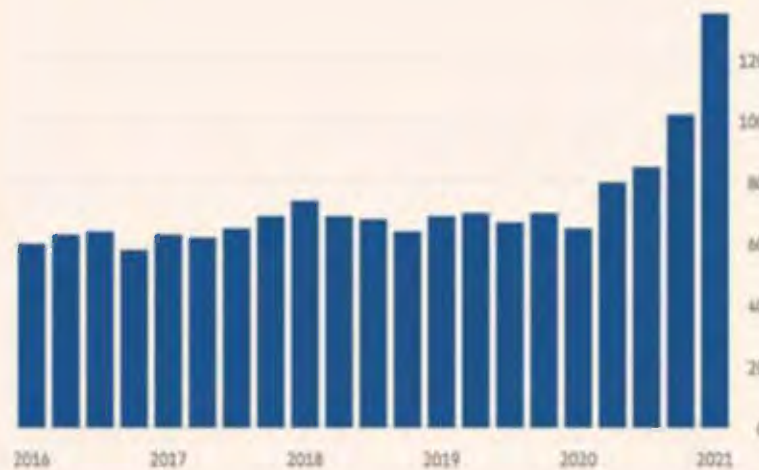
Funds that have made capital gains distributions over past three years, %



As of March 31 2021
Source: Morningstar SPDR Americas Research
© FT

Leveraged and inverse ETFs have exploded in usage lately

Assets under management (\$bn)



Source: Morningstar Direct
© FT

- Officials from CSRC, Commerce Ministry are most in demand
- Government affairs specialists pay has doubled in five years

A hedge fund revival? Industry hopes a dismal decade is over (FT, attached – Ling Yu) Although the sector is enjoying a pandemic renaissance, some leading investors still believe many funds do not justify the high fees

Why Gold Bugs, Bond Bears and Amazon Skeptics Think Alike (WSJ) Investors often prefer to stick their heads in the sand rather than confront the evidence in front of them

More Companies Postpone Return to Offices Until October or Later (Barrons) More companies are **now postponing their return to offices** until October or later, and nearly 25% of the 30 Dow component companies have mandated vaccines for workers in addition to requiring masks, in response to rising coronavirus cases.

- **Chevron**, which had planned a September return to the office, now says it is “monitoring regional case rates for improvement to determine a new return date” for its California headquarters. Some Chevron office employees will **work a hybrid schedule** with two days of remote work.
- **Wells Fargo, BlackRock, NBCUniversal and Hasbro** are pushing back their reopenings **until at least October**, and Capital One is considering a return to the office in November. **Facebook, Amazon, DoorDash, Lyft and Overstock.com** all say they won’t return to in-person work until 2022.
- **Microsoft, Salesforce.com and Cisco** are **requiring vaccines** for workers who choose to work at an office, while letting others work from home. **JPMorgan, AT&T, Home Depot, General Motors, Ford Motor and Stellantis** have company-wide mask mandates even for vaccinated employees.
- Although all three Covid-19 vaccines authorized in the U.S. are highly **effective at preventing severe illness**, hospitalization and death, only 51% of Americans are fully vaccinated. The U.S. is averaging 145,000 new cases a day, and the seven-day average of Covid hospitalizations is 80,465, per Johns Hopkins University.

State Street, Firm Behind Wall Street's 'Fearless Girl' Statue, Is Vacating New York City Offices (Bloomberg, attached)

CREDIT DAYBOOK AMERICAS: CDX Weakens; Primary Markets to Slow (Bloomberg) -- Credit markets are weakening with stock futures this morning amid concerns about weak Chinese data and the spread of the coronavirus delta variant. The \$10 billion to \$15 billion of fresh investment-grade bond supply expected this week will be likely centered around Monday and Tuesday before the market goes quiet until after the Labor Day weekend. Primary loan and bond deals from riskier issuers are also slowing down.

- The benchmark high-grade CDX spread increased 0.3 to 48.7 as of 7:23 a.m in New York, data compiled by Bloomberg show; the equivalent junk-bond CDX index price fell 0.13 to 109.35
- In high yield, **Cooke Omega Investments** is a candidate for issuance early in the week after it concludes a roadshow for a \$580 million note sale Monday. Meanwhile **International Paper's** wholly-owned subsidiary **Sylvamo** is conducting investor outreach through Thursday for its \$500 million senior unsecured bond offering
- Investor outreach for **PSSI's** \$165 million acquisition loan funding its purchase of **Safe Foods** is the only meeting scheduled for Monday in leveraged loans
- A few more strong jobs reports over the coming months would mark enough progress in the recovery from the pandemic to allow the U.S. central bank to begin winding down its bond-buying program, Federal Reserve Bank of Minneapolis President **Neel Kashkari** said
- **Talen Energy** bonds sank after the closely held company gave investors a downbeat earnings outlook and failed to quell speculation it's considering debt reduction proposals that might harm the interests of some creditors
- U.S. Bankruptcy Judge **Robert Drain** has “some concerns about the breadth” of releases being offered to members of the **Sackler family** under **Purdue Pharma's** bankruptcy plan, he said in court
- **Citigroup** is syndicating a \$400 million bridge loan that is helping to finance **Warburg Pincus's** acquisition of subprime auto lending company **Exeter Finance**, according to people familiar with the matter
- **U.S. credit ratings improved last week** as the main ratings companies issued 30 upgrades and 18 downgrades

U.S. HY OPEN: Junk-Bond Issuance Poised to Slow as Yields Rise (Bloomberg) -- U.S. junk-bond yields jumped for the fifth straight week, the longest rising streak since March, amid volatile oil prices, concerns that the Federal Reserve will begin tapering sooner than expected and heavy new issue volume.

- The softer backdrop may help slow the pace of bond sales, though new issues could still emerge through to the middle of next week
- There are currently two deals for more than \$1b slated to be sold in the next few days before market participants head off on vacations and the late summer primary lull sets in
 - **Sylvamo Corp**, a bulk paper manufacturer, is marketing \$500m of eight-year notes to make a special payment to **International Paper** in connection with the spinoff of the business
 - **Cooke Omega**, which processes and markets seafood products, wraps up marketing Monday for \$580m of eight-year bonds to fund a distribution to equity holders. The debt offering is rated Caa1/CCC+

- See pipeline for more on upcoming deals
- Borrowers have been on a tear this month, raising more than \$14b last week to take August volume to almost \$30b
 - They've been keen to lock in cheap rates before yields rise even further and amid concerns about the impact of the delta variant on economic growth
 - The Fed's symposium in Jackson Hole later this month is also awaited for clues on whether the central bank will consider tapering stimulus
- With two full weeks to go, it's already the second busiest August on record, according to data compiled by Bloomberg. The busiest was August 2020 with more than \$52b
 - SeaWorld Parks & Entertainment sold \$725m of eight-year notes, rated Caa1/B-, Friday at the lower end of talk. The size of bond sale was cut by \$100m, while a concurrent loan offering was boosted by the same amount
 - For more on new issue pricing and analysis: HY ANALYSIS US: Sales Barrage Boosts August Volume to Over \$29b
- The U.S. junk-bond index ended the week with a loss of 0.16%, the second straight week of losses, although a small gain of 0.05% Friday ended seven days of negative returns
 - Yields rose 9bps to 4.11%, rising for the fifth consecutive week. Spreads widened 8bps to +309, the six straight week of widening and the longest such stretch since December 2014
 - CCC yields were unchanged for the week at 6.26%, while spreads were at +525bps, up just 2bps for the period
- U.S. equity futures edged lower Monday after closing at a record high Friday amid signs of faltering growth and investor nervousness in the run-up to the Jackson Hole symposium. Oil, meanwhile, sank for the third consecutive day on disappointing Chinese economic data which may hurt global demand

STRUCTURED PIPELINE: ABS Deals Roll On; Hollywood CMBS in Focus (Bloomberg) -- A trio of subprime auto issuers, one prime auto, one consumer loan, one single-family rental and a debut tax lien are expected to tap the U.S. ABS market this week. Last week's supply was the eighth highest of the year at about \$9.5 billion, according to data compiled by Bloomberg. This year's volume is ~58% higher year-over-year, and ~18% higher compared to the same period in 2019 at \$193.7 billion.

- YTD CLO pricing activity includes roughly 204 new issues (BSL and middle market) for \$98.9 billion and 367 refis/resets/reissues for \$162.2 billion. New issue sales are up 120.2% year-over-year, while refi/reset/reissue sales are up a whopping 481.4%
- Private-label CMBS sales are up 105% year-over-year, and 29.6% compared to the same period in 2019 at \$78.5 billion
 - A SASB transaction secured by a portfolio of eight Hollywood offices/studios is expected to price this week
- Private-label RMBS issuance is on track for a post-2008 record, according to an Aug. 12 research note from Elen Callahan at the Structured Finance Association
 - New issue volume is approximately \$119 billion, surpassing 2020 full-year issuance and just 12% below 2019's record year
 - "RMBS backed by prime jumbo loans have led the 2021 surge, contributing \$39.1 billion of issuance," Callahan writes. "RMBS backed by re-performing and non-performing mortgage loans have contributed a combined total of \$23.6 billion"

Structured Highlights: Last Week

- Investors Can Find Gems in CMBS Despite High Values: Barclays
- Home Prices in the U.S. Soar 23%, the Fastest Rate on Record
- Blackstone, Ares Are Turning Into Banks for LBO Financing
- Libor Countdown: Wall Street Analysts Divided Over SOFR Floaters
- All Eyes on the Fed Taper for Mortgage Bonds: Research Roundup

ABS PIPELINE:

- The following issuers recently filed ABS-15Gs:
 - FRTKL 2021- SFR1
 - Boston Lending Trust 2021-1
- The following are marketing:
 - PREMARKETING: Progress Residential \$1.34B PROG 2021- SFR8 single family rental
 - PREMARKETING: Liberty Lending \$197M+ LLEND 2021-1 consumer loans
 - PREMARKETING: American Honda Finance Corp \$1.3B+ HAROT 2021-3 prime auto
 - PREMARKETING: Exeter \$1B EART 2021-3 subprime auto
 - PREMARKETING: Santander Consumer \$1.3B DRIVE 2021-2 subprime auto
 - PREMARKETING: Home Tax Solutions \$105M HTS 2021-1 tax liens
 - PREMARKETING: First Investors \$325M FIAOT 2021-2 subprime auto
- The following priced last week:
 - Goldman Sachs \$264.795M GHIT 2021-GRN2 home improvement loans

- Nelnet \$1.6B+ NSLT 2021-C private education student loans
- Signal Rail Holdings \$265M SRL 2021-1 railcar
- Taco Bell \$2.25B BELL 2021-1 whole business securitization
- GoodLeap \$304.503M GOOD 2021-4GS solar loans
- FirstKey Homes \$643M+ FKH 2021-SFR2 single family rental
- Aligned Data Centers \$1.35B ADC 2021-1 data centers
- GM Financial \$1.3B GMALT 2021-3 prime auto lease
- Harley-Davidson \$605.3M HDMOT 2021-B prime motorcycle loans
- Flagship \$377.98M FCAT 2021-3 subprime auto
- Sallie Mae Bank \$527M SMB 2021-D private student loan

U.S. ABS 2021 Volume: *T Sector YTD Volume (\$b) Autos 89.01 Cards 7.37 Equipment 14.39 Student Loans 20.9 Other 62.07 Total 193.72 *T

- ~\$122.5b priced by this time last year (~58.1% higher y/y)
- \$17.5b priced in August 2020
- \$200.9b priced in 2020
- \$248.3b priced in 2019
- \$244.7b priced in 2018
- \$237.8b priced in 2017
- \$198.4b priced in 2016

CMBS PIPELINE:

- The following filed an ABS-15G:
 - BLOX Trust 2021-BLOX
 - MOTEL Trust 2021-MTL6
- The following is marketing:
 - ANNOUNCED: Hudson Pacific/Blackstone \$1B+ BXHPP 2021-FILM Hollywood Office SASB
- The following priced so far this month:
 - Velocity \$195M VCC 2021-2 small balance commercial
 - Freddie Mac \$425.47M FRESB 2021-SB89 multifamily
 - Freddie Mac \$780.36M FHMS K744 multifamily
 - Freddie Mac \$928.69M FREMF 21K-F118 multifamily
 - Kohlberg, Kravis, Roberts \$267M KREST 2021-CHIP SASB
 - Ready Capital \$652.52M RCMT 2021-FL6 CRE CLO
 - Freddie Mac \$1.2B+ FHMS K130 multifamily
 - Brookfield Asset Management \$443.1M BSREP 2021-DC SASB
 - JPM, Citi, DB, GS \$1.375B+ BMARK 2021-B28 conduit

U.S. CMBS 2021 Volume: *T Private Label YTD Volume-\$m Conduits 18,492.93 SASB 34,762.04 CRE CLO 24,808.07 Small Balance 446.22 Other 0 TOTAL 78,509.26 AGENCY Freddie K Volume 41,393.01 Freddie Small Balance 3,372.37 Freddie Mac Multifamily CRT 509.309 Fannie Mae Multifamily CRT 0 Fannie Mae GeMS 6,106.575 *T

- ~\$38.3b in private-label priced by this time last year (~105% higher y/y)
- \$62b private-label priced in 2020
- \$114.1b private-label priced in 2019
- \$88.7b private-label priced in 2018
- \$92.7b private-label priced in 2017
- \$70.4b private-label priced in 2016

CLO PIPELINE:

- The following new issues are marketing:
 - ANNOUNCED: Ares 61 \$508.42M via Nomura
 - GUIDANCE: Allegro CLO XIV \$510.1M via Natixis
 - GUIDANCE: Monroe Capital CLO XII \$455M middle market via SMBC
- The following resets are marketing:
 - Dryden 68 CLO \$521.85M via BNP Paribas
 - TICP CLO XII \$411.9M CLO via Citigroup
- The following new issues priced this week:
 - BCC 2021-4

- Carlyle US CLO 2021-7
- KKR 35
- New Mountain CLO 3
- The following refis priced last week:
 - Anchorage Capital CLO 9
 - Marathon CLO XIII
 - Vibrant CLO IV
- The following resets priced last week:
 - Hildene TruPS Securitization 2020-3
 - Jamestown CLO IX
 - Pikes Peak CLO 3
 - Benefit Street Partners CLO XX
 - Wellfleet CLO 2020-2

U.S. CLO 2021 Volume: *T YTD Pricing Volume Number of Deals YTD Volume (\$m) New Issue BSL CLO 186 90,254.45 New Issue Middle Market CLO 18 8,629.93 YTD BSL and MM Volume 204 98,884.38 Hybrid CLOs 3 1,415.1 Re-Issue 8 3,816.11 Refis (Includes Hybrids) 203 75,867.24 Resets: 156 82,530.35 Re-Pricings: 0 0 CLO Refi/Reset/Repricing/Reissues 367 162,213.7 *T

- ~\$44.9b in new issue priced by this time last year (~120.2% higher y/y)
- ~\$89.7b priced in 2020
- ~\$119.5b priced in 2019
- ~\$130.4b priced in 2018
- ~\$119.9b priced in 2017
- ~\$72.4b priced in 2016

RMBS PIPELINE

- The following issuers have recently filed ABS-15Gs:
 - GCAT 2021- NQM4 Trust
 - Morgan Stanley Residential Mortgage Loan Trust 2021-5
 - Angel Oak Mortgage Trust 2021-4
 - GS Mortgage-Backed Securities Trust 2021-RPL2
 - CFMT 2021-EBO1, LLC
 - New Residential Funding 2021-INV1
 - GS Mortgage-Backed Securities Trust 2021-GR2
 - GS Mortgage-Backed Securities Trust 2021-PJ8
 - Towd Point Asset Trust 2021-SL1
 - Veritate Issuance Trust 2021-1
 - CSMC 2021-RPL5 Trust
 - Oceanview Mortgage Trust 2021-INV1
- The following priced so far this month:
 - PRICED: Citigroup Mortgage Loan Trust \$311M+ CMLTI 2021-INV2 agency-eligible prime investment loans
 - New Residential \$337M NRZT 2021-INV1 agency-eligible non- owner
 - Flagstar \$661.06M FSMT 2021-7 prime jumbo/agency- eligible
 - Onslow Bay Financial \$356.5m OBX 2021-NQM3 non-QM
 - BRAVO \$293M+ BRAVO 2021-NQM2 non-QM
 - MFA \$277M+ MFRA 2021-NQM2 non- QM
 - Chimera \$434.67M CIM 2021-INV1 prime agency-eligible investment property loans
 - Guaranteed Rate \$401M+ RATE 2021-J2 prime jumbo
 - Provident Funding \$296M+ PFMT 2021-INV1 agency eligible investment loans
 - Zillow \$450M ZILLO 2021-1 single family home-revolver

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Case 1:24-cv-01838-ACR Document 34-5 Filed 06/20/25 Page 172 of 172

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S&P Global
Ratings

Digitalization Of Markets

Framing The Emerging Ecosystem

September 16, 2021



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Table Of Contents

1. Blockchain What's Under The Hood	7
2. Blockchain Can Scalability Solutions Unleash Blockchain Technology's Full Potential?	9
3. Cryptocurrencies Not Yet For The Mainstream	12
4. Nonfungible Tokens Creating New Asset Classes, Disrupting Others	15
5. Central Bank Digital Currencies The New Cash For A Digital Age	17
6. Decentralized Finance Disrupting But Not Derailing Traditional Finance	19
7. DeFi Lending Set To Disrupt Traditional Systems--But Not Until Constraints Are Lifted	21
8. Digital Bonds More Than An Efficiency Play	23
9. Regulation Of Digital Assets How Far, How Fast?	26
10. U.S. Public Finance Cryptocurrencies May Boost Revenue--But Are Not Without Risk	29
11. Structured Finance Distributed Ledger Technology Prepares For Takeoff	31
12. El Salvador's Bitcoin Case High Risks Will Limit Benefits	33
13. ESG Does Blockchain And Distributed Ledger Technology Align With ESG Principles?	35
14. Glossary	37

Foreword

Bitcoin, blockchain, and the capabilities of the distributed ledger were first introduced to the market 13 years ago through the Bitcoin Whitepaper--the virtual currency's 3,550-word foundational document that is 1,000 words shorter than another foundational document, the U.S. Constitution, examendments. Both documents established a framework for a new form of governance. The simplicity of Bitcoin's concept and brevity of the foundational document are not commensurate with the complexity of the ecosystem, magnitude of market innovation, and scale of new opportunities and potential disruption that is now emerging. Although it is still early days in the digitalization of markets, the pace of crypto adoption already outpaces the adoption rate of the internet in the 1990s and portends more change to come.

Bitcoin initially captured the imagination of retail investors but is now grabbing the attention of institutional investors and policymakers throughout the world. This is because, while bitcoin provided a foundation for cryptocurrencies and the current incarnation of blockchain, the digitalization of markets now extends well beyond the more narrow confines and use cases of bitcoin.

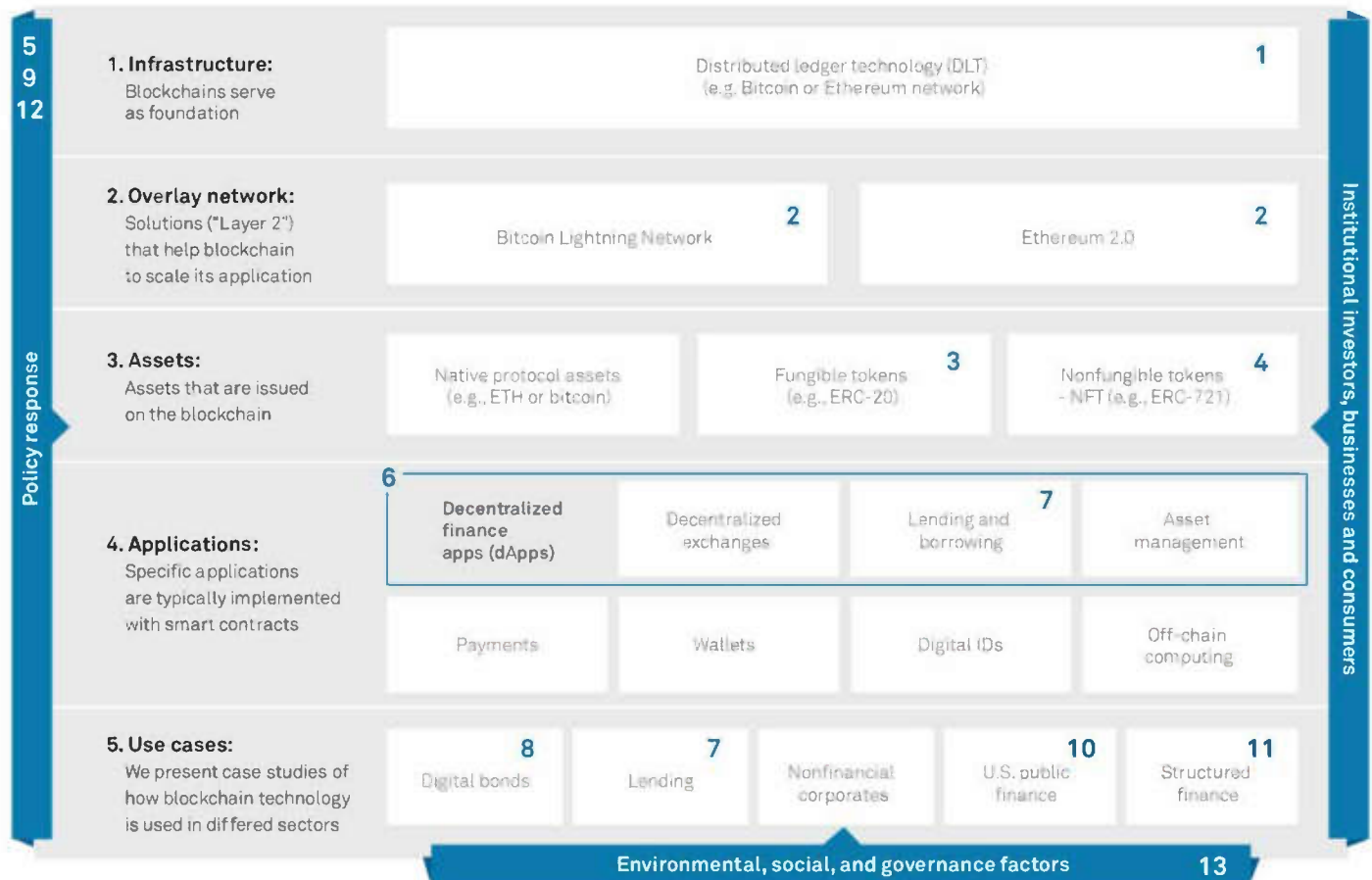
As is often the case with emerging technologies, the full scale and scope of the market impact--driven by blockchain, cryptography, and smart contracts--is difficult to understand and even more difficult to accurately predict. Cryptocurrencies and the broader ecosystem remain a small segment of the financial market. For instance, as of Sept. 7, 2021, the total market capitalization of cryptocurrencies stood at around \$2.2 trillion--about 5% of the U.S. equity market capitalization. But broader institutional investor acceptance may herald a new phase of rapid acceleration.

This digital ecosystem includes new organizations, which provide new services, new products, new forms of risk and performance analytics, new job functions, and ultimately a new set of terms and language that are integral to it. The response to this developing ecosystem is very polarized, not helped by the technical and fast-moving nature of the underpinning technologies. Learning what staking is, or how a flash loan or liquidity pool works, or the difference between a hard fork versus a soft fork, or proof of work versus proof of stake, can be demanding and often confusing.

In this initial report, we strive to provide a high-level framework for understanding the evolving digital landscape and ecosystem, including catalysts and obstacles for its advancement and credit implications. We present a compilation of short reports on various key aspects of the digitalization of markets, including the technology that powers digitalization, the global regulatory and policy landscape, the decentralized finance (DeFi) ecosystem, tokenization, altcoins, and non-fungible tokens (NFTs), to name a few. For each topic we provide an overview of the subject, the operating landscape, and the key credit implications. As a result, the report is largely tailored to readers in the earlier stages of their digital journey. In addition, while this report focuses on the financial market impact and infrastructure, we acknowledge that the use cases and wider effects of the technology powering digitalization go well beyond these confines.

Digitalization Of Markets: Framing The Emerging Ecosystem

The Digitalization Of Markets--A Simplified Thematic Map



Note: numbers in graphic refer to writeup in the table of contents. Source: S&P Global Ratings.

Why The Fuss?

At its root, market digitalization is powered by technology capabilities that can both complement and disrupt established market frameworks and business models through the formation of a digital ecosystem and a new set of operating rails. These new rails are:

- Decentralized, enabling peer-to-peer transactions that reduce or eliminate the need for traditional intermediaries;
- Immutable and fully transparent for each transaction; and
- Permissionless, borderless, and censorship-resistant, giving users access from anywhere at any time, with complete freedom to interact with any other user of the technology.

The development of this new set of financial rails has a myriad of implications across financial markets. As an operating paradigm, the distributed ledger offers the potential for efficiency gains by reducing or eliminating the need and role for intermediaries to execute transactions in both primary and secondary markets. As a result, market participants will design and implement entirely new workflows and operating regimes, where the degree of disruption to established intermediaries will be driven by several variables, including technology capabilities, scalability, and the pace of adoption by market participants.

Digitalization Of Markets: Framing The Emerging Ecosystem

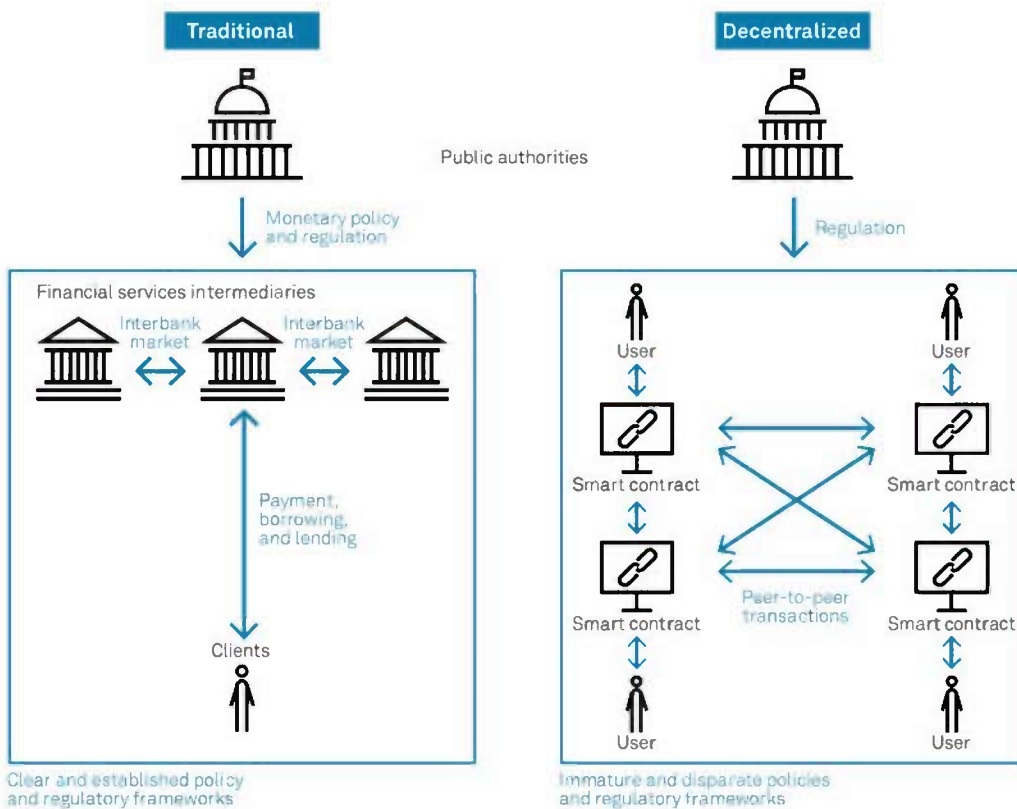
Alongside execution impacts is the formation of new types of digital assets. Some of these assets are digitally native (e.g., bitcoin and altcoins), while others may be digitized versions of traditional assets (e.g., bonds, equities, real estate, art, or fiat currencies). The emergence of new digital asset classes may usher in an expanded paradigm for managing portfolios of traditional and digital assets. In turn, the introduction of these new types of assets requires new data and risk analytic frameworks and capabilities that will integrate traditional measures of risk and performance (such as volatility, correlation, diversification, liquidity, credit, and factor exposure) with new types of analysis and measures (e.g., hash rates, network effects, and protocol risk).

Beyond the functional capabilities and portfolio management approaches related to digitalization, market participants also face the uncertainty and risks associated with building a new--or adapting the existing--regulatory framework that is fit for purpose. Defining what a digital asset is (e.g., a security, commodity, or currency), clarifying reporting requirements and tax treatment, and integrating anti-money-laundering requirements are foundational elements in the digitalization of markets. However, complicating the development of these frameworks is the lack of clarity regarding which bodies have regulatory and prudential oversight within countries and across jurisdictions, and the borderless nature of many of these technologies and activities. Some components of regulating digital assets may fit more neatly into the existing regulatory infrastructure (such as a tokenized equity holding), while others may not (such as DeFi lending). In other words, a fast-growing and evolving new ecosystem of digital assets necessitates a new model of regulation and oversight, and the sooner the better.

In addition to the regulation and oversight of digital assets, there are complex policy challenges and approaches to be formed related to monetary policy and ensuring the stability of global financial markets. The exponential growth and diversity of digitized assets, whether private cryptocurrencies (e.g., bitcoins) or stablecoins (e.g., tether) necessitates both a prompt and thoughtful set of policy responses. The acceleration of projects around central bank digital currencies (CBDCs) illustrates central banks' focus on staying relevant faced with the potential explosion in private money.

Digitalization Of Markets: Framing The Emerging Ecosystem

Traditional Finance Versus Decentralized Finance



Source: S&P Global Ratings.

The path ahead for digitalization and digital assets will not be a straight one, reflecting:

- The complexities of the technology;
- Wide variance in understanding and adoption among retail and institutional players; and
- The mobilization of established stakeholders who can and will shape the evolution of digitalization, with policymakers and regulators taking a prominent role.

As a result, uncertainty and volatility are likely to remain defining characteristics for the foreseeable future. And the credit implications for our rated universe will be a function of the pace of development of these technologies, the relative exposure of specific industries to disruption risk, and the ability of individual issuers to adopt or adjust to these new technologies.

We would like to thank the many colleagues who have contributed to this report to provide you with S&P Global Ratings' essential insights. Special thanks to Marcus Daley, Chief Ratings Technology Officer.

Blockchain | What's Under The Hood

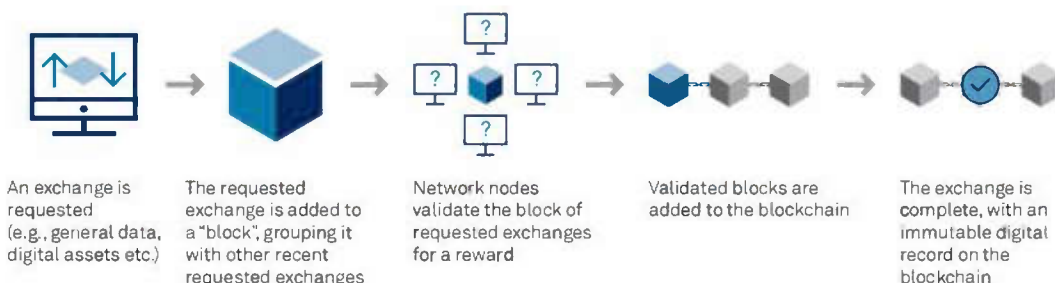
Blockchain technology removes the need for a trusted central party for settlement and clearing, and has the potential to revolutionize how digital value is recorded and transferred.

What is a blockchain?

Blockchain is a new way to record data. It is a subset of distributed ledger technology (DLT), a database that stores information on a ledger that is distributed among a network of participants, as opposed to databases that store and manage information in a centralized location. Blockchains are a type of DLT that groups data into "blocks," which, when verified by members of the network, are linked together to form the "blockchain." Unlike regular databases, there is generally no single authority controlling this ledger. Instead, identical copies of the ledger are held by all participants across different locations in the network (nodes).

Decentralization and immutability are key advantages. Blocks of data are sequentially linked, and new ones are added using a consensus mechanism. Members of the network verify and cross-check updates to ensure data validity. All entries are permanent and traceable.

Simplified Blockchain Process



Source: S&P Global Ratings.

The technology provides an edge in transaction record keeping. Blockchain can provide a viable alternative to processes that require a trusted intermediary to handle transactions (such as trade finance), a digital store of value (such as digital assets or cryptocurrencies), or for processes that are notoriously complex in the real world by legacy and may be overhauled (such as securities settlement).

Smart contracts can irreversibly encode processes. These are programs that are stored on a blockchain and are executed by any party willing to pay the fees necessary to execute the contract. Permitted use on the public blockchain is typically handled by a smart contract providing services to wallet addresses that own some asset or attribute, typically a token. For example, a smart contract could automatically initiate a payment once an order has been shipped by automatically issuing payment to one or more token holders who hold a token associated with the order. This could be triggered by any party contingent upon logic specified in the smart contract and data stored on the blockchain. This provides transparency and certainty for all involved parties, although the irreversible nature of blockchain entries also brings its own set of risks, in case of bugs in the code or unexpected inputs.

The current landscape

Adoption across many industries is accelerating. The first implementation of a blockchain was the Bitcoin network, but the spectrum of blockchain implementations is much broader today and includes tasks such as supply chain and logistics solutions, health care, or royalty tracking. Most of these projects are still in the conceptual or testing phase, and we see little adoption of large public use cases. One area of rapid growth is decentralized finance (DeFi), which drives the adoption of blockchain and crypto assets. DeFi aims to replicate

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[What Blockchain Could Mean For Structured Finance](#), Feb. 22, 2019

[Blockchain Is Coming To MuniLand, And The Changes Could Be Significant](#), July 30, 2018

[The Future Of Banking: Blockchain Can Reshape The Financial System](#), Oct. 26, 2016

[Glossary](#)

The adoption of blockchain is accelerating across many industries

Digitalization Of Markets

traditional financial products and bring them on-chain to benefit from the advantages of blockchain technology.

Blockchain technology still has many hurdles to clear. The main challenges relate to lack of blockchain scalability and standardization, as well as a lack of interoperability between different blockchains and with traditional systems. For example, the dominant platform for smart contracts--Ethereum--can process only around 30 transactions per second, compared with thousands for traditional credit card networks. While blockchain projects are making progress in addressing these issues, we consider the technology to be still in its early stages.

Blockchains' steep energy consumption raises environmental concerns. The largest public blockchains, Bitcoin and Ethereum, utilize a proof-of-work algorithm to validate transactions, which is based on an energy-intensive process. For example, bitcoin mining's energy consumption is in line with that of the Netherlands (Cambridge Bitcoin Electricity Consumption Index). Additionally, the reportedly short lifespan of the mining machines adds to environmental concerns. But Ethereum's ongoing transition to a proof-of-stake algorithm is expected to considerably reduce its energy consumption by around 99% by 2022.

There are different types of blockchains. Private (permissioned) blockchains differ from public (permissionless) ones in that they are open only to selected participants. Typically, they are also more centralized, which helps to avoid time-consuming consensus mechanisms and improve throughput. This makes them particularly relevant for many enterprise solutions, which seek to retain a level of control (for example, Hyperledger Fabric and R3 Corda). However, critics point out that private blockchains are typically more prone to hacks and data breaches owing to a lower level of decentralization when compared with their public counterparts. This is because the lower number of nodes makes it easier for malicious actors to gain control over the consensus network.

The credit implications

Blockchain's scalability and efficiency improvements will determine its long-term applicable use cases.

Most large blockchains work actively to solve the limitations listed above (for example, Ethereum 2.0 or the Bitcoin lightning project), while other blockchains are already more advanced. We expect entrepreneurial focus and rising investments will help to address these limitations and refine the technology.

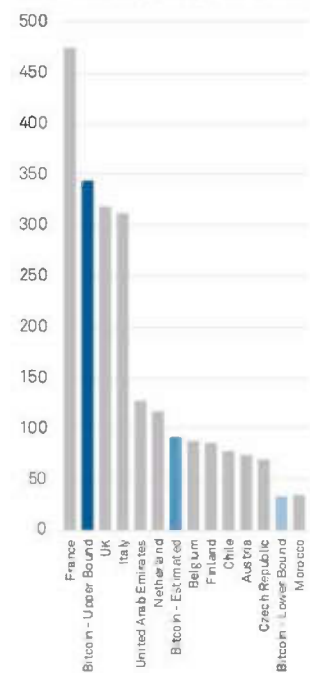
Blockchain can be a solution for multiple problems, but it is not appropriate for every situation. Blockchains are best suited to processes that involve multiple parties that need to interact but wish to do so in a trustless manner, and where a central authority is either not available or not desired. Users must weigh the additional complexity and network efficiency of blockchains against the vulnerabilities and control conferred by centralized databases when implementing a solution.

Blockchain capabilities can both complement and disrupt business workflows and market functions.

Blockchain-based solutions can help to improve cumbersome legacy processes and raise operational efficiencies, particularly for those use cases that so far involve multiple participants and slow transaction times, such as securities settlement or trade finance. However, other use cases could disrupt the established role of financial intermediaries. For example, decentralized exchanges, such as Uniswap, facilitate peer-to-peer cryptocurrency transactions without the need for a traditional intermediary. It remains highly uncertain which of these scenarios will prevail, but we believe it is more plausible that existing players will disrupt themselves first and use the technology to their advantage.

We expect that specific use cases will increasingly become regulated, but not the technology itself. This includes those activities whose traditional counterparts are regulated, such as digital assets, cryptocurrencies, or decentralized finance. So far, regulation is still at an early stage and authorities' responses vary considerably. It remains unclear how most jurisdictions are going to balance innovation and regulation, but we expect more clarity in the coming years.

Bitcoin Energy Consumption Versus Selected Countries (TWh)



Note: Bitcoin estimate for Sept. 1, 2021. Country data as of 2019 (or most recent available year). Sources: S&P Global Ratings, International Energy Agency, University of Cambridge, U.S. Energy Information Administration.

Bitcoin mining's average energy consumption is approximately in line with that of the Netherlands

Blockchain | Can Scalability Solutions Unleash Blockchain Technology's Full Potential?

Capacity limitations have so far prevented blockchain technology from realizing its potential, but the key to unlocking scalability is in sight--in the form of important compromises.

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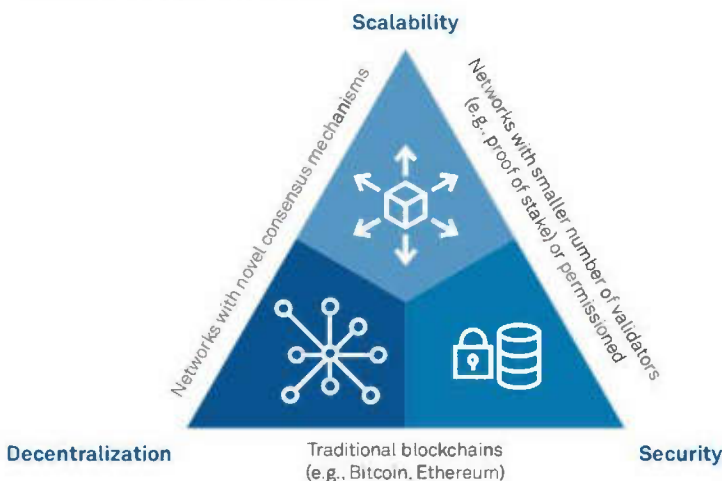
What is the scalability issue?

The transaction processing power of public blockchains is currently limited. Blockchain networks have limited capacity to handle large amounts of transaction data on their platforms. For example, the largest blockchains, the Bitcoin network and Ethereum, can process around five and 30 transactions per second (TPS), respectively. This compares with around 1,700 average TPS on Visa's network. This limited throughput is particularly problematic for high-transaction-volume use cases and enterprises that depend on high-performance legacy transaction processing systems. While blockchain solutions or distributed ledger technology (DLT) has clear benefits (for example, trustless transactions, improved security and privacy, visibility, and traceability), key blockchains such as Ethereum face inefficiencies, because their networks are rapidly growing and filling up with millions of users. The lack of scalability has resulted in higher costs, slower transaction speed, and the general dissatisfaction of many users.

Changing parameters is not necessarily the solution. A lot of constraints on the scalability of public blockchains come by design. For example, in the Bitcoin network, it takes about 10 minutes to generate one block, which consists of about 2,800 transactions. It would theoretically be possible to increase TPS by amending the parameters--that is, reducing the block generation time or increasing the block size. However, this would likely force out regular node operators due to higher storage, bandwidth, and processing requirements, which are critical for the security of proof-of-work (PoW) networks.

Blockchains face a trilemma between scalability, decentralization, and security. Traditionally, blockchains can only achieve two of these three properties simultaneously. Historically, the large public blockchains have prioritized decentralization and security over scalability, which is reflected by their low transaction volumes. Other blockchains take a different approach and sacrifice decentralization for better scalability.

The Scalability Trilemma



Source: S&P Global Ratings.

Blockchains have to compromise on at least one of three properties: scalability, decentralization, or security

Read more

[Glossary](#)

Digitalization Of Markets

Scalability issues on blockchains are holding back many applications. This became evident as the use of decentralized finance surged in summer 2020 and heavily congested the Ethereum network, which hosts the majority of applications. As a result, average transaction costs (measured in “gwei” or gas fees) have surged to \$400+ on some days in 2021.

The current landscape

High-performance blockchains are more scalable but also more centralized. Referring to the scalability trilemma, one solution is to shift the tradeoff toward scalability. This approach is followed by multiple high-performance blockchains, such as Stellar and Solana, which have reported TPS of up to 3,000 and 50,000, respectively. The main difference between these and more decentralized blockchains lies in their consensus mechanism. For Solana, block information is distributed across a set of only 1,000 nodes, which produce and validate each block.

The industry is exploring highly divergent solutions to improve scalability, also in a highly decentralized setting. The most notable projects include Bitcoin's lightning network, Ethereum 2.0, and Ethereum L2s (layer 2). The details are very technical and include a variety of measures. For Ethereum 2.0, it is a direct upgrade of the current Ethereum 1.0 network to bring its consensus algorithm from PoW to proof-of-stake (PoS). This allegedly increases scalability to as much as 100,000 TPS. Ethereum 2.0 is already running alongside the Ethereum 1.0 mainnet in a testnet configuration for production deployment in early 2022.

Ethereum L2s are a second layer that is added on top of the mainnet blockchain, which executes the transaction outside the Ethereum mainnet but settles all transaction data back onto the Ethereum blockchain. It brings another 10x improvement in speed against the underlying Ethereum mainnet TPS. Ethereum L2's Arbitrum and Optimism are already in production and delivering the anticipated scalability. However, in order to ship, they have sacrificed decentralization in their early deployments.

Bitcoin's lightning network is a decentralized layer 2 that takes Bitcoin transactions offline and processes them directly between parties. This increases TPS by as much as 250 TPS per channel, but as part of the trilemma, appears to sacrifice security by not settling all transaction data to the Bitcoin blockchain and forcing non-DLT concepts such as watchtowers and payment channels.

PoW consensus algorithms are increasingly replaced by PoS. The original mechanism used by blockchains is PoW, which requires computers to compete against each other to process transactions and get rewards. This process is highly energy-intensive and time-consuming. For this reason, Ethereum's upgrade to version 2.0 will also see it transition to PoS, to support faster transactions and lower fees. With PoS, consensus is reached by using an algorithm that chooses a node to win a block of transactions, rather than the nodes competing to win the block by using large amounts of power.

The credit implications

Improvements in scalability can bring use cases to another level. We expect that both more and less decentralized blockchains will improve the scalability of their technology. Their use in mainstream applications will be the real test. Greater scalability is a precondition to many mainstream applications. However, jeopardizing security for the sake of higher scalability can undermine confidence in a particular blockchain and hurt the use case itself. Other types of DLT, such as directed acyclic graphs (DAG), address current scalability issues and offer lower transaction costs. A few protocols, such as Hedera Hashgraph or IOTA, use DAG solutions. We think DAG-based solutions could help in overcoming scalability issues.

We believe highly decentralized solutions are the main game-changers. The strength of highly decentralized blockchains lies in their resistance to centralized control through intermediaries. If successful, we expect solutions based on highly decentralized blockchains can be more disruptive to current intermediaries, particularly in the financial world, compared with those from more centralized platforms, which critics sometimes liken to cloud computing. We believe use cases based on more centralized platforms align more closely with the existing market infrastructure and allow players to increase efficiencies while generally avoiding being disintermediated.

However, there is a case for more centralized versions. Although decentralization can underpin a high level of security and accessibility, we believe the blockchain's other properties are not necessarily optimal for every use case. For example, abandoning the immutability of blockchains may allow easier alterations, which can be

We expect more centralized versions of blockchain will be vehicles for efficiency gains rather than disruption

Digitalization Of Markets

beneficial to certain applications (for example, credit card payments can be reversed for multiple weeks). For that reason, we expect more centralized versions of blockchains, often permissioned ones, will appeal to a broader area of applications. Those can be an efficient trigger to revamp legacy processes, while an identified intermediary and regulated access to blockchains fit more readily in existing regulatory frameworks.

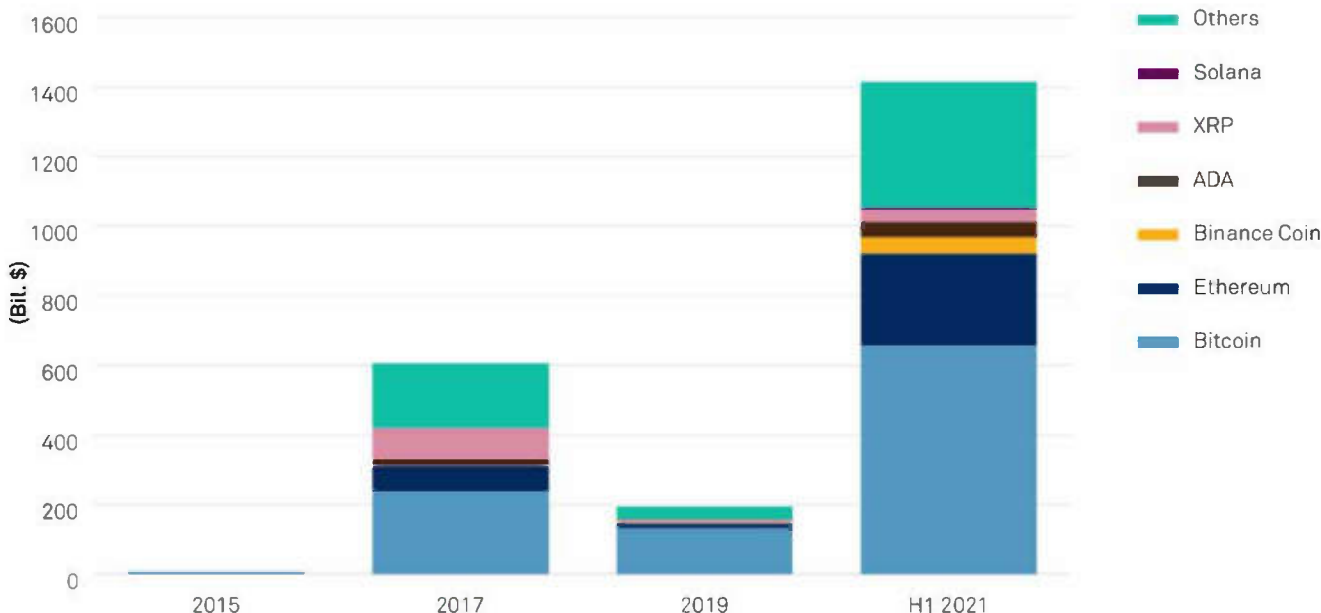
Cryptocurrencies | Not Yet For The Mainstream

Although the rapid growth of cryptocurrencies has captured global attention, the nascent ecosystem is skewed toward trade and investment rather than payments. We think authorities will play an instrumental role in the further development of the ecosystem through their controls over existing legal and financial systems.

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The Crypto Universe Is Rapidly Rising In Value



Source: CoinMarketCap and Coin360.

What are cryptocurrencies?

Decentralized tokens. These digital tokens are created or “minted” through protocols developed by private sector parties, not by any central monetary authority. The tokens are encrypted and issued over a distributed ledger technology (DLT) network where transfers are permanently recorded and each entry verified by consensus or validated by “special users.” The number of tokens and other features is predetermined in the protocol and is typically not altered after launch. However, mechanisms for altering tokenomics vary widely depending on whether they are on-chain tokens, such as SushiSwap or Uniswap [with their native tokens SUSHI and UNI], or native blockchain assets, such as Ethereum or Bitcoin.

Stablecoins. This form of cryptocurrency is a crypto token that is linked to underlying assets, such as national currencies, commodities, other crypto tokens, or other financial instruments. Stablecoins are designed to ensure price stability and enable investor access to a wider range of assets on crypto exchanges. Stablecoins are increasingly being scrutinized by policymakers because of the limited transparency of the underlying assets. They have also raised issues common to all cryptocurrencies concerning the possibility of illicit transactions and their threat to financial system stability should they significantly substitute traditional money.

The current landscape

Filling a void. The prime reasons for advocating the use of cryptocurrencies as alternatives to traditional money are their digital and decentralized nature and token scarcity. Bitcoin is the first of its kind and the most prominent. That said, many proponents of bitcoin do not see it as currency (means of payment) but rather as a

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[Coinbase Global Inc. Assigned 'BB+' Rating; Outlook Stable](#), Sept. 13, 2021

[Net Debt: Why Digital Currencies Like Bitcoin Are Not Akin to Cash in Our Ratio Analysis](#), May 3, 2021

[The Future Of Banking: Cryptocurrencies Are Still Mostly About Speculation, Not Payment](#), March 8, 2021

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[The Future Of Banking: Cryptocurrencies Will Need Some Rules To Change The Game](#), Feb. 19, 2018

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Digitalization Of Markets

store of value, like gold. Ether, the second-largest cryptocurrency, offers smart-contract functionality and is a host for decentralized apps and hundreds of thousands of tokens and their underlying protocols. The list of uses and alternative coins continues to expand, which is a distinct feature of this ecosystem compared with central bank digital currencies (CBDC), which focus on a single payment currency.

On the other hand, while key cryptocurrencies enjoy efficiencies compared with fiat money (government-issued and backed currency) transactions, for example in cross-border transactions, some advantages could be reduced by more sophisticated CBDC implementation. Some CBDC implementations have promised smart contract features that could compete with decentralized composability and further diminish these efficiency advantages.

Valuation is not based on a strong payment ecosystem. With long wait times for a transaction to go through, it is difficult to envisage bitcoin being used as a mainstream currency for payment without a centralized intermediary. Most cryptocurrencies are not built on strong payment-based foundations, although some have robust money transfer adoption, such as Stellar Lumens, Ripple, and Solana. Notable evidence of payment adoption is Visa's use of USD Coin (USDC), a stablecoin backed by the U.S. dollar, to settle transactions on Ethereum, launched in Q1 2021. Layer 2 protocols, such as Bitcoin's lightning network and Ethereum's Arbitrum and Optimism, which enable transactions between parties off the blockchain, could address the latency issue.

Regulation could limit cryptocurrencies' value. Authorities could potentially use their control over the existing legal and financial system to cut off the fiat channel funding the crypto exchanges to stave off growth in adoption while also regulating them to diminished levels. A wide range of potential policy and regulatory actions could ultimately affect use cases, scalability, and valuations. Anti-money laundering, combating the financing of terrorism, ransomware, securities law violation, and environmental considerations are some of the rationale for regulatory action.

The credit implications

Compliance risk. The search for additional sources of revenue, particularly in the form of fees, could lure financial institutions with the appetite to deal in this speculative asset class. Rising valuations and growing popularity are attracting the attention of fund managers, bankers, payment processors, and traders. These financial service providers are typically regulated and may be exposed to developing rules and possible look-back audits in principle-based supervisory regimes.

Legal rights and counterparty risk. Failed crypto exchanges have resulted in losses. Investors are also subject to cyber risks. Cryptocurrencies are generally not recognized as securities by law. Therefore, holders may not benefit from legal protections and are vulnerable to market manipulation and other malpractices prohibited in traditional trade. Financial institutions handling or taking positions in crypto trades are exposed to these risks.

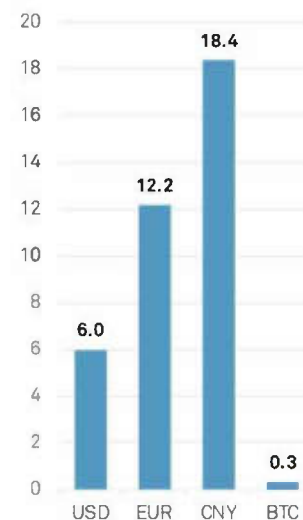
Volatility and customer risks. A growing number of companies, and even countries are accepting cryptocurrencies as a form of payment or legal tender. In addition to investment risk connected to cryptocurrencies' price volatility, they are also taking on additional know-your-customer risks where proof of transferee identity is more difficult from certain crypto accounts.

Reputational risks. Losses, especially endured by vulnerable segments of society may have significant reputational damage to financial-service providers, such as fund managers, especially if inappropriate selling practices are involved. This could also entail monetary penalties.

Dollarization, cryptoization. Crypto could undermine a country's monetary control if cryptocurrencies became more mainstream. This is similar to dollarization in some emerging countries although cryptocurrency volatility may be less of a concern relative to fiat value. Relative money remittance efficiency is another proponent of cryptocurrency usage in those countries. The mixed policy response shows varied appetites to systemic risks.

Until cryptocurrencies become more mainstream, they will remain a speculative asset with a fiat valuation

Annual Payment Transaction Volume/Money Supply (X)



Sources: ECB, Federal Reserve, PBOC, Bloomberg, Chainalysis, S&P Global Ratings' estimates.

Digitalization Of Markets

Recent Use Cases Of Top Cryptocurrencies

Cryptocurrency	Purpose	Recent use case
Bitcoin	A decentralized digital currency, first of its kind	<ul style="list-style-type: none"> - El Salvador has adopted it as legal currency - Fidelity Bitcoin Fund attracts \$102 million in less than a year - Tesla could resume accepting it as payment after environmental concerns are addressed - JPMorgan has launched in-house bitcoin fund for private bank clients - Invesco has filed with SEC for bitcoin strategy ETF
Ether	Native currency of the Ethereum network. Ethereum is a decentralized, open-source blockchain with smart-contract functionality	<ul style="list-style-type: none"> - Microsoft is looking to use a system developed on the Ethereum blockchain to prevent piracy - CME Group has launched Ethereum Futures - Chinese app Meitu has bought \$40 million worth of ether and bitcoin - WisdomTree Investment filed for ETH ETF with the SEC
Binance Coin	Issued by Binance crypto exchange, and can be used as payments for transaction fees	<ul style="list-style-type: none"> - Hundreds of online merchants, including Travala.com, accept BNB as payment
Cardano	A proof-of-stake blockchain platform with a multi-asset ledger	<ul style="list-style-type: none"> - Hundreds of online merchants accept Cardano as payment
XRP	Acts as a bridge currency to other fiat currencies exchanged on the Ripple platform. Ripple is a real-time gross settlement system, currency exchange and remittance network	<ul style="list-style-type: none"> - Hundreds of financial institutions, including American Express, Bank of America, and Santander have partnerships with Ripple - Ripple partnered with various sustainability leaders, including the Bill & Melinda Gates Foundation, aiming to hit carbon net zero by 2030
Solana	Decentralized, open-source blockchain with smart contract functionality and focuses on fast processing speed	<ul style="list-style-type: none"> - Hundreds of projects spanning decentralized applications, finance, nonfungible tokens, and others are being run on this network

Note: Stablecoins such as Tether and USDC provide a gateway to fiat and cryptocurrencies. Payment companies such as Mastercard and Visa have piloted stablecoin settlements. Source: Binance, Coinbase, Cryptwerk, Ripple, and Solana.

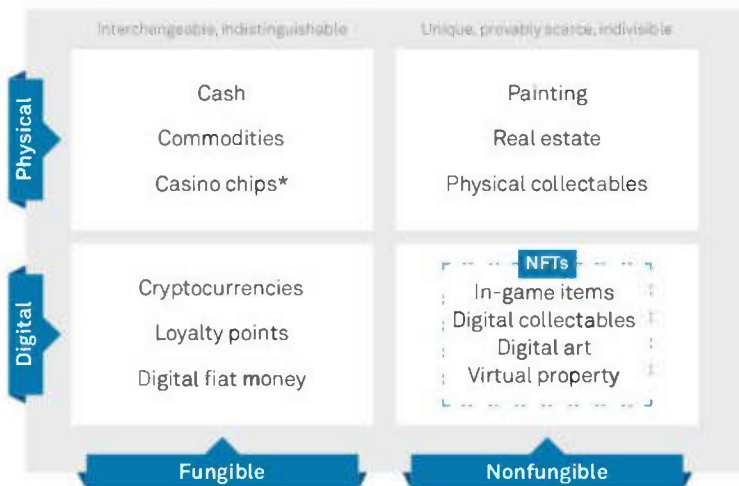
Nonfungible Tokens | Creating New Asset Classes, Disrupting Others

Nonfungible tokens (NFTs) showcase the innovative power of distributed ledger technology (DLT). Their potential to optimize and democratize certain assets and disrupt existing processes has yet to be fully realized.

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Simplified Classification Of Selected Asset Types



*Only accepted as currency in casino ecosystem. Source: DappRadar, S&P Global Ratings.

What are nonfungible tokens?

NFTs are unique digital assets whose ownership rights can be demonstrated and verified via smart contracts on DLT. They can be used to create a tokenized proof of ownership for a virtual version of an underlying digital asset (such as images, videos, or music) or physical asset (such as paintings or other tangible assets). NFTs of physical assets are created to record ownership on a distributed ledger, where they become tradeable, while the narrow definition of an NFT enables the creation of purely digital assets that are tradable on certain platforms.

Each NFT is unique with individual properties stored in the metadata and verified with a digital signature on the distributed ledger. This creates digital scarcity for NFTs. In contrast, fungible assets--such as fiat money and Bitcoin--are interchangeable and indistinguishable from one another.

When someone "mints" an NFT, they create a unique digital version of an underlying asset such as a data file on a specific distributed file system (such as IPFS). Once minted, NFTs cannot be edited or deleted (immutable), and can be viewed publicly and traded freely with verifiable security of exclusive ownership and transaction traceability. They are borderless and transferable between digital wallets (interoperability).

NFTs are implemented via smart contracts, which specify and automate certain rights and obligations of the buyer and seller. For example, the NFT's creator can receive a percentage of the transaction proceeds every time the NFT is sold if this rule is coded in the smart contract.

The current landscape

While NFTs have been available since 2014, the market exploded recently. Primary and secondary trading volumes reached more than \$2 billion in first-half (H1) 2021, compared with \$13 million during the same period in 2020 (see <https://dappradar.com/nft>). In July and August 2021, an astonishing \$3.2 billion of total NFT sales were measured on OpenSea, a leading NFT marketplace. NFT sales activity is currently the highest

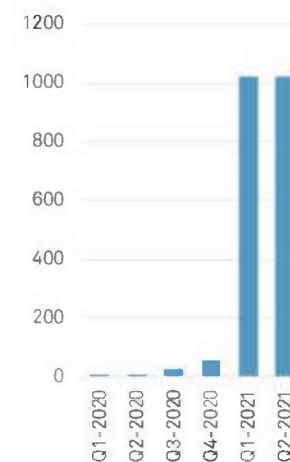
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[The Future Of Banking: Building A Token Collection](#), June 1, 2020

[The Future Of Banking: Blockchain Can Reshape The Financial System](#), Oct. 26, 2016

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Record High NFT Sales In 2021 (Mil. \$)



Note: Data reflects NFT sales on different blockchains incl. Ethereum, Binance Smart Chain, Flow, Wax. Source: DappRadar.

Digitalization Of Markets

in assets classified as collectibles, gaming, art, metaverse, and sports. One notable example is the sale of a digital artwork which was auctioned for \$69 million in March 2021. During mid-2021, digital artwork in the NFT space experienced a boom, which was measured by NFT sales. Most of the NFT sales (about \$800 million) are classified as digital artwork.

NFTs have the potential to digitize unique physical assets. So far, digitized items largely comprise artwork and collectibles, but in principle, all physical assets could be tokenized as NFTs. This includes real estate transactions, the digitalization of which could be one of the biggest disruptions to the norm. One notable example is MakerDAO, which began minting NFTs in April 2021 to then purchase real estate assets as collateral to support its Dai stablecoin, one of the largest decentralized finance (DeFi) protocols.

Real world assets such as illiquid residential and commercial real estate assets could be tokenized and optimized for investors who could buy tokenized parts or whole properties to earn regular rent income or just hold partial or whole ownership title depending on the tokenization scheme. The tokenization of real estate assets is equivalent to minting an NFT with a physical asset as underlying collateral. Any relevant data that makes the real estate asset deal legally binding can be coded into the smart contract of the NFT.

A real estate NFT has all the characteristics of DLT solutions that ensure a successful deal settlement: high security through rules and agreements in smart contracts; transferability via digital wallets that increases liquidity; and uniqueness that makes the real estate NFT scarce. The owner of the NFT is the owner of the real estate. This empowers not only large corporations, but also individual investors. For example, the world's first residential real estate NFT sale was successfully closed in June 2021, with a retail investor selling an apartment in Kiev via an NFT. Paperwork and regulation are still part of the wider process but could be simplified over time.

The credit implications

It is too early to assess whether NFTs have any relevant credit implications. Most NFT players operate in the crypto space as art, gaming, and NFT marketplace service providers. We expect more NFT solutions in the future, particularly if real estate tokenization can gain traction.

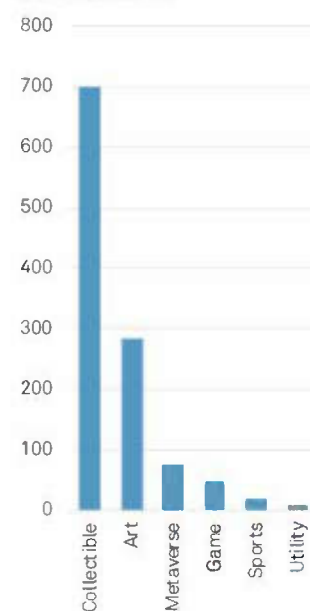
The fragmentation of ownership can offer opportunities and pose threats to incumbents. NFTs can democratize the ownership of certain asset classes (such as art or real estate). The easier acquisition and trading of a fraction of a property could, for instance, pose a threat to real estate funds. At the same time, it could offer new opportunities to financial intermediaries (for example, artworks could become tradeable commodities) and act as a positive diversifier for portfolios because it is a new asset class.

There might be market opportunities to offer new services such as custodial wallets, custodial services of underlying physical assets, and crypto asset accounts around NFTs. In addition, NFTs could be used as collateral for borrowing other currencies in decentralized finance protocols. That said, collateralization requires an easy price discovery process for the NFT to be able to mark-to-market. This is still a weakness. Improving the liquidity of physical assets by creating an NFT does not necessarily mean there will be a liquid market for the token. Peer-to-peer lending in the crypto space that uses NFTs as collateral may therefore rely on subjective assessments of value.

We think NFTs and a general tokenization of physical assets cannot be ignored in the long term. New use cases might arise in the virtual space, while the technology will likely optimize value chains by means of safety, speed, and transparency, among others.

NFT sales activity exploded in H1 2021 with \$2.5 billion worth of transactions, after merely \$13 million in H1 2020

Sales For Relevant NFT Categories In H1 2021 (Mil. \$)

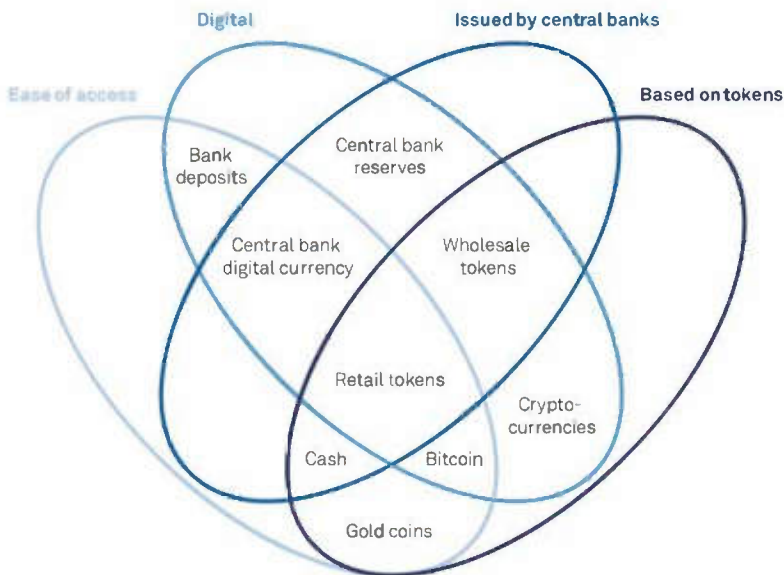


Note: Data for NFT sales on Ethereum blockchain. Find NFT examples of each category at source of data. Source: NonFungible.com

Central Bank Digital Currencies | The New Cash For A Digital Age

We believe the emergence of central bank digital currencies is a question of when, not if.

The Money Flower: A Taxonomy Of Money



Sources: Deutsche Bank, Bank for International Settlements, S&P Global Ratings.

What are central bank digital currencies (CBDCs)?

A natural evolution of cash for the digital age. CBDCs aim to fulfill the two basic requisites of a currency: act as an effective means of exchange and an effective store of value. They can be issued using traditional, blockchain, or a hybrid technology of the two.

A CBDC would represent a liability of the issuing central bank. Like cash, this means the CBDC's legitimacy would mirror that of its central bank from day one. This could encourage wider adoption of CBDCs in countries where the local currency is largely trusted. That said, privacy considerations, and the way these are handled by authorities, will also determine their uptake.

A CBDC would be widely and easily accessible. There are three potential models: (i) A disintermediated model, where the issuing central bank would authorize users to open accounts that it would manage directly; (ii) An intermediated model, where banks or other financial intermediaries would open and manage these accounts; and (iii) A hybrid model, where accounts are opened with the central bank, but managed by banks or other financial intermediaries.

The current landscape

Discussions are gearing up. Technological innovation and growing interest from end users in digital money have prompted central banks into action. The most advanced have also organized trials to assess the implications for the financial system. Some governments are also not willing to risk being left behind in the next leg of financial innovation.

CBDCs could foster financial inclusion. CBDCs could help the under- and unbanked, who are unable to meet minimum deposit and other requirements for a bank account but own a smart phone. At the same time, less

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S&P Global Ratings:

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[The Future Of Banking: Central Bank Digital Currency May Replace Cash, Not Banks](#), Dec. 3, 2020

[The Future Of Banking: China's Digital Renminbi Could Hit Payment Platforms](#), Nov. 11, 2020

BIS:

[CBDCs: an opportunity for the monetary system](#), June 23, 2021

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Central banks are likely to choose models where banks and other financial intermediaries continue to play a strong role

Digitalization Of Markets

sophisticated banks or payment firms could be cut off unless they are integrated into the broader CBDC framework and scalability model.

Central banks are progressing at different speeds. More than three-quarters of central banks around the world are engaged in CBDC-related research. Some are more advanced than others, with China being the first G-20 country to trial a digital currency, currently underway, and Bahamas launching its sand dollar in October 2020. Other advanced and emerging market countries are likely to follow in the next few years.

The Race For CBDCs Is Progressing At Different Speeds Across Jurisdictions



R--Retail. W--Wholesale.

Canceled--Countries that canceled a CBDC. Research--Countries that have conducted explanatory CBDC research. Pilot--Countries that have developed a CBDC that is tested in a real environment either with a limited number of parties or on a wide scale. Launched--Countries that officially fully launched a CBDC.

Sources: CBDCtracker.org, S&P Global Ratings.

The credit implications

CBDCs could protect central banks' mandate. The emergence of cryptocurrencies and other forms of money could lead to a fragmentation in the monetary system, which could reduce the ability by central banks to respond to emerging crises. A CBDC could help central banks defend their position.

CBDCs could enhance economic policy implementation and transparency. CBDCs could help the implementation of fiscal policy by smoothing and accelerating the process of distribution and collection of funds to/from individuals and companies. An example is the provision of fiscal support by governments to economic agents during the COVID-19 pandemic.

Banks will be affected, but not replaced. Assuming central banks go for an intermediated or a hybrid model, CBDCs will likely pressure the revenue profile of certain activities of banks (such as payments) while allowing them to keep their important intermediation function. A disintermediated model would not only destabilize the financial system but also place an additional operational burden on the central bank (for example, in terms of know-your-customer, anti-terrorist financing, anti-money-laundering requirements, and managing a much bigger balance sheet.)

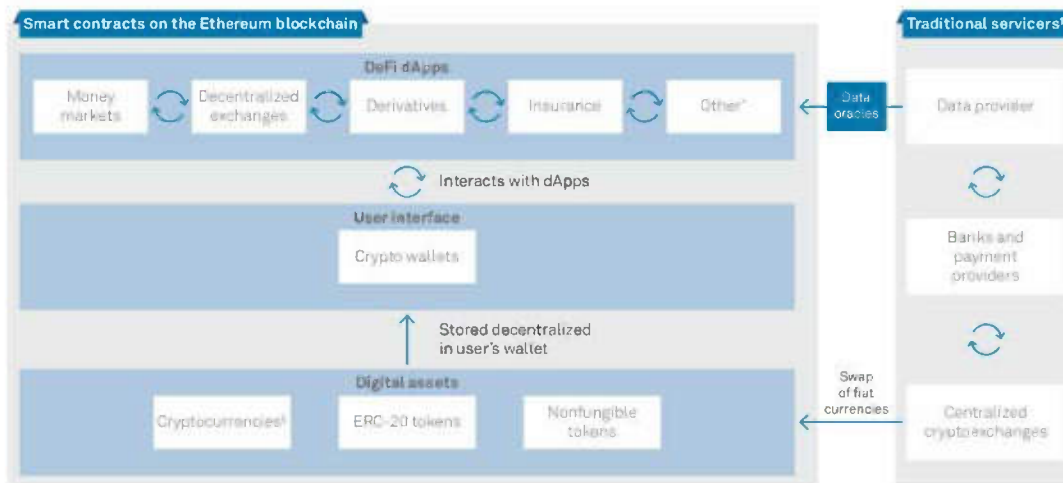
Decentralized Finance | Disrupting But Not Derailing Traditional Finance

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Following the surge of interest in decentralized finance (DeFi) since last summer, it remains to be seen whether DeFi will completely transform traditional financial products or simply complement and optimize them.

Decentralized Finance Simplified



*There are more than four dApp classes in the "DeFi Stack," such as aggregators and asset management protocols, but these are not as relevant for the time being. †Simplified. Source: S&P Global Ratings.

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[The Future Of Banking: Digital Wallets Will Replace Cash in Pockets, June 14, 2021](#)

[The Future Of Banking: Cryptocurrencies Are Still Mostly About Speculation, Not Payment, March 8, 2021](#)

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What is decentralized finance?

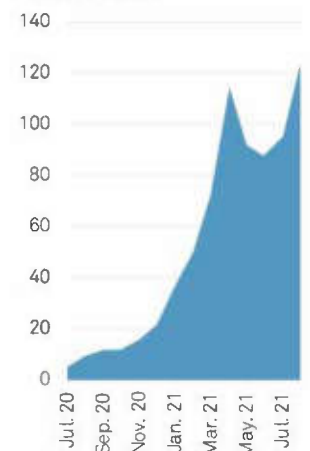
Decentralized finance (DeFi) is a new financial ecosystem that uses smart contracts on blockchains instead of central financial intermediaries to offer financial products and services. It emerged from the cryptocurrency ecosystem. Proponents claim that DeFi will become the new backbone of the future financial system because it has features superior to traditional centralized finance (TradFi). We believe it will complement the current financial system rather than substitute financial service companies.

Products and services have mainly evolved within four different financial solutions: money markets (lending and borrowing), derivatives, exchanges, and insurance. They are decentralized and offered by protocols via smart contracts on a blockchain platform, such as Ethereum. Protocols usually issue tokens to fund the project development of the project, and investors can participate for capital gains, airdrops (equivalent to extraordinary dividends), or yield farming (lending the purchased native token to a certain liquidity pool to earn more of the native tokens).

DeFi investors can use different decentralized applications (dApps) offered by the protocols to make use of products and services. DApps work in conjunction with each other, making it possible to mix and match different products and potentially create new solutions. These act like traditional web applications, with the difference that they live in decentralized smart contracts typically coupled with a Web 3.0 front-end hosted on a decentralized file system. They remove the need for an intermediary to act as a central clearing house for app interactions. Price oracles provide relevant off-chain data for dApps in order to operate properly, the ETH-to-dollar exchange rate being one example.

Proponents claim DeFi offers a fast, low-cost, trustworthy, transparent, and global financial ecosystem. Investors can access dApps from any location at any time (borderless and permissionless) and can rely on agreements that are fix-coded in the underlying smart contract (immutable). While a smart contract offers some safety via immutable contracts, the risk of fraudulent developers or deficient coding cannot be excluded.

Total Value Locked in DeFi Protocols (Bil. \$)



Total value locked measured by total balance of ether (ETH) and ERC-20 tokens multiplied by their price in USD. Source: DappRadar.

The current landscape

DeFi tokens helped the crypto market enjoy a massive inflow of new liquidity over the past 12 months. The "DeFi summer" of 2020, when many DeFi dApps entered the market, triggered massive price spikes across cryptocurrencies and tokens. The most common metrics to measure the total size of the DeFi market is total value locked (TVL). It measures the dollar value of tokens invested and locked in DeFi protocols. TVL has increased significantly since July 2020 and surged beyond \$100 billion in April 2021. That said, compared with traditional finance, volumes remain negligible.

Stablecoins are an important pillar in cryptomarkets and DeFi. They emerged as a result of excessive price volatility of established cryptocurrencies, such as Bitcoin and Ether. Stablecoins aim to maintain price parity by being pegged to specific assets, usually the U.S. dollar. There are currently about 200 stablecoins, which are backed by fiat currencies, crypto assets, commodities, other financial assets, or by a seigniorage (enabled with a strict governance through an algorithm in the smart contract). Despite some regulatory concerns surrounding Tether, the largest stablecoin, and its 1-1 coverage with the U.S. dollar, we note that the \$1 peg has so far remained stable.

Money market protocols enable decentralized lending and borrowing with smart contracts that replace the usual risk functions in TradFi. Lenders receive interest in the form of their deposited token and/or a basket of other tokens including the native token of the protocol, while borrowers can use these funds if they overcollateralize the amount they borrow in the form of other cryptocurrencies.

Decentralized exchanges (DEXs) enable peer-to-peer trading by relying on autonomous smart contracts that execute trades without an intermediary. One of the leading DEXs on Ethereum is Uniswap. Similar to other leading DEXs, it does not use the usual order book model to facilitate trades or set prices. Instead, it employs liquidity pools, such that buyers and sellers swap any two Ethereum-based tokens seamlessly via the underlying liquidity pool provided to the DEX.

Derivative protocols have grown less strongly than DEXs and money market dApps in DeFi. There are a smaller number of projects that allow for the creation of synthetic assets that track the price of an underlying asset, one of them being Synthetix. While still evolving, derivative protocols have vast potential considering the size of the derivatives markets in TradFi. Finally, insurance solutions in DeFi safeguard investors against hacks, glitches, or bugs in smart contracts. Like derivatives, this is also an evolving and growing space in DeFi.

The credit implications

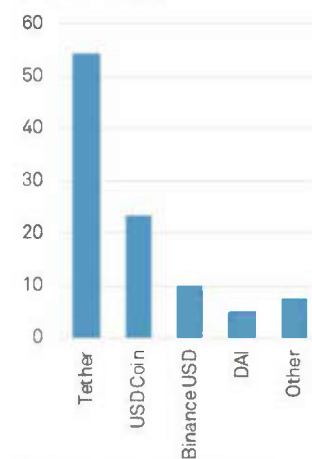
In our view, DeFi is disruptive for financial service companies. At the moment, almost all relate to digital assets. But banks, insurance, and other traditional companies are considering the advantages of smart contracts, and monitor developments in the DeFi market. Ignoring this trend might lead to a wake-up call in the future, although we think this is a few years off given that DeFi is still in its infancy.

Financial services clients might see benefits in blockchain-based solutions and redirect some of their funds to dApp products and services. While most clients might not yet be prepared and willing to use DeFi-based products (such as lending, borrowing, or yield farming), we think that banks should be considering whether to adopt smart contract solutions to complement existing products and services to eventually increase efficiency, tap new revenue pools, and more deeply engage their customer base.

The future will tell whether DeFi will become a transformational force for markets. Regulators and policymakers will likely increase regulation of DeFi given the significant rise in TVL and the powerful technology that could redefine the future of finance. Regulators do not have a strong presence in the DeFi market in most jurisdictions, and mostly lack the frameworks to fully monitor it. Some areas of DeFi present a challenge under existing regulations, which are tailored for a financial system with accountable centralized agents. That said, policymakers must find the right balance between regulation and innovation to steer DeFi growth. We believe this could lead to innovations and more value-add for financial services.

DeFi tokens have supercharged the massive inflow of new liquidity in the crypto market

Market Shares Of Largest Stablecoins (%)



Measured by market capitalization which was about \$121 billion as of Aug. 31, 2021. Source: CoinMarketCap.

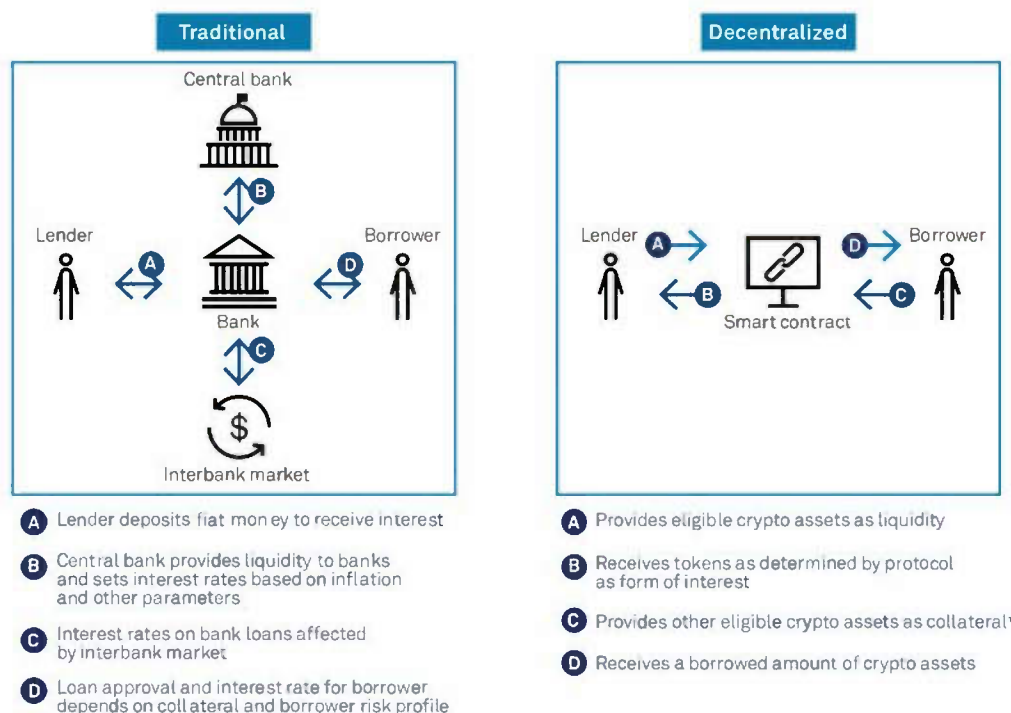
DeFi Lending | Set To Disrupt Traditional Systems-- But Not Until Constraints Are Lifted

Lending through decentralized finance (DeFi) doesn't pose an imminent threat to traditional lenders, but hurdles such as collateral requirements and volatile digital assets could be cleared over time.

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DeFi Uses Smart Contracts In Place Of Conventional Financial Risk Functions



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*Most DeFi borrowing solutions require an overcollateralization based on a collateral factor. A few solutions offer unsecured borrowing.
Source: S&P Global Ratings.

What is decentralized finance (DeFi) lending?

DeFi describes the emerging financial ecosystem that makes products and services, such as lending activities, available through distributed ledger technology (DLT). DeFi protocols enable decentralized lending and borrowing through smart contracts, which replace the usual risk functions in conventional finance. Lenders can put their cryptocurrency holdings to use and gain interest, while borrowers can receive these funds so long as they overcollateralize the amount in the form of other digital assets. This process is made possible through lending pools, all of which have their unique characteristics.

With enough collateral, any interested borrower can have access to liquidity. Interest rates are solely determined with an algorithm balancing the supply and demand of the assets lent and borrowed. In some cases, holders of the protocol's governance token can vote on interest rates as part of a decentralized autonomous organization (DAO).

DeFi lending offers the promise of returns and the means to avoid crypto assets sitting idly. With certain native currencies being continually issued at a steady pace, investors may risk losing the value of some of their digital assets to inflation. DeFi lending can help offset this risk with interest gains.

Digitalization Of Markets

High counterparty risk requires almost systematic overcollateralization. Most lending applications don't allow for traditional credit checks on potential borrowers. Therefore, collateral posting is usually essential to mitigate credit and fraud risk. This in turn limits the sector's growth and its use cases.

The current landscape

Lending volumes are growing, but are still small. We estimate that debt outstanding is slightly in excess of \$30 billion. That represents a few basis points of global banks' total lending. As of June 30, 2021, DeFi lending and borrowing protocols made up about 18% of the total DeFi market measured by market capitalization. The four largest DeFi lending and borrowing platforms (Aave, Maker, Celsius Network, and Compound) had a total market capitalization of about \$13 billion as of mid-August, 2021. This showcases the concentration of the lending and borrowing market within DeFi.

Real risk and returns can be difficult for users to assess. This reflects the lack in many cases of consumer-protection regulations, the highly technical and fast-moving nature of the segment, and the use of different tokens in terms of purchased assets, collateral posted, or interest payment. Some of these currencies can be inflated away, and fiat-equivalent returns can be hard to assess given the volatility in various digital assets.

In September 2021, cryptocurrency exchange and services firm Coinbase received notice of a possible enforcement action from the SEC related to its interest-earning product called Coinbase Lend, illustrating, in our view, regulators' increasing focus on the segment.

Most DeFi borrowing, at present, appears to be for the acquisition of other crypto assets. There are three reasons to borrow money: i) borrowers expect the digital asset they purchased to increase in value and lock it temporarily with the existing value to receive new crypto assets that can be used for other means (e.g., staking or trading); ii) users need liquidity but aim to avoid a taxable event when selling the collateralized asset; iii) borrowers leverage their trading by holding an existing asset in a vault and use the borrowed asset to trade or compose more complex lending, borrowing, and staking activities with the same collateral base. These overcollateralized use cases limit the threat to traditional lenders.

Some recent protocols are testing uncollateralized lending. For example, protocols launched in 2020 aim to test uncollateralized lending with a credit approval process delegated to a decentralized network of credit approvers. These approvers receive rewards for correct credit predictions in the form of native tokens, and the digital tokens used throughout are in some cases pegged to the dollar. Volumes remain small, while a high annual percentage rate has restricted demand so far. However, should demand and offers take off, these protocols could represent the main threat to traditional finance.

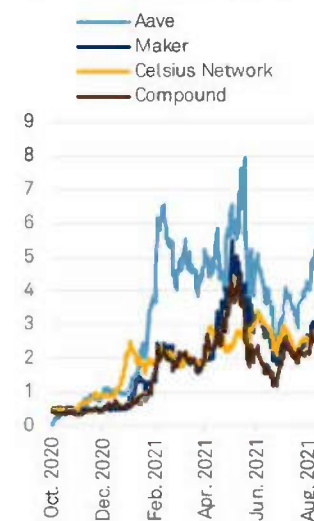
The credit implications

DeFi lending could improve the liquidity of certain digital assets. Holders of better-established digital assets (such as bitcoin and even nonfungible tokens) can diversify their portfolios by pledging existing digital assets for the purchase of other types. DeFi lending can therefore improve liquidity within the overall digital assets ecosystem.

DeFi lending and borrowing does not come without risk. Given the typically collateralized nature of the activities, we believe that volatility in the valuation of the digital assets posted as collateral could translate into volatility in the valuation of the digital assets acquired. The volume of activities remains relatively low, but greater DeFi lending volumes could ultimately lead to increased contagion risks between digital assets. This could also occur because of automated liquidations that materialize if the collateral provided drops below a predetermined value. Smart contract risks (such as bugs in the code) could also lead to losses for users, as demonstrated by certain protocols in recent months.

In their current use, DeFi lending activities do not threaten traditional lenders' position. For now, most DeFi lending activities appear to be a process of using digital asset collateral to acquire new digital assets. It therefore poses a limited threat to the existing core franchise of traditional lenders. Several hurdles--whether technical, process-linked, or regulatory--must be cleared before DeFi lenders can bridge the gap to traditional finance at scale. However, should recent trials prove successful, more traditional use cases could take off, and these protocols could start competing with traditional lenders.

Market Capitalization Of Top-Four DeFi Lending Protocols (Bil. \$)



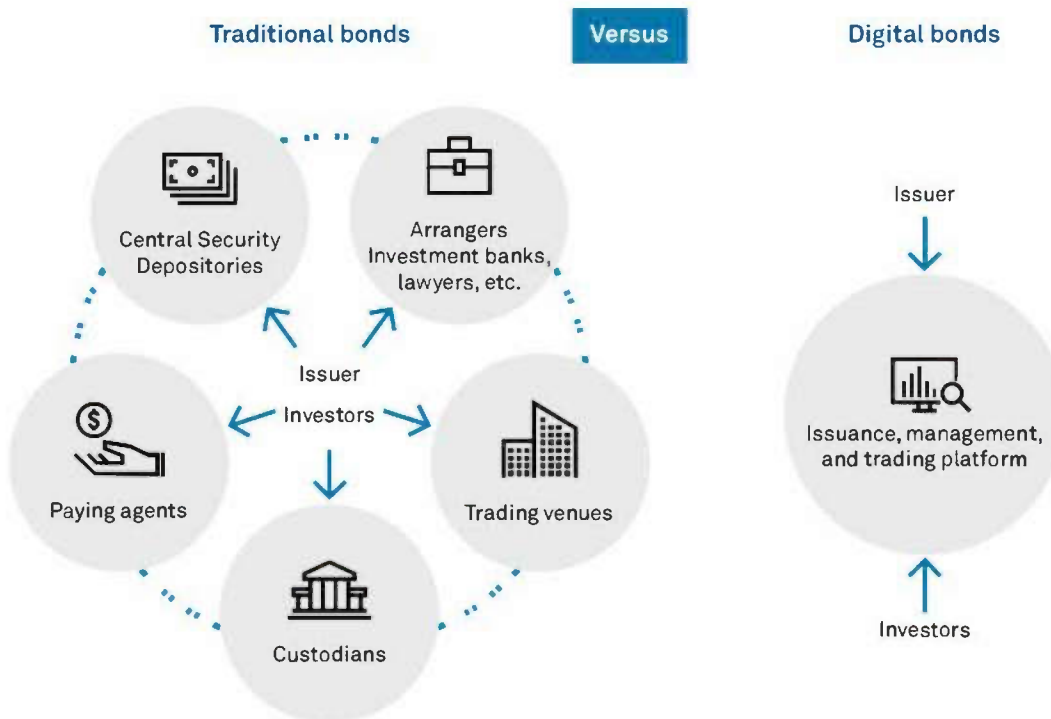
Data as of Aug. 18, 2021.
Source: CoinMarketCap.

DeFi lending remains small at about \$30 billion; use cases haven't yet crossed the bridge to traditional finance

Digital Bonds | More Than An Efficiency Play

Digital bonds may be a force for change that not only reduces costs, but could also promote financial inclusion, once regulatory, compliance, and technology hurdles are removed.

Digital Bonds Can Offer Lower Intermediation And Greater Efficiency



Source: S&P Global Ratings.

What are digital bonds?

Digital bonds are financial instruments that are created and managed on decentralized systems. They help issuers raise disintermediated funding more efficiently than through traditional bonds, thanks to the lower number of intermediaries involved. Digital bonds can also provide access to a wider pool of investors and improved pricing with instantaneous settlement.

Digital bonds must fulfill certain characteristics. The legal documents underpinning the digital bonds must be verifiable and executable. In most cases, these documents are standardized as part of the offering of the issuance platforms. The management of the instrument should also be secured, which is typically achieved using blockchain technology.

Digital bonds aim to be leaner and more accessible. A primary objective of digital issuance is to simplify the issuance process, compared with that of physical bonds. For issuers, the benefits could include cost reduction, stronger security, better traceability, and higher efficiency of the transaction. Digital bonds could also help financial inclusion by allowing existing and new issuers to raise financing at a lower cost than intermediated and over-the-counter instruments.

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[The Future Of Banking: Building A Token Collection](#), July 1, 2020

[The Future Of Banking: Blockchain May Be The Sukuk Industry's Missing Link](#), Oct. 24, 2018

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Digital And Physical Bonds Compared

	Physical bonds	Digital bonds
Time to market	Few weeks	Few hours to less than one week assuming the use of dedicated platforms
Diversification of investors' base	Global	Access to new class of investors
Credit risk	Similar; the risk taken by investors is related to the default of the issuer/sponsor of the bond	Similar; the risk taken by investors is related to the default of the issuer/sponsor of the bond
Trading	Electronic and over-the-counter, which could create some inefficiencies	Electronic and more efficient
Recourse mechanisms	Can be lengthy and inefficient	Efficient if based on smart contract

The current landscape

The bond market is ripe for disruption. Despite an acceleration over the past few years, electronic trading still represented only about 38% of the bond market for investment-grade and 26% of speculative-grade at year-end 2020, according to Greenwich Market Review. A lot of trading is still over the counter, and most orders are still placed telephonically. These factors, alongside the fragmentation of the overall market, underpin some inefficiencies.

Volumes of issuance remain low but are growing. Since the beginning of 2021, issuers have raised €160 million through the issuance of three digital bonds, compared with the same number of transactions for the whole of 2020. So far, issuances have typically been arranged by one bank or a small syndicate, with a limited number of investors and limited secondary market trading. We expect to see more transactions as intermediaries streamline their platform offerings.

The necessary infrastructure for digital bonds is slowly being developed. A few companies have been created to facilitate the issuance of digital bonds or sukuk (an Islamic finance product similar to bonds) and manage other parts of the bond lifecycle. They may allow over time a greater standardization of processes. Some of these platforms are affiliated with existing banks or financial intermediaries, which have seen an opportunity to disrupt themselves before being disrupted by external parties.

Digital bonds face some hurdles. The main challenges are related to regulation and the status of digital bonds, the mechanism of recourse in case of need, and the legal force of smart contract protocols. Some of these issues have been resolved in countries such as France, where an ordinance was published in December 2017 establishing the regime governing the registration of securities on distributed ledgers. We expect other regulators to follow. Another difficulty relates to the readiness of the existing technology and its immunity to cyberattacks. Finally, the rules related to custody of the assets and the collateralization of the exchange or platforms for issuance and trading of digital bonds will need to be clarified.

Digital bonds can disrupt corporate financing and give access to a new class of investor

The credit implications

Digital bonds could both complement and disrupt corporate and government financing in the coming years. Banks' corporate funding franchises have been built on a foundation of trusting relationships and their ability to bridge the issuing and investing communities. However, an emerging capability that offers a seamless way to source funding via technology platforms could disrupt the established role of the financial intermediary. As a result, the digitalization of primary and secondary markets creates new opportunities for, and a risk of disruption to, established market participants.

Some financial intermediation activities will be affected more than others. Digital bonds could remove the need for a central securities depository and custodian. They could also largely circumvent the need for the structuring or distribution activities typically performed by investment banks. Investors could also transact on a peer-to-peer basis in the secondary market without intermediation.

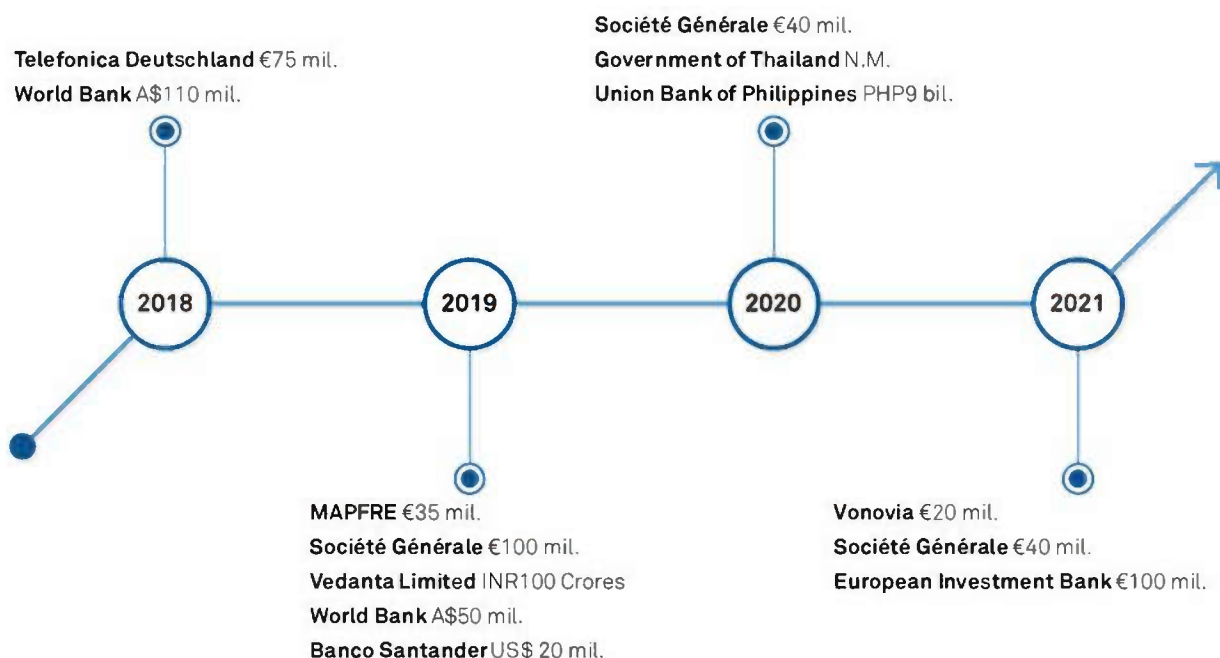
Multiple catalysts will fuel digitalization. For example, the confluence of regulatory, technological, and client adoption of digitalized assets will affect the pace and scale of digitalization. The degree to which these developments are complementary or disruptive will in part be dictated by conventional finance players' ability to develop capabilities and frameworks to position themselves within the new ecosystem.

Digitalization Of Markets

Digital bonds may enable a new class of issuer to access to a new class of investor. For example, they could appeal to an increased number of tech-savvy individuals or reach a wider pool of potential investors via a lower minimum ticket size. This could support activity volume for the companies managing or interplaying with these new platforms. However, it is hard to gauge the potential size of this untapped market and the related potential for additional economic growth. Meanwhile, investor protection is another potential hurdle.

Some incompressible costs will remain, many stemming from regulatory obligations. Digital bonds aim to eliminate the need for financial intermediaries, but many of the tasks these intermediaries perform will still be required, such as anti-money-laundering checks and compliance with antiterrorism financing regulations. While technology may allow new ways to carry out these tasks (such as digital signatures) over time, it is also not without risks. For example, smart contract risk is potentially significant for digital bond issuers and investors, because the written code could contain bugs or be attacked by third parties.

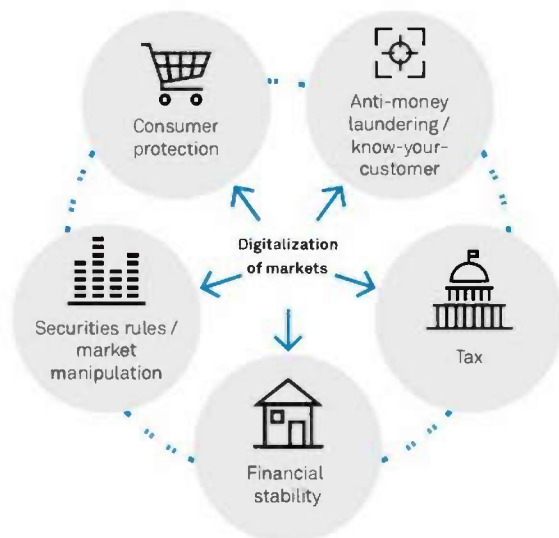
Recent Digital Bonds Issuances



Regulation Of Digital Assets | How Far, How Fast?

Regulators are, rightly, becoming increasingly vocal about digital assets because transformational change is already on the way and the industry is not pausing for policymakers to catch up.

Key Areas Of Regulatory Focus



Source: S&P Global Ratings.

The challenges

Defining a "digital asset" is a mix of art and science. Regulatory initiatives target activities themselves rather than the distributed ledger technology (DLT) that applications are built on. The context of these activities is considered by regulators to classify digital tokens that are used on these networks. However, the issue of classifying digital tokens is not always straightforward.

How policymakers and regulators define a digital token has cascading implications. For instance, Bitcoin is classified as a commodity in the U.S., placing it primarily under the supervision of the Commodity Futures Trading Commission (CFTC), which regulates derivatives and has anti-fraud and anti-manipulation enforcement authority over cash commodities, with some Bitcoin-related products and services falling under the supervision of the Securities and Exchange Commission (SEC; either solely or jointly with the CFTC). But unlike Bitcoin, not all cryptocurrencies are classified as commodities in the U.S., and to complicate things further, a cryptocurrency's classification can change over time. How a digital token is defined will determine under what supervision authority, and within what scope of diverging laws and regulations in any given jurisdiction it falls (for example, see "SEC Charges Ripple," SEC, December 2020).

It also raises the fundamental policy question of how to balance innovation and regulation. Regulatory stances vary considerably between countries and are even mixed within countries. In the Asia-Pacific region for instance, Singapore has positioned itself as an innovation hub by providing regulatory clarity and taking an open regulatory stance. Conversely, China has largely banned the private cryptocurrency industry, while rapidly progressing with the development of a digital yuan.

A lack of policy response can have consequences. The history of digital assets in South Korea serves as a case study. Rapid uptake of digital assets and speculative trading in South Korea led to wide divergence between prices on South Korean and foreign exchanges that prompted the government to intervene in 2017. In 2018, two South Korean exchanges were hacked, with about \$70 million in tokens stolen. In 2020, in its first

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[The Future Of Banking: Cryptocurrencies Will Need Some Rules To Change The Game](#), Feb. 19, 2018

[Digital and Digitized Assets: Federal and State Jurisdictional Issues](#), The American Bar Association Derivatives and Futures Law Committee, Dec. 2020

[Platforms and Tokens](#), By Markus Brunnermeier and Jonathan Payne, Nov. 5, 2020

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Digitalization Of Markets

step toward comprehensive regulation of digital assets, South Korea passed new legislation taking effect in September 2021.

The potential risks require coordination among policymakers, regulators, and standard setters. Cross-border applications of DLT require a globally coordinated response, especially considering that protocols underpinning these applications may not be managed centrally, and while the key areas of regulatory focus are not new, associated risks often manifest themselves differently than in traditional finance.

The current landscape

Interest around regulation has accelerated in the past few quarters. New entrants in financial services are forging ahead, building innovative ecosystems on DLT, often with unclear policy frameworks in place. Policymakers are playing catch-up and attempting to adapt to a dynamic new industry, often with existing regulations that are not entirely fit for purpose.

It remains unclear how most jurisdictions are going to balance innovation and regulation. We expect more clarity in the coming years, with additional coordination and guidance at the international, regional, and national levels. Until then, stakeholders expose themselves to regulatory risk where guidance and regulation are subject to change.

A global agenda is taking shape. The G20 is collaborating with international standard setters such as the Financial Action Task Force (FATF) and the Financial Stability Board (FSB) to establish a coordinated approach to regulating digital assets. The primary focus has been on financial stability and anti-money laundering (AML) and combating the financing of terrorism (CFT). In 2018 the G20 agreed to regulate digital assets for AML/CFT in line with FATF standards, and recently the Basel Committee published a consultative paper on the prudential treatment by banks of their exposures to digital assets. While we've seen progress from collaborations at the international level, the regulatory landscape for digital assets is still in a discovery phase and is far from reaching the level of regulatory clarity in traditional finance.

At regional and national levels, approaches to regulation vary considerably. Some are relying more on preexisting regulations (e.g., Switzerland), while others have implemented more targeted regulatory schemes (e.g., Japan). Regulatory stances also differ, with some adopting policies that favor private sector innovation (e.g., Singapore) and others tightly controlling private industry (e.g., China). Policymakers and regulators are becoming increasingly awake to both the potential benefits and the potential risks. In the U.S. for instance, we have seen increased attention from Congress and the SEC to address gaps in current regulation, casting a shadow over the U.S. industry, in our view. Globally, jurisdictions are at varied stages in establishing regulatory frameworks, with some Asia-Pacific countries appearing the most established.

The credit implications

An acceleration in regulatory initiatives doesn't necessarily protect traditional finance incumbents. The building of a coherent regulatory framework around digital assets and decentralized finance (DeFi) could legitimize and accelerate industry development by attracting new customers and incentivizing the arrival of new entrants that pose a risk to traditional finance incumbents' operating models. We will continue to monitor new entrants, traditional finance incumbents, which we believe will ultimately disrupt themselves, and growth in various DLT applications, such as issuance, lending, and trading.

Clear and stable regulatory frameworks would reduce risks for stakeholders. This includes both traditional finance incumbents interested in developing related activities and new entrants that operate digital asset business models. For now, first movers are exposed to regulatory risk. We will continue to monitor international, regional, and national bodies as well as track related legal developments.

Effective regulation is necessary for the development of innovative market infrastructure that is more efficient and promotes financial inclusion. DLT and digital assets have the potential to lower transaction costs, lower financing costs, improve liquidity, increase accessibility, and increase productivity. Effective regulation will facilitate the confidence and trust needed for wider adoption that brings innovations to scale. We will continue to monitor regulatory developments around consumer and investor protections and wider public interest in digital assets and DLT applications.

Google Searches On Digital Asset Regulation Peaked In 2021

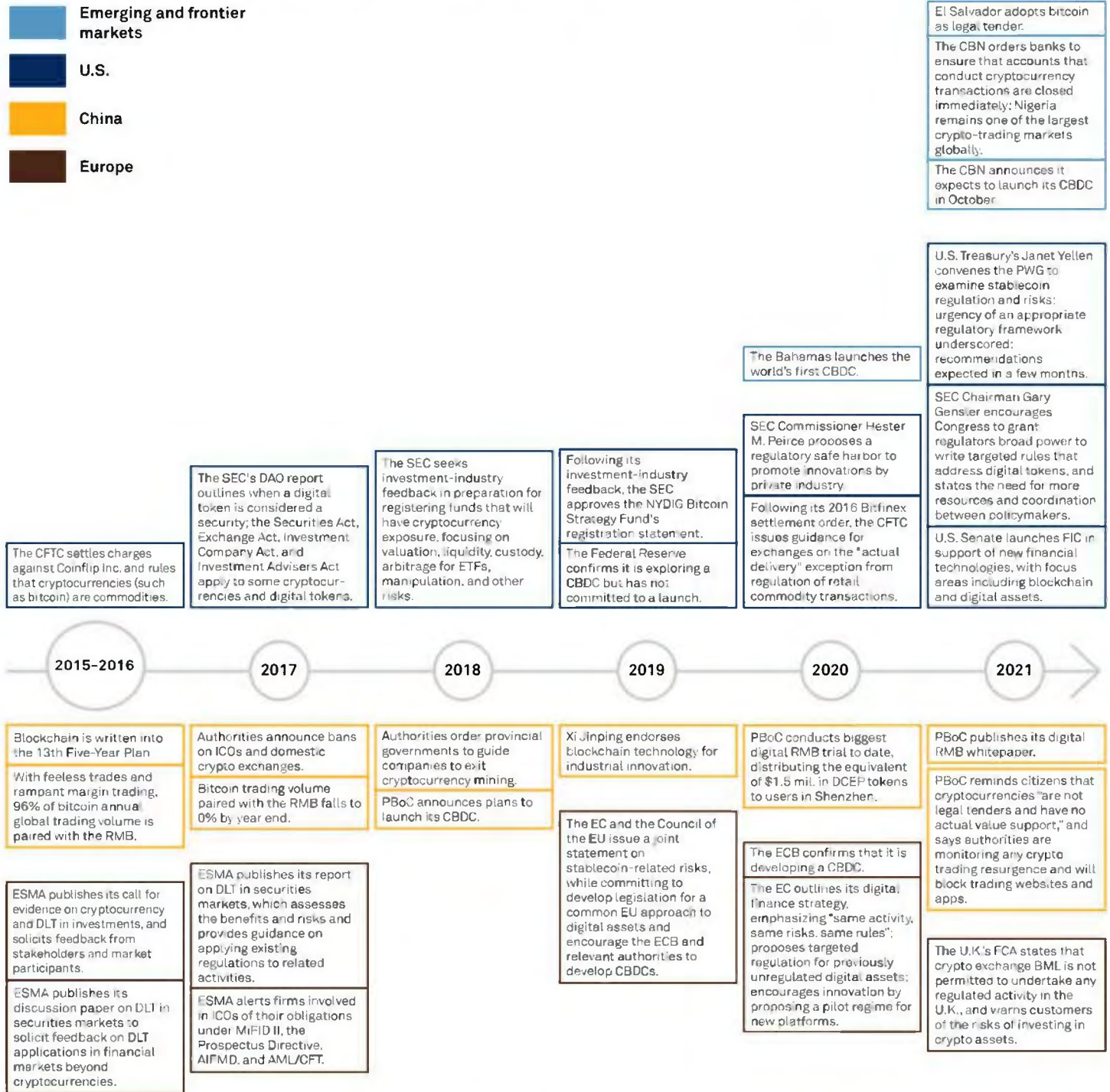


Note: 4-week average number of searches for "bitcoin regulation", "crypto regulation", "SEC crypto", "Basel crypto", "bitcoin ban", "cryptotax".

Digitalization Of Markets

A weak regulatory response would entail systemic risks. Inadequate regulation with rapid growth in DeFi and digital assets increases risk to financial stability, with the potential for contagion to the traditional financial system in the long run. We will continue to monitor cyber risk, DeFi growth, initial coin offerings (ICOs), and stablecoins.

The Digitalization Of Markets: Policy And Regulatory Developments Are Accelerating

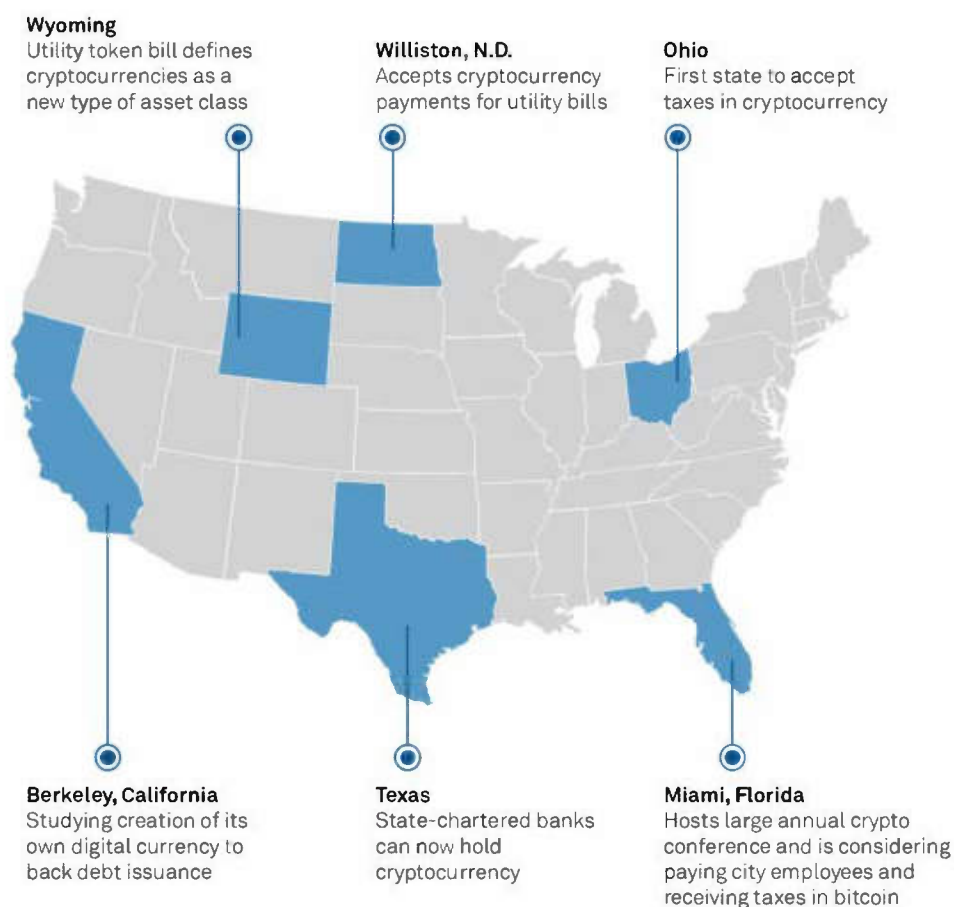


AIFMD--The Alternative Investment Fund Managers Directive. AML/CFT-- Anti-money laundering/combating the financing of terrorism. BML--Binance Markets Ltd. CBDC--Central bank digital currency. CBN--Central Bank of Nigeria. CFTC--Commodity Futures Trading Commission. DAO--Decentralized autonomous organization. DCEP--Digital currency electronic payment. DLT--Distributed ledger technology. EC--European Commission. ECB--European Central Bank. ETFs--Exchange traded funds. ESMA--The European Securities and Markets Authority. FCA--Financial Conduct Authority. FIC--Financial Innovation Caucus. ICOs--Initial coin offerings. MiFID II-- Markets in Financial Instruments Directive. NYDIG--New York Digital Investment Group. PBoC--People's Bank of China. PWG--President's Working Group on Financial Markets. RMB--Chinese Renminbi. SEC--Securities And Exchange Commission. Source: S&P Global Ratings.

U.S. Public Finance | Cryptocurrencies May Boost Revenue--But Are Not Without Risk

U.S. state and local governments, and other public finance issuers, are increasing their use of cryptocurrencies--not just as an investment, but also for payments. The benefits include ease of electronic transfer and potentially lower fees, but we also see cyber risk, portfolio risks, and environmental, social, and governance concerns.

U.S. States Are Beginning To Adopt Cryptocurrencies Selected examples



Source: S&P Global Ratings.

How is cryptocurrency used in U.S. public finance?

Easy electronic transfer. Taxes and fees in some locales can be paid through cryptocurrency. For example, Williston, N.D. is accepting cryptocurrency payments for utility bills, and there are plans to add functionality for license fees. Local governments in many states are exploring cryptocurrency payments as an option for employees to receive paychecks.

A promising, if volatile, investment. Public finance entities are showing a limited, but rapidly increasing interest in blockchain technology companies and cryptocurrencies as a new investment option. They hope to

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[Cryptocurrency: U.S. Public Finance Issuers Cautiously Consider Its Applications](#), Sept. 15, 2021

[Net Debt: Why Digital Currencies Like Bitcoin Are Not Akin to Cash in Our Ratio Analysis](#), May 3, 2021

[How Artificial Intelligence Technologies Are Changing U.S. Public Finance](#), June 11, 2020

[Blockchain is Coming To MuniLand, And The Changes Could Be Significant](#), July 30, 2018

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Digitalization Of Markets

earn higher returns or incorporate new instruments with distinct risk profiles to combat the market and liquidity risks that are present in more traditional markets.

Growing acceptability as payment. In the higher education sector, some schools are accepting cryptocurrencies for endowment gifts, although most are not yet accepting them for tuition payments and other business operations. In early May 2021, for example, the University of Pennsylvania received an anonymous gift of bitcoins worth \$5 million.

The current landscape

Public finance stakeholders may not be leading the digitalization charge, but they are not ignoring it. At the federal level, a myriad of legislative and regulatory stakeholders are evaluating the digital asset landscape. Additionally, states such as Wyoming, Ohio, and Texas, among others, are creating legal frameworks to prepare for the continued digitalization of markets. While there hasn't been any U.S. public finance issuance to date, issuers are considering digitalized capital raising.

There is growing interest in cryptocurrency's use in transfers as well as investment. We are seeing slow but increased interest from governments (including U.S. states), local governments, and other public finance issuers in using, and regulating, cryptocurrencies not just as a store of value or speculative investment, but for payments, because of the ease of electronic transfer and the potential for lower fees than those offered by current intermediaries. The city of Berkeley, Calif., for example, is looking at creating its own cryptocurrency to be used to back its debt. The states of Wyoming and New York have built comprehensive regulatory frameworks around cryptocurrency to aid technological advancement.

The burgeoning industry is creating competition for a "crypto-friendly" reputation. Some governments are actively creating economic development campaigns to encourage companies to locate in "crypto-friendly" areas to attract employees. For example, the city of Miami, Fla. hosts a large annual crypto conference and is considering paying city employees and receiving taxes in bitcoin. However, others--such as the city of Plattsburgh, N.Y.--are shying away, in part because of the related electricity demands.

The credit implications

Cryptocurrencies are a new area of rapid economic growth. Successful implementation of the legal cryptocurrency framework and a reputation as "friendly" to the new industry could boost revenue through an expanding new job market, or through investment gains, and result in credit-positive growth.

The cyber risks are extensive. Sufficient internal or external cyber controls would demonstrate management aptitude, which we view as an integral part of cryptocurrency ownership.

Cryptocurrencies create environmental, social, and governance concerns. The main environmental concern surrounds proof-of-work, because coin mining can demand high energy usage. Social concerns arise over inequitable access, should hardware needs limit use. Meanwhile, governance issues are introduced through the nascent legal and regulatory frameworks under consideration.

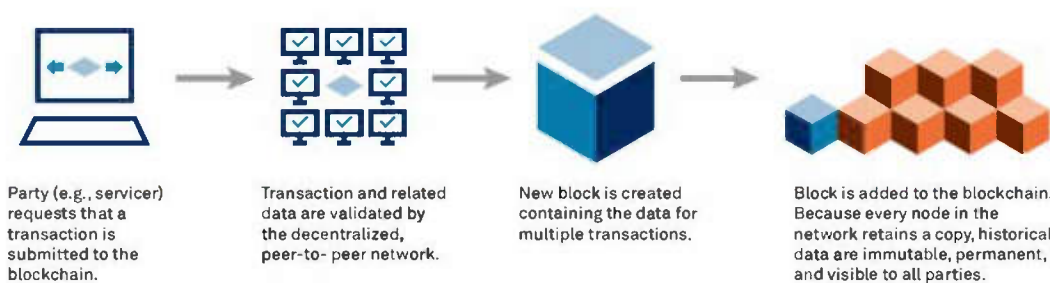
Cryptocurrency investment adds portfolio risk. The high volatility of cash-out value means that a portfolio that includes cryptocurrency contains liquidity risk, and this could affect credit through reduced budgetary stability.

Credit effects of cryptocurrency ownership are tied to cyber defense. Risks can, however, be mitigated through policies and intermediaries

Structured Finance | Distributed Ledger Technology Prepares For Takeoff

Despite limited real-life use cases to date, the application of distributed ledger technology (DLT) in securitization will likely increase in the future given the potential cost savings and operational efficiencies it could bring to the securitization process.

How A Blockchain Digital Ledger Can Enable The Transparent Tracking Of Cash Flows And Assets



Source: S&P Global Ratings.

How DLT could make securitizations more efficient

The creation of a structured product involves multiple interacting parties sharing information, some of which needs to be updated on a regular basis. For decades, typical securitizations have employed familiar structures with standard transaction parties engaged in various relationships, legal or otherwise. Parties generally have access to data for immediately relevant tasks, but there is a lack of full transparency and real-time visibility into asset and performance data, which, for the most part, are manually aggregated by servicers and originators. Moreover, ratings are assessed based on accuracy of the available data, which in some sectors (such as residential mortgage-backed securities) is predicated on additional laborious and costly checks, such as third-party loan file reviews or audits.

Once a securitization embeds DLT, a special-purpose entity could still house the assets. However, smart contracts (i.e., computer codes that are executed when a specified condition is met) could implement the cash flow waterfall. Provision of asset data and performance from servicers and other relevant parties would potentially be available in real time on the distributed ledger, improving timeliness and possibly reducing errors. The process by which new information is recorded on DLT is illustrated in the graphic above.

The current landscape

We have seen an increase in structured finance transactions that use DLT, but they remain limited. In some cases, digital structured securities are offered to accredited investors in private placements. As such, the issuer is exempt from securities registration requirements with the SEC. Due to the relative complexity of structured products, DLT applications in structured finance could benefit from additional guidance from regulators and standard setters, which we believe would support wider adoption.

In 2020, Figure Technologies issued residential mortgage-backed securities on a blockchain governed by partner company Provenance. According to Figure Technologies, the benefits of the blockchain will confer substantial savings throughout the life of the transaction. In Europe, three Société Générale covered bond transactions employed blockchain technology between 2019 and 2021. Certain Chinese issuers have reportedly produced several structured finance transactions using blockchain technology, most of them privately placed. These securitizations use permissioned blockchains primarily to record and verify asset data and cash flows.

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[What Blockchain Could Mean For Structured Finance](#), Feb. 22, 2019

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[Société Générale Issues the First Structured Product on Public Blockchain](#), April 15, 2021

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Because DLT can supply enhanced visibility and access to data, credit analysis and surveillance would be improved

Digitalization Of Markets

There are technical hurdles as well as other barriers, including general market acceptance. Whether DLT is widely adopted by structured finance markets remains to be seen, despite the promised benefits. Additional emerging risks to transaction parties include the possibilities of misinformation being added to the blockchain and the sharing of proprietary and duplicate information between blockchains for the same transaction. Such risks generally concern data consistency between blockchains and privacy and regulatory controls.

The credit implications

Certain factors of our rating methodology could be affected. Of our five key rating factors, it appears that “legal and regulatory” and “operational and administrative” risks would initially be most affected by any adoption of DLT in securitization. We will continue to analyze the potential impact of DLT should its popularity among market participants grow and translate to practical implementation.

Because DLT can supply enhanced visibility and access to data, credit analysis and surveillance would be improved. More accurate and detailed collateral data would help assess base-case assumptions and inform credit analysis. Post transaction, efficiencies brought about by DLT would improve surveillance on the collateral pool. All transaction parties, as well as rating agencies, regulators, and investors, could have access to the distributed ledger, which could create real-time deal performance transparency. Historical performance data used to determine our base-case assumptions in certain asset classes could be rendered fully transparent and less prone to manipulation if available on a digital ledger. In the case of assets for which it's currently not the standard, DLT could allow for detailed loan-level performance data and collateral characteristics to inform our credit analysis. Moreover, real-time performance updates would enhance our surveillance process.

El Salvador's Bitcoin Case | High Risks Will Limit Benefits

The risks associated with the adoption of bitcoin as legal tender in El Salvador seem to outweigh its potential benefits. There are immediate negative implications for credit, and wide usage of bitcoin is unlikely.

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Bitcoin as legal tender

On Sept. 7, 2021, bitcoin became legal tender in El Salvador, following parliament's approval on June 9, 2021. The launch suffered from several missteps, especially around the use of the government-backed crypto wallet, Chivo, which had to go temporarily offline because of technical glitches. However, several merchants reported that they had started to process payments in bitcoin, especially larger corporates.

Wide usage of bitcoin is unlikely. The bill states that all economic agents, including the government, "must" accept bitcoin as payment with the exception of those lacking the technology to do so, but that prices "may" be expressed in bitcoin. A survey conducted by El Salvador's Chamber of Commerce and Industry showed that over 90% of respondents did not want the obligation to accept bitcoin as payment, and 75% said they will continue to use U.S. dollars. Widespread protests against mandatory bitcoin adoption have also taken place, both pre- and post-launch day.

It is unclear whether bitcoin really is legal tender. While the law defines the cryptocurrency as legal tender, not all economic agents are technically forced to accept bitcoin in exchange for goods and services. A clause states that those with insufficient technological capabilities to transact in bitcoin are not forced to accept it as payment. Economic agents that do not want to transact in bitcoin may claim that status, and there are no clear rules enforcing the acceptance of bitcoin as payment; although this, of course, could change.

El Salvador's small, open, dollarized economy status means bitcoin's impact could be sizable. The country's GDP is \$25 billion (or about 600,000 bitcoins), with trade accounting for 60% of GDP (goods exports plus imports), and remittances close to 25% of GDP. This means that if bitcoin was widely used for cross-border transactions, the effect of the cryptocurrency's high volatility on the wider economy would be significant. While El Salvador's adoption of U.S. dollars meant that it didn't face exchange rate risk in the past, the introduction of bitcoin--if the cryptocurrency is widely used--would introduce exchange rate risk, with potentially disruptive implications for trade and cross-border financial flows. On the other hand, as a hedge against sanctions from the U.S. government and other extra sovereign risks, the move to bitcoin does have some advantages.

The current landscape

Bitcoin's adoption comes at a high cost. Its extreme volatility would drive large swings in prices, reducing the incentive to use it for day-to-day transactions. There are also fiscal risks associated with the ability to pay taxes in bitcoin, and exchange rate mismatch risk in the financial sector if banks hold large amounts of bitcoin on their balance sheet but supply credit mostly in U.S. dollars.

The cryptocurrency's potential benefits are unlikely to materialize in the short term. Bitcoin could increase financial inclusion of the unbanked (70% of the population), and reduce costs on cross-border transactions, such as remittances. However, these benefits will only be realized if there is widespread trust in bitcoin--and surveys indicate the contrary. Without trust, bitcoin transactions are likely to be immediately converted into U.S. dollars due to exchange rate risk and the propensity by bitcoin holders to retain their bitcoin as a store of value as opposed to using it as a medium of exchange.

Financial integrity is also at risk. In the absence of effective anti-money-laundering and other measures that combat the financing of illicit activities, the adoption of bitcoin could facilitate these activities, contribute to tax evasion, and pose a risk to the country's financial system and its relationship with other countries and multilateral organizations.

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BTC's extreme volatility would drive large swings in prices, reducing the incentive to use it for day-to-day transactions or as a storage of value

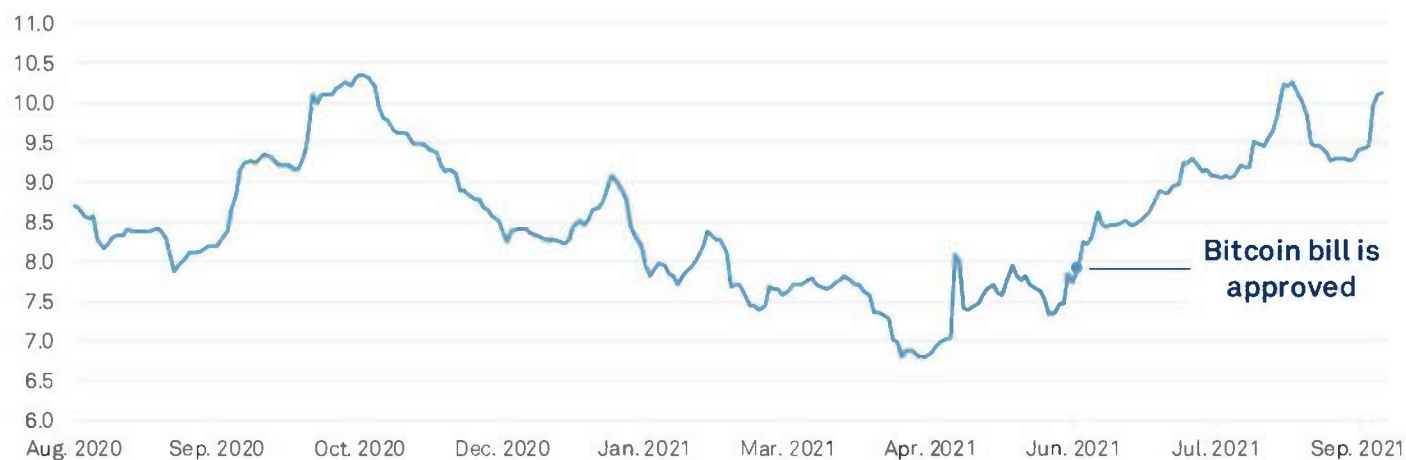
Digitalization Of Markets

The credit implications

Bitcoin adoption threatens El Salvador's IMF deal. The country is in a tough fiscal position: the deficit is 10% of GDP, and public debt about 90% of GDP. With about \$2 billion in debt repayments in 2021, the government is seeking a \$1 billion IMF loan. Bitcoin's potential lowering of financial integrity, by indirectly encouraging illicit financial activities such as money laundering and tax evasion, could complicate ongoing negotiations. However, in practicality, all these illicit activities could also be conducted through U.S. dollars with limited oversight. Credit markets have reacted, with yields on sovereign bonds heading higher since the bitcoin law was approved (see chart).

Bitcoin adoption increases fiscal vulnerabilities. Allowing taxes to be paid in either U.S. dollars or bitcoin reduces visibility over the trajectory of fiscal revenue. The government, at its own cost, will transfer \$30 worth of bitcoin to every national who registers to the Chivo crypto wallet--a de facto fiscal transfer. Furthermore, the government announced that it will fund a \$150 million trust fund to mitigate volatility in the bitcoin-U.S. dollar exchange rate, and it is unclear whether it will commit to replenish the trust fund if it falls below a certain U.S. dollar balance.

We see potential disruption to credit from domestic banks if bitcoin is widely used. Assuming banks continue to supply loans in U.S. dollars but are forced to accept payments and deposits in bitcoin, this could generate balance sheet currency-mismatch-related vulnerabilities. The availability of bitcoin futures provides a means to manage exchange rate risk. However, the costs of managing bitcoin futures, and concerns over the underlying volatility of bitcoin, may ultimately encourage banks to automatically convert all bitcoin received into U.S. dollars. Otherwise, banks could act to reduce exposure to that risk by reducing lending activities.

El Salvador Sovereign 2035 Bond Yield (%)

Sources: Bloomberg, S&P Global Ratings.

ESG | Does Blockchain And Distributed Ledger Technology Align With ESG Principles?

Blockchain mining consumes a lot of energy. Yet distributed ledger technology (DLT), at its core, promises greater transparency and efficiency as well as accessibility to financial products for the unbanked. Energy consumption is just one aspect of a much larger environmental, social, and governance (ESG) mosaic.

U.N. Sustainable Development Goals



1. No poverty



2. Zero hunger



3. Good health and wellbeing



4. Quality education



5. Gender equality



6. Clean water and sanitation



7. Affordable and clean energy



8. Decent work and economic growth



9. Industry, innovation, and infrastructure



10. Reduced inequalities



11. Sustainable cities and communities



12. Responsible consumption and production



13. Climate action



14. Life below water



15. Life on land



16. Peace, justice, and strong institutions



17. Partnerships for the goals

What are blockchain's key promises?

The 'S' in 'ESG' is at the core of decentralized finance's promise of financial inclusion. By removing intermediaries, it could eliminate the economic rent attached to certain activities, reduce transaction costs, and democratize access to financial services for the 1.7 billion adults globally who are unbanked, according to the World Bank. With limited access to finance, many of these individuals rely on a less-reputable shadow finance system, especially in developing economies, without access to formal credit. The World Bank has stated that financial inclusion is woven into seven of the UN's 17 sustainable development goals.

Blockchain can provide a transparent, trusted, and traceable record of transactions. A key feature is its resistance to tampering and fraud. This could prove particularly valuable in regions with high levels of corruption and weak or unpredictable institutions, or which systemically lack transparent reporting. For example, the technology can provide a monetary system that is free of censorship and less exposed to the risk of interventions by government and geopolitical conflicts.

Transparency and traceability are underpinned by the protocols and codes that underpin the applications and digital assets. They require little human input beyond initial coding of the protocol. However, codes can't foresee all eventualities, and governance therefore still has a role to play. Various governance models are possible, with differing degrees of centralization in decision-making power.

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[Climate Change Challenges And Blockchain Opportunities](#), UNEP DTU Partnership

[Blockchain can help us beat climate change. Here's how](#), World Economic Forum, June 30, 2021

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The debate over bitcoin's energy consumption often eclipses discussions on blockchain's potential to support other environmental goals such as carbon tracing

The current landscape

The environmental impact of crypto mining is heavily debated. Reportedly, bitcoin has a material environmental impact and for instance consumes as much electricity as the Netherlands. In fact, energy consumption for bitcoin proof of work could be considered a feature rather than a bug, as it aligns incentives with security. The value judgement about the energy consumed for bitcoin mining depends on the judgement on its usefulness. National policymakers, citizens of wealthy nations, or citizens of poorer nations with limited access to financial services may have divergent views and experiences of this value proposition.

The amount of greenhouse gas emissions from bitcoin mining depends on the energy source, that is, whether it was derived from clean sources, such as wind, solar, or hydropower, or dirty sources such as coal-fired plants. Crypto-mining operations move within and across countries for a variety of political, regulatory, and economic reasons. The green component of energy consumption will continually evolve as mining operations relocate, energy grids become greener, and secondary technology protocols are developed that ease energy consumption.

Disjointed regulatory approaches and frameworks raise money laundering risks and could support fraud and tax evasion. Cryptocurrency, because of lagging regulations, can give fraudsters another tool and allow nefarious parties to move funds across borders. However, authorities are becoming increasingly knowledgeable and better equipped to trace back certain fraudulent transactions. For instance, in the case of the Colonial Pipeline ransomware, the U.S. Department of Justice announced in early June 2021 that it had recovered a large part of the bitcoins paid as ransom, supported among other things by the traceability of cryptocurrencies. As is often the case, the regulation has not kept up with technology, but over time authorities are likely to have more tools at their disposal to oversee cryptocurrency.

Technology can be vulnerable to attacks and deficient coding. A number of actors in this emerging ecosystem are vulnerable to cyberattacks. There have been several examples in the past years of raids on crypto exchanges. Also, many of these applications have not been tested for mainstream usage. Finally, the technical nature of many of the decentralized finance applications, and the inability of many users to assess the robustness of underpinning protocols and governance, leaves users exposed to the risk of "rug pulls," whereby users invest money in a new project or application, and developers then maliciously run away with the funds. Risks are exacerbated by the lack of consumer protection regulations around many of these applications. As with many new technologies, the benefits are fully understood before the risks are, and it is incumbent on users of cryptocurrency to put in place effective risk management techniques.

The credit implications

Technological improvements could enhance the scalability of blockchain and cryptocurrencies. The move to proof-of-stake from proof-of-work platforms, or other enhancements will likely reduce computing power requirements. Hence, they could eventually reduce the environmental impact and support the mainstream usability of some of these applications--and in turn increase the potential disruption to traditional finance.

DLT could lead to greater transparency, including for supply chains. By allowing greater transparency and accountability, DLT could help demonstrate the sustainability of supply chains from an environmental or social point of view. For example, initiatives are being tested around the technology's ability to support more comprehensive carbon tracing.

The technology could in some cases help corporates and governments better meet their ESG goals. On its own, the technology is rarely a panacea, and rather an enabler. It often depends on the quality of other external data sources (also known as oracles). But a judicious use of the technology may help meet growing ESG expectations from various stakeholders, most notably fortifying social capital by improving access to finance. This could create opportunities and reduce ESG-related risks, which are growing in this sector.

Glossary

Altcoins. Any cryptocurrency that can serve as a substitute for bitcoin.

Bitcoin Lightning Network. A protocol designed to address scalability issues on the Bitcoin network by taking transactions off the blockchain to promote transaction speed and efficiency.

Blockchain. A type of distributed ledger technology that groups data into blocks that when verified by members of the network are linked together to form the blockchain.

Central bank digital currency (CBDC). A digital token representing sovereign fiat currency.

Cryptocurrency. A digital token used either as a medium of exchange or store of value with transactions recorded using distributed ledger technology.

Cryptography. Broadly encompasses techniques that secure and encrypt information.

Cold wallet. A digital wallet that exists off the internet.

Decentralized finance (DeFi). Distributed ledger technology-based financial services without traditional intermediaries and central authorities.

Digital assets. Any asset that exists in a digital form.

Digital wallet. A place to store digital assets with some level of security.

Distributed ledger technology (DLT). A system of record that is shared and stored across a network of participants (nodes). Blockchain is a type of DLT.

Ethereum. A popular blockchain platform that has smart contract capabilities.

Flash loan. An unsecured loan originated and repaid instantaneously on a distributed ledger technology platform within a single transaction (e.g., typically used for arbitrage).

Hard fork. A change to a blockchain network's protocol that results in two separate blockchain networks, forcing all nodes to upgrade to the latest version of the protocol's software.

Hash rate. A proof-of-work blockchain network's total capacity to validate exchanges.

Liquidity pool. A pool of digital assets used to facilitate trading and lending, designed to eliminate the need to identify a counterparty.

Nonfungible tokens (NFTs). A unique digital token that cannot be replicated.

Node. One of several dedicated computational engines, stores of memory, and broadcasting sites on a distributed ledger technology network.

Nonce. A number that can be used just once in a cryptographic communication in a distributed ledger technology network to guarantee unique exchanges.

Proof of stake (PoS). A protocol for validating transactions on a distributed ledger technology network that requires "validator nodes" to stake digital tokens to be eligible to validate transactions for rewards.

Proof of work (PoW). A protocol for validating transactions on a distributed ledger technology network that requires "mining nodes" to iteratively solve for the nonce to validate exchanges for rewards.

Protocol. A coded set of rules or procedures.

Smart contracts. A dynamic, open-ended mechanism that provides for coded sets of rules for a specific use case on a distributed ledger technology network (a type of protocol).

Soft fork. A change to a blockchain network's protocol that is backward compatible (i.e., doesn't result in two blockchain networks or forced upgrades).

Digitalization Of Markets

Stablecoin. A cryptocurrency pegged to the value of a fiat currency such as the dollar, backed by traditional assets (e.g., fiat currency or commodities) or algorithmically attached to digital assets that are automatically bought and sold in order to maintain a stable value.

Staking. The process of committing digital assets to a protocol on a distributed ledger technology network to either actively or passively participate in return for rewards.

Tokenization. The process of creating a digital token on a distributed ledger technology network.

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Digitalization Of Markets

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To: Bridget Lombardozzi (b)(6), (b)(7)(C) [redacted]@aim.com
From: (b)(6), (b)(7)(C) [redacted] Case 1:24-cv-01858-AGR Document 34-5 Filed 06/20/25 Page 214 of 672
Sent: 2021-12-21T14:13:02Z
Subject: Ex-1
Received: 2021-12-21T14:13:02Z
[Ex. 1.pdf](#)

Hi Bridget,
Please see the attached Exhibit 1.
Thank you.
Stella

Kind Regards,

(b)(6), (b)(7)(C) [redacted]

**U.S. Securities and Exchange Commission
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From: Nigro, Daniel
Sent: 2022-01-19T13:41:25Z
Subject: Markets Daily: The Case for 2+% 10 Year Yields; Fed's Unprecedented Tightening Sows Uncertainty; Crypto.com Platform Halts Withdrawals After Suspicious Account Activity; Junk Slammed
Received: 2022-01-19T13:41:26Z
[The SEC Is Suddenly Sounding Very European. Phew.pdf](#)
[CLOs Are More Popular Than Ever With Institutions. Here's Why. Institutional Investor.pdf](#)
[When Will Tightening Hit Financial Conditions - Mohamed El-Erian.pdf](#)
[The race to dominate the DeFi ecosystem is on The Economist-1.pdf](#)
[Fed's Unprecedented Tightening Steps Sow Market. Economy Jitters.pdf](#)
[Markets Bet Things Are Different This Time. Really - John Authers.pdf](#)
[FT - What happens when the Fed balance sheet shrinks - 01-19-2022.pdf](#)
[Law360 - 'Shadow Trading' Theory Passes Muster With Judge - 02-18-2022.pdf](#)
[FT - Why do so many investors sell out too early - 01-19-2022.pdf](#)
[S&P - SF Credit Brief CLO Insights 2021 U.S. BSL Index Wrap Up What A Difference A Year Makes - 01-14-2022.pdf](#)
[Ignites -Money Funds Waived \\$8.4B in 2021, but This Year Is Looking Up - 01-19-2022.pdf](#)

Wall St. Breakfast Summary: Futures are ticking higher while government bond yields are slightly lower. Investors have been stepping up bets that major central banks will move to tighten policy. German benchmark bond yields climbed into positive territory for the first time since 2019—and that came just after U.S. Treasury yields [hit a two-year high](#). Consumer prices in the U.K. rose at the fastest pace in December since 1992. [Read our full market wrap here.](#)

The selloff in Treasuries isn't staying in the U.S. as traders ramp up bets on further bond declines across the globe. Eurozone inflation hit a record high of 5% in December, triggering fears of prolonged price pressures across the bloc. Much like the Fed, which ruled out rate hikes through 2023 before its "transitory" forecast was retired, many are now pricing in a more aggressive stance from the ECB. Last month, the central bank said it would cut its monthly asset purchases - but pledged to continue its unprecedented level of stimulus in 2022 - though coming inflation data may change that position.

Hut, hut, hike! In the meantime, predictions surrounding the number of rate increases the Fed will have to implement this year keep going up. Futures markets are now betting on four to five hikes in 2022, up from forecasts of three to four as of Friday. The momentum has seen the U.S. 10-year Treasury yield climb 39 basis points so far in January to 1.9%, pushing the tech-heavy Nasdaq Composite Index to the brink of a correction.

Futures at 8:40, Dow +0.3%. S&P +0.5%. Nasdaq +0.75%. Crude +.6% to \$85.92. Gold +0.6% at \$1823.90. Bitcoin -.5% to \$42170
Ten-year Treasury Yield flat at 1.87%

BMO Commentary - The Case for 2-Handle 10s: The repricing to a higher rate plateau remains in place with 10-year yields as high as 1.90% overnight and 30s >2.20%. With investors eager to see 10s trade with a 2-handle, the question is when, not if, this milestone will be achieved on the path toward an even more dramatic selloff. We're certainly onboard with 10- and 30-year yields moving higher from here and while the zone between 1.90% and 2.00% will be more challenging than the last 35 bp backup in rates, the macro landscape and hawkish Fed have set the tone for 2-handle 10s. The pace and magnitude of the move thus far hasn't provided any incentive to step in front of the selloff. Dip-buying will emerge, but it's still scarce at the moment which leaves us decidedly in go-with mode. In response to questions regarding when 10s breach 2.0%, our take is that while the event may be at hand soon, the test of the sustainability of the selloff will occur during the window between the January 26 and March 16 FOMC meetings.

Next week's Fed events (statement and press conference) will surely reinforce the hawkish tone from monetary policymakers as of late; although we're not anticipating any tangible policy changes – with a nod to chatter that the Committee could announce an immediate end to QE. Bringing forward the final bond purchase from mid-March to mid-February is on the table, but we're skeptical the FOMC is willing to risk the relatively orderly nature of the repricing thus far. After all, while equities are down year-to-date, the tone isn't one of panic or forced selling – rather recalibrating to the Fed's well-telegraphed intentions of beginning a gradual hiking cycle. In the event the Fed ends QE a month earlier than already assumed, we'd anticipate greater angst in risk assets. Moreover, the mid-March versus mid-February end date isn't a binding constraint for a March hike in terms of sequencing - so why risk further rattling investor sentiment.

Beyond next week's meeting and in addition to the return of scheduled Fedspeak, the Minutes (which have increasingly become market-moving events) will provide the FOMC an ideal forum to more specifically articulate the anticipated trajectory of rate normalization and extent to which balance sheet runoff will lag – clearly shorter than the 22 months between the first hike and runoff seen last cycle. During the window between the January and March meetings investors will also see two inflation and employment reports as well as the first look at Q4 growth. These economic updates won't dissuade the Fed's rate normalization intentions; however, the data will be instrumental in gauging the degree to which the journey to the land of higher yields is sustainable.

As a point of clarification, the dip-buying we're anticipating will emerge and serve to define the upper-bound for 10- and 30-year

yields is focused further out the curve. Said differently, the repricing in 2s and 5s is far more durable as the Fed has greater control of the shorter maturity benchmarks via policy guidance and expectations. This has also reinforced our ongoing curve flattening bias in 5s/30s and the recent foray below 50 bp has further emboldened this notion. Curve compression also has the fundamental support of a central bank committed to fighting inflation that's proven more persistent than previously assumed and therefore merits a policy response. After all, with the Fed recommitted to containing forward inflation expectations, it would follow intuitively that while real rates are on the rise, lower breakevens will limit (but not eliminate) the rise in nominal yields. Hence, the flatter curve.

The counterpoints include a raising global rate environment; a fair point to be sure as overnight saw positive Bund yields for the first time since May 2019. In addition, the looming prospect of a smaller Fed balance sheet and the implications for liquidity as well as support of the real economy more broadly shouldn't be ignored. Our take is that while the US rates market is in the process of adjusting to the forward policy path both in the US as well as overseas, implications for risk assets from a less accommodative global central banking community have yet to be fully reflected and this will ultimately offset any more dramatic steepening pressure.

Tactical Bias: Tuesday was a session in which the price action itself was the most operative takeaway as the selloff in Treasuries extended, although the overnight flattening that defined the move coming in from the weekend was retraced as the long-end underperformed and brought 5s/30s off its new cycle flat at 49.4 bp. As the debate on normalization continues to define the macro conversation, the price action in risk assets cannot be ignored with the S&P 500 reaching nearly 5% off the highs as 10-year real yields touched their highest level since April 2021 at -64.5 bp. **To be clear, a 5% equity downtrade from record highs is hardly a selloff sufficient to inspire hesitation at the Fed, but this will nonetheless be a space to watch as financial markets calibrate to this redefined rate environment.**

While the kneejerk response to December's building permits and housing starts data will be negligible, we are reminded of real estate's overall influence on the macro backdrop at this point in the cycle. Recall OER's 0.4% MoM contribution to CPI and the ongoing lagged impact that the pandemic-driven surge in home prices is having on the overall inflation backdrop. Last year's data will hardly reshape the trading zone in US rates, but particularly as mortgage rates begin to rise in response to higher Treasury yields, we'll be especially mindful of the magnitude of any moderation in the housing sector as 2022 plays out. Not solely as a function of average 30-year mortgage rates that reached their highest level since March 2020 earlier this month, but also the rationalization of the supply and demand imbalances that have worked themselves out as the pandemic's influence has faded. - Ian Lyngen and Ben Jeffery

Fed's Unprecedented Tightening Steps Sow Market, Economy Jitters (Bloomberg, attached)

- Fed plans quick succession of end of QE, rate hikes, QT
- Observers differ on impact of faster quantitative tightening

When Will Tightening Hit Financial Conditions?: Mohamed El-Erian (Bloomberg, attached) A disconnect increases the risk of a policy mistake and undue damage to livelihoods.

FT - What happens when the Fed balance sheet shrinks? (attached, Ling Yu) Not even the central bank has a clear idea

Markets Bet Things Are Different This Time. Really? John Authers (Bloomberg, attached) Rates probably will rise, as widely signaled and now priced in. The murkier question remains how inflation will behave.

Oil Prices Hit Seven-Year High on Rising Geopolitical Tensions (WSJ) Ebbing concerns over the Omicron variant and tensions in Europe and the Middle East are helping to drive the rally.

Oil Demand to Exceed Pre-Covid Levels in 2022, IEA Says (WSJ) Paris-based agency says total demand this year should stand at 99.7 million barrels a day. Gasoline prices are rising, adding to inflationary pressures

The race to dominate the DeFi ecosystem is on – (The Economist, attached) Why Ethereum is losing share.

Bitcoin Sags in 2022 Under Weight of Stock Selloff and Fed Policy (WSJ) Crypto markets mirror traditional markets with surge of institutional investors

Crypto.com Platform Halts Withdrawals After Suspicious Account Activity (WSJ) CEO says no user funds were lost; company to offer full report after investigation is completed

CLOs Are More Popular Than Ever With Institutions. Here's Why. (Institutional Investor, attached) CLOs — have produced outsized returns for investors who have allocated to the equity tranche

S&P - SF Credit Brief: CLO Insights 2021 U.S. - BSL Index Wrap Up (attached, Ling Yu) What A Difference A Year Makes



FT - Why do so many investors sell out too early? - Simply being invested to benefit from miracle of long-term compounding of returns is the most important thing (attached, Ling Yu)

The SEC Is Suddenly Sounding Very European. Phew (Bloomberg, attached) America is far behind on financial reporting by private businesses. It could learn a lot from Britain in particular.

Big Tech and Foes Spar Over Bill to Curb Market Power of Dominant Internet Platforms (WSJ) Tech lobby launches ad campaign to block bipartisan bill by Klobuchar, Grassley

Law360 - SEC's 'Shadow Trading' Theory Passes Muster With Judge (attached, Ling Yu) U.S. District Judge William H. Orrick ruled Friday that the SEC's complaint against Matthew Panuwat, former head of business development for Medivation Inc., adequately alleges that Panuwat breached his duty to the company by using nonpublic information about its upcoming merger with Pfizer Inc. to profitably trade on shares of one of Medivation's rivals, Incyte Corp.

FT/Ignites - Money Funds Waived \$8.4B in 2021, but This Year Is Looking Up (attached, Ling Yu) Money market funds collected \$131 million in revenue in 2021, after accounting for \$326 million in fee waivers.

CREDIT DAYBOOK AMERICAS: More Bank Debt Expected; Loans Get Busy (Bloomberg) -- Bank of America, Morgan Stanley and Goldman Sachs are candidates to sell new debt after reporting earnings. Financial peers Citigroup and JPMorgan sold bonds Tuesday.

- BofA reported trading revenue that missed the average analyst estimate, continuing the theme of disappointing results for banks
 - Morgan Stanley also reports before the opening bell
- Wall Street banks are expected to borrow heavily in the coming days to lock in funding ahead of Fed rate hikes and the potential for further interest rate volatility
- Citi and JPM paid little to no new issue concession on sizeable bond sales despite a clear risk-off tone. Both sales included fixed-to-floating-rate notes
 - Floating-rate bank notes are giving dollar-bond investors something rare in 2022: positive returns, even if minuscule
- As many as eight investor outreach events for leveraged loans are scheduled for Wednesday, including Athenahealth's \$6.75 billion debt package for its buyout by a group led by Hellman & Friedman and Bain Capital
 - At least five deals have commitments due Wednesday, including Quest Software's \$3.6 billion dual-tranche offering backing its takeover by Clearlake Capital
- Investors withdrew from U.S.-listed fixed income ETFs last week for the second week of outflows. Corporate bond ETFs led the outflows
- The bankruptcy auction for one of the largest mansions in the United States was pushed back three weeks to allow more time to attract potential purchasers of the home, which has a \$295 million asking price

U.S. HY OPEN: Junk Bonds Post Biggest Loss Since November (Bloomberg) -- U.S. junk bonds plummeted in sympathy with equities, posting the biggest one-day loss since late November after falling for three consecutive sessions. The losses were across all ratings led by BBs, the most rate-sensitive part of the high yield market.

- January's month-to-date losses are the worst since 2016 as nervous investors looked for the exit and pulled cash out of retail funds
 - HYG, one of the two largest high-yield ETFs, reported an outflow of a little more than \$1.3b on Tuesday, the biggest one-day outflow since February, 2020. The fund has leaked cash in three of the last four sessions
- Junk-bond index yields climbed to a seven-week high of 4.70% after steadily rising for three straight sessions
- The broader index posted negative returns of 0.36% Tuesday, BBs performed the worst, down 0.45%
 - BB yields also rose to a seven-week high of 3.85% after seeing the biggest one-day jump in seven weeks
 - CCCs were the best assets with a more modest loss of 0.24%
- The panic selloff across all markets was partly fueled by a sharp rise in Treasury yields, with the two-year breaching the 1% mark to close at a high of 1.05%, the highest since February, and ramping up the speculation that a rate hike could come as early as March and could be bigger than expected
 - The 5-year and 10-year Treasury yields rose 10bps and 8bps respectively, to close at fresh two-year highs of 1.66% and 1.88%
- The primary market was frozen as borrowers stayed on the sidelines amid broader market turmoil
 - Some of the potential big debt sales to fund acquisitions, such as Athenahealth, may begin their marketing campaign for bond sales after some semblance of stability returns to the market
 - Athenahealth has already begun marketing the \$5.75b first lien term loan, with lender call scheduled for 3:30pm today
- The high-yield market may wait and watch as U.S. equity futures drift sideways while attempting to recover from the selloff on Tuesday and shifting focus to earnings optimism from rising Treasury yields. Oil, meanwhile, climbed to a new seven-year high as the International Energy Agency turned bullish on outlook

STRUCTURED PIPELINE: ABS Count at Fourteen; Action Everywhere (Bloomberg) -- The ABS issuer count has increased to fourteen.

In addition to the 11 expected names, a credit card deal from Bank of Montreal, a solar trade from GoodLeap and a whole business from Servpro Industries have been added to the fray. Many of the week's transactions will price later Wednesday.

- Wells Fargo, Morgan Stanley and JPMorgan plan to price the STWD 2022-FL3 CRE CLO later this week
- Citigroup and Barclays announced a \$2.08 billion single asset, single borrower CMBS for SMARTCO Properties LP. The deal is backed by a portfolio of 18 primarily self-storage facilities. Pricing is expected this week
- Wells Fargo priced the WFCM 2022-JS2 SASB to kick off this week's private-label CMBS supply
- The K-747 agency CMBS may price later Wednesday
- Freddie Mac priced its \$1.35B+ STACR 2022-DNA1 credit risk transfer RMBS on Monday. Onslow Bay also priced a non-QM trade
- Private-label RMBS deals are in the works for Lone Star, Pretium/Deephaven, New Residential, Bayview, Sequoia and Starwood
- Goldman Sachs is marketing a CLO refinancing of Madison Park Funding XXXIII. Pricing is expected later in the week. The underwriter is also marketing a reset of Octagon 45 that is expected to wrap up the week of Jan. 24

Structured Highlights: This Week

- Fed's Unprecedented Tightening Steps Sow Market, Economy Jitters
- Supply-Demand Mismatch in Mortgages Could Spell Trouble

ABS PIPELINE:

- The following issuers recently filed ABS-15Gs:
 - Theorem Funding Trust 2022-1
 - CPS Auto Receivables Trust 2022-A
 - Toyota Auto Receivables 2022-A Owner Trust
 - BHG Securitization Trust 2022- A
 - GoodGreen 2022-1 Trust

2022 U.S. ABS Volume: *T Sector YTD Volume (\$b) Autos 6.32 Cards 0 Equipment 0 Student Loans 0 Other 0.95 Total 7.27 *T

- \$13.9b priced in January 2021
- \$312.6b priced in 2021
- \$200.9b priced in 2020
- \$248.3b priced in 2019
- \$244.7b priced in 2018
- \$237.8b priced in 2017
- \$198.4b priced in 2016

CMBS PIPELINE:

- The following issuers recently filed ABS-15Gs:
 - Benchmark 2022-B32 Mortgage Trust
 - KREF 2022-FL3 Ltd.
 - SMR 2022-IND Mortgage Trust
 - Arbor Realty Commercial Real Estate Notes 2022-FL1, Ltd.
 - Arbor Multifamily Mortgage Securities Trust 2022-MF4
 - BAMLL Commercial Mortgage Securities Trust 2022- DKLX
 - BANK 2022-BNK39
 - BX Trust 2022-VAMF

PENDING DEALS: *T TYPE DEAL NAME BOOKRUNNERS SIZE-\$MM RETENTION AGENCY FHMS K747 Citi/JPM 1043.19 CRE CLO STWD 2022-FL3 Wells/MS/JPM 1000 Horizontal SASB SMRT 2022-MINI Citi/Barclays 2080 Horizontal *T JANUARY PRICED DEALS: *T TYPE DEAL NAME BOOKRUNNERS SIZE-\$MM RETENTION AGENCY FHMS KF128 JPM/GS 896.521 AGENCY FHMS K137 BofA/Wells 1224.35 AGENCY FRESB 2022-SB94 JPM/Amherst 445.19 CRE CLO AREIT 2022-CRE6 MS/GS/Wells 893.12 Horizontal CRE CLO MF1 2022-FL8 CS/JPM 2022 Horizontal SASB WFCM 2022-JS2 Wells 216.5 Horizontal SASB COMM 2022-HC DB 467 Horizontal SASB JPMCC 2022-OPO JPM 669.75 Vertical SASB SUMMT 2022-BVUE Barclays/GS 305 Horizontal SASB MHP 2022-MHIL Citi/JPM/GS 615 Horizontal *T 2022 U.S. CMBS Volume: *T Private Label YTD Volume-\$m Conduits 0.00 SASB 2,273.25 CRE CLO 2,915.12 Small Balance 0.00 Other 0.00 TOTAL 5,188.37 AGENCY Freddie K Volume 2,120.87 Freddie Small Balance 445.19 Freddie Mac Multifamily CRT 0.00 Fannie Mae Multifamily CRT 0.00 Fannie Mae GeMS 0.00 *T

- \$155b private-label priced in 2021

- \$62b in 2020
- \$114.1b in 2019
- \$88.7b in 2018
- \$92.7b in 2017
- \$70.4b in 2016

CLO PIPELINE: PENDING DEALS: *T Deal Manager STATUS BOOKS SIZE (\$M) REINVEST NON-CALL NEW ISSUES NEUB 2022-47A Neuberger Berman IPT Wells 612 5.11Y 2Y FCO 2022-17A FCO XVII CLO CM Guidance DB 350 N/A 1Y REFI MDPK 2019-33A CSAM Guidance GS 704 1/15/25 4/15/23 RESETS OCT45 2019-1A Octagon Guidance GS 654.2 4/2027 3/2024 *T JANUARY PRICED DEALS: *T Deal Manager BOOKS SIZE (\$M) REINVEST NON-CALL PX DATE NEW ISSUE PSTAT 2022-1 Palmer Square Citi 752.52 N/A 2/25/23 1/14/22 REFIS TFLAT 2016-1 TCI Capital Management II BofA 364.5 1/17/23 8/3/22 1/14/2022 FDF 2019-5A FDF V Management GreensLedge 112.665 1/25/25 10/25/22 1/11/2022 RESETS ABBSL 2020-1A AB Broadly Syndicated Loan Manager MS 411.425 1/15/27 1/15/24 1/14/2022 *T 2022 U.S. CLO Volume:

- ~\$183.8b new issue priced in 2021 (BSL & Middle Market)
 - ~\$89.7b priced in 2020
 - ~\$119.5b priced in 2019
 - ~\$130.4b priced in 2018
 - ~\$119.9b priced in 2017
 - ~\$72.4b priced in 2016

RMBS PIPELINE

- The following issuers have recently filed ABS-15Gs:
 - BRAVO Residential Funding Trust 2022-RPL1
 - CSMC 2022-NQM1 Trust
 - J.P. Morgan Mortgage Trust 2022-INV1
 - Boston Lending Trust 2022-1
 - GCAT 2022-HX1 Trust
 - Brean Asset Backed Securities Trust 2022-RM3
 - Change Depositor, LLC
 - RMF Proprietary Issuance Trust 2022-1
 - Mello Mortgage Capital Acceptance 2022-INV1
 - OBX 2022-INV1 Trust
 - New Residential Funding 2022-NQM1
- The following are marketing:
 - IPT: Silverstone SMI 2022-1A Prime U.K. RMBS
 - PREMARKETING: Pretium/Deephaven \$370.77M DRMT 2022-1 Non-QM
 - PREMARKETING: Lone Star \$326.88M COLT 2022-1 Non-QM
 - PREMARKETING: Starwood \$547.343M STAR 2022-1 Non-QM
 - PRESALE: Bayview MSR Opportunity Master Fund Trust \$714.95M BVINV 2022-2 agency-eligible investment purpose loans
 - PRESALE: Sequoia \$687.2M SEMT 2022-1 prime
- The following priced so far in January:
 - Freddie Mac \$1.353B STACR 2022-DNA1 Credit Risk Transfer
 - Onslow Bay \$556.7M OBX 2022-NQM1 Non-QM
 - Ellington \$417.2M EFMT 2022-1 Non-QM RMBS
 - Goldman Sachs \$519.291M GSMBS 2022-GR1 Agency Investor
 - Wells Fargo \$462.997M WFMBS 2022-1 Prime QRM
 - New York Mortgage Trust \$287M+ NYMT 2022- CP1 SPL/RPL
 - Fannie Mae \$1.5B+ CAS 2022-R01 Credit Risk Transfer
 - Woodward Capital Management \$748.123M RCKT 2022-1 Prime Jumbo
 - Goldman Sachs \$789M GSMBS 2022-PJ1 Prime Jumbo
 - Angelo Gordon \$464.315M GCAT 2022-INV1 Agency-Eligible Investor Loans
 - Oceanview \$393.44M BVINV 2022-1 Agency-Eligible Non-Owner

DISTRESSED DAILY: [Bankrupt Company Counts Doja Cat as Creditor](#) (Bloomberg) -- Rapper Doja Cat is among BHCosmetics Holdings LLC's largest unsecured creditors in the makeup company's bankruptcy case. The chart-topping artist, known for hits like "Say So" and "Need to Know" and her outlandish Internet presence, is owed \$200,000 by the company via an LLC in her name, according to the bankruptcy petition. Doja Cat launched a makeup line with BH Cosmetics last year, featuring products like \$12 plumping lip

gloss and a \$36 "mega" eyeshadow palette in gold and hot pink packaging. Los Angeles-based BH Cosmetics filed for bankruptcy protection in Delaware on Friday, with plans to sell itself. The firm, which sells its wares online and in Ulta Beauty Inc. stores, listed assets and liabilities of up to \$100 million each. Its other major unsecured creditors include Chinese cosmetics manufacturers and Ulta. Doja Cat -- whose real name is Amala Ratna Zandile Dlamini -- has a shot at recovering the funds she's owed: BH Cosmetics said in the filing that it expects to have money left over to repay creditors after its administrative expenses. A representative for Doja Cat didn't immediately respond to a request seeking comment.

- DATA POINTS

Read More: Property Bonds Slump on Logan Debt Concerns: Evergrande Update

- QUOTABLE
- "I am worried about inflation. Inflation is excessive."
 - Howard Marks, co-founder of Oaktree Capital Management, in an interview with Bloomberg TV
- DEADLINES AND DOCKETS
 - All times are U.S. Eastern unless specified and are subject to late revision or cancellation.
- Wednesday, Jan. 19
 - LTL Management, bankruptcy hearing, 10 a.m.
 - Basic Energy, hearing, 4 p.m.
 - Kumtor Gold Co. CSJC, omnibus hearing, 10 a.m.
- READING LIST
 - News, research and insight relevant to distressed investing
- Puerto Rico Approved to Exit Bankruptcy as Judge Backs Plan
- Appaloosa Alum's Special Situations Fund Gains 64% in First Year
- Bankrupt Megamansion Auction Pushed Back to Woo Potential Buyers
- Paul Weiss Hires Lazard's Ziman in Restructuring Expansion

Daniel J. Nigro

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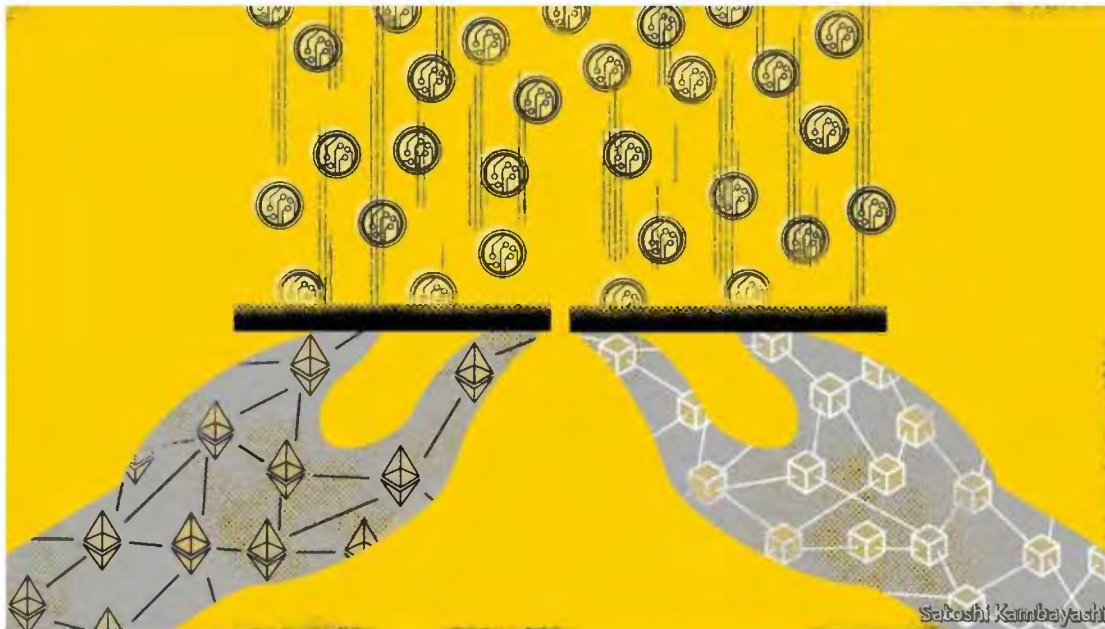
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Finance & economics

Battle of the blockchains

The race to dominate the DeFi ecosystem is on

Why Ethereum is losing market share



Jan 16th 2022

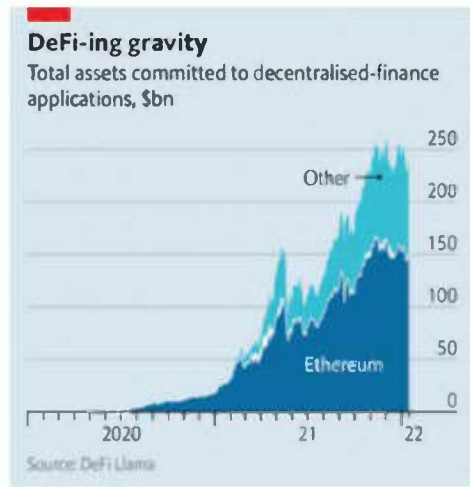
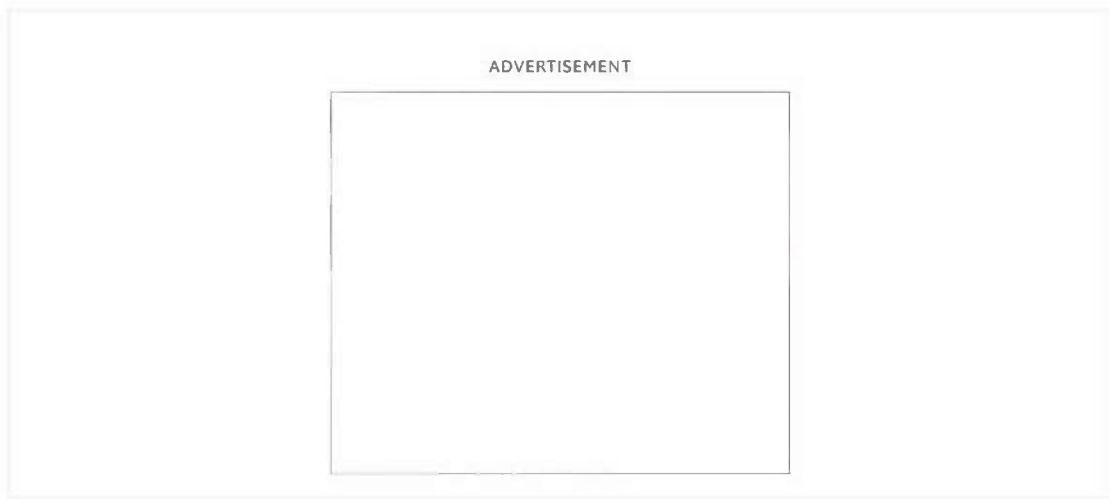
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TO BELIEVERS, OPEN, public blockchains provide a second chance at building a digital economy. The fact that the applications built on top of such blockchains all work with each other, and that the information they store is visible to all, harks back to the idealism of the internet's early architects, before most users embraced the walled gardens offered by the tech giants. The idea that a new kind of "decentralised" digital economy might be possible has been bolstered over the past year as the applications being built on top of various blockchains have boomed in size and functionality.

Perhaps the most significant part of that economy has been decentralised-finance (DeFi) applications, which enable users to trade assets, get loans and store deposits. Now an intensifying battle for market share is breaking out in this area. Crucially, Ethereum, the leading DeFi platform, seems to be losing its near-monopoly. The struggle shows how DeFi is subject to the standards wars that have broken out in other emerging technologies — think of Sony Betamax versus VHS video cassettes in

OTHER EMERGING TECHNOLOGIES—UNLIKE OLD-SCHOOL DEBIT CARDS VERSUS VHS VIDEO CASSETTES IN the 1970s—and illustrates how DeFi technology is improving lightning fast.



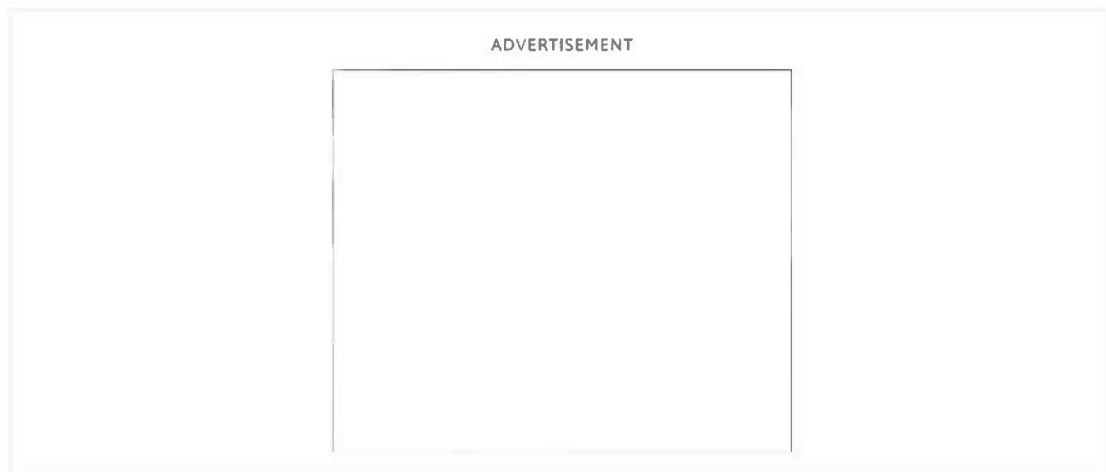
The Economist

The idea behind DeFi is that blockchains—databases distributed over many computers and kept secure by cryptography—can help replace centralised intermediaries like global banks and tech platforms. The value of assets stored in this nascent financial system has climbed from less than \$1bn at the start of 2020 to more than \$200bn today (see chart).

Until recently the Ethereum blockchain was the undisputed host of all this activity. It was created in 2015 as a more general-purpose version of bitcoin. Bitcoin’s database stores information about transactions in the associated cryptocurrency, providing proof of who owns what at any time. Ethereum stores more information, such as lines of computer code. An application that can be programmed in code can be guaranteed to operate as written, thereby removing the need for an intermediary. But just as Ethereum improved upon bitcoin, it too is now being usurped by newer, better technology. The fight resembles competition between operating systems for computers, says Jeremy Allaire, the boss of Circle, a firm that issues USD Coin, a popular crypto-token.

Current blockchain technology is clunky and slow. Both Bitcoin and Ethereum use a mechanism called “proof of work”, where computers race to solve mathematical problems to verify transactions, in return for a reward. This slows the networks down and limits capacity. Bitcoin can only process seven transactions per second;

Ethereum can only handle 15. At busy times transactions are either very slow or very costly (and sometimes both). When demand to complete transactions on Ethereum’s network is high, the fees paid to the computers that verify them climb and settlement times grow. Your correspondent has paid as much as \$70 to convert \$500 into ether and waited for several minutes for a transfer from one crypto-wallet to another to take place.



Developers have long been trying to improve Ethereum’s capacity. One prong of that is, in effect, rewiring it. Plans are afoot to shift Ethereum to a more easily scalable mechanism called “proof of stake” later this year. Another idea is to split the blockchain up (through a process called “sharding”). The shards will share the load, expanding capacity. Some developers are also working on ways to bundle transactions, reducing the number of them that must be directly verified.

The problem is that each advance comes with costs. DeFi’s supporters tout the virtue of being able to conduct transactions securely and without centralised intermediaries. But scale must be traded off against a loss of security or of decentralisation. Pooling transactions before they reach the blockchain tends to be done by centralised entities. And it might be easier for hackers to attack a single shard of a blockchain than the entire thing. As a consequence, Ethereum developers have been slow to make changes.

This sluggishness has made the network vulnerable in a different way—by encouraging rivals. In early 2021 nearly all of the assets locked in DeFi applications were on Ethereum’s network. But in a recent research note JPMorgan Chase, a bank, estimates that the share of DeFi applications using Ethereum fell to 70% by the end of 2021. A growing number of networks, such as Avalanche, Binance Smart Chain, Terra and Solana, now use proof of stake to run blockchains that do the same basic job as Ethereum, but much more quickly and cheaply. Avalanche and Solana, for instance, both process thousands of transactions a second.

The experience of USD Coin illustrates these shifts. The token was launched on Ethereum just over three years ago, but has since been launched on a number of competitor networks, including Algorand, Hedera and Solana. Mr Allaire says that

whereas transactions on Ethereum are subject to cost and speed limitations, those on Solana can handle “Visa-scale volumes” with “settlement finality in about 400 milliseconds and a transaction cost of about a twentieth of a penny”. Other DeFi applications, like SushiSwap, an exchange founded on Ethereum, have also launched on several other blockchains.

With the planned changes to Ethereum likely to take at least a year, if not longer, “the risk is that...the Ethereum network will lose further market share”, wrote Nikolaos Panigirtzoglou of JPMorgan. For Mr Allaire, the picture is pleasingly competitive: “Just like with the web, where Windows, iOS and Android all compete, there are competing blockchain platforms too.” He thinks the ultimate victor will be the network that attracts the best developers to build applications and therefore reaps network effects.

But the operating-system metaphor may only extend so far, in part because of the nature of open, public blockchains. Anyone can access the data they produce and view their operating code, making it possible to build bridges or applications that work across many blockchains, or which aggregate information from different blockchains. Some applications, like 1inch, already scan exchanges on various blockchains in order to find the best execution prices for various crypto transactions. “Multi-chain” blockchains, like Polkadot and Cosmos, act like bridges between different networks, making it possible to work across them.

For as long as decentralised finance holds promise, competition to be the network of choice will naturally be fierce. But the idea that the winner will take everything, gaining overall control over the digital economy and how it develops, may one day seem as outdated as the video cassette.

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From: Nigro, Daniel
Sent: 2022-08-19T12:53:25Z
Subject: Markets Daily: Housing - In Recession Already; \$2 Trillion Options Deadline Today Is Make-Or-Break Moment for Bulls; Jackson Hole Next Week Looming Hawkish
Received: 2022-08-19T12:53:25Z
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Wall St. Breakfast Summary: Futures are down and Treasury yields are up as investors contend with a murky outlook for Federal Reserve policy. A Fed official on Thursday said he was leaning toward a 0.75-percentage-point interest-rate increase in September. That came after Fed minutes on Wednesday hinted that the central bank was uncertain how far it would ultimately need to go in tightening policy to cool inflation. Bed Bath & Beyond shares are plunging premarket after filings confirmed that billionaire investor Ryan Cohen sold his stake. Bitcoin is down as a fresh bout of volatility has hit crypto prices. With August shaping up to be the calmest month this year for US stocks, traders are closely watching Friday's \$2 trillion options expiration for hints whether the tranquility will last. At issue is the belief that derivatives markets have somehow played a key role in suppressing volatility, thereby compelling rules-based quant traders to buy shares and in turn luring a broader group of investors back into the market in order to chase gains.(see story below) Read our live market coverage here.

This week's housing data did much to confirm a slowdown sought by the Federal Reserve. Along with what may have been peak inflation last week, cooler housing data is another piece in the puzzle as the FOMC tightens conditions. The outlier remains the labor market, where jobless claims dropped this week and payroll growth remains strong. By the numbers: the August NAHB measure of homebuilder confidence fell below 50 for the first time since May 2020. Housing starts for July dropped 9.6%, more than expected, (although permits dropped less than forecast). And most recently the NAR reported that July existing home sales fell 5.9%, more than anticipated. "Existing home sales have now fallen for six months in a row, and are 26% lower than the January peak," Pantheon Macro Economist Ian Shepherdson said. "But the bottom is still some way off, given the degree to which demand has been crushed by rising rates; the required monthly mortgage payment for a new purchaser of an existing single-family home is no longer rising, but it was still up by 51% year-over-year in July." "To make matters worse, the market is now grappling with rapidly rising supply as well as crumbling demand," he added. "Our measure of seasonally adjusted existing single-family homes for sale rose 6% in July, but it has a long way to go before it reaches pre-Covid levels." "Home sales likely have further to fall," Odeta Kushi, deputy chief economist at First American Financial, tweeted. "Mortgage applications so far in August point to another decline in existing-home sales. This month's number of 4.81 million puts us at about 2014 sales level." Fed reaction: The market predictions for the Fed's move next month have been volatile through the week and there is still Jackson Hole coming next week. But while chatter from members remains hawkish, after all the housing figures expectations are back to a 65% chance of 50-basis-point hike over 75. "Fed officials pay particularly close attention to the housing market and are monitoring how higher mortgage rates are impacting home sales and housing prices in order to gauge how tighter monetary policy is affecting the broader economy," Wells Fargo economists wrote. In the July FOMC minutes just released, members said housing activity "had slowed notably." "We agree with the Fed's assessment that home sales likely have further to fall," Wells Fargo said. "As of August 12, mortgage applications for purchase have declined on a week-to-week basis in seven of the previous eight weeks."

Futures at 8:40, Dow -0.75%. S&P -1%. Nasdaq -1.1%. Crude -1.8% at \$88.89. Gold -0.2% to \$1767.50. Bitcoin -8.3% to \$21,484. Ten-year Treasury Yield +8 bps to 2.96%.

BMO Commentary: The selloff in Treasuries extended overnight as the break of 2.90% 10s was pressed and yields closed in on 2.95% -- reaching their highest level since July 21 when the benchmark of all benchmarks rallied from 3.01% to 2.87%. While it is tempting to characterize the price action as a low volume, summer Friday inspired move, trading volumes >130% of the recent norms imply greater conviction than would otherwise be anticipated. With nothing scheduled on the calendar aside from Barkin's remarks, it promises to be a session in the US rates market defined largely by the sustainability of the downtrade, and any evidence that the cheapening in duration is going to bring in more substantial dip buying interest. Despite the dovish interpretation from investors on the information contained within Wednesday's minutes release and acknowledgment by monetary policymakers that over tightening is a risk to consider, the macro backdrop brought into this week is broadly unchanged. This leaves the operative

unknown the size of the September rate hike, which in practical terms is a derivative of the performance of August payrolls and CPI prints. Next week's Jackson Hole symposium will offer the Fed a forum to refine investors' expectations on the issue, with Powell's 10am speech on August 26th the clear headliner.

A dataless Friday in the middle of August is not an environment that we expect will inspire a great deal of trading conviction, but given the market conditions we are cognizant of an early concession for next week's supply that may have a more outsized impact on the price action than would otherwise be expected. \$44 bn 2s, \$45 bn 5s and \$37 bn 7s hold all hold a concessionary potential to flatten the curve, or at minimum prevent a more outsized steepening move before the weekend. Especially in the wake of the minutes that emphasized the need to slow the pace of tightening 'at some point', the bid the meets the offerings will help inform the collective consensus and when exactly that point may be. There is also the proximity to Jackson Hole to consider and the event risk implicit in the monetary policy update that would add to the case for some concession to clear the final round of this month's coupon supply. Particularly as volumes thin out this afternoon, we will be mindful of the role this may play in the late-Friday afternoon price action.

Along with the unknown of the size of September's rate hike, one of the primary near term tradable pieces of information that will be in focus is how the Fed's assumption on terminal may have shifted since the last update to the dotplot in June. At the July press conference, Powell suggested that terminal will lie somewhere in the 3.5%-3.75% range, and given the state of inflation, the only macro variable that will bias that lower will be a significant increase in joblessness. However, a deterioration of that scale would need to be accompanied by some extension of the moderation evident in the July inflation data; core consumer prices rising above 5% YoY would necessitate more hawkishness even if the unemployment rate is climbing.

The hawkish alternative (while not our base case) is easier to argue; the job market stays robust, and the pillars driving core inflation remain sticky in a way that forces the Fed to push even deeper into restrictive territory in order to maintain credibility as an inflation fighter. The minutes release suggested that for the time being the FOMC does not want the market to press loftier terminal assumptions, but this promises to be one of the most tradable pieces of information at the September meeting when the revised dotplot gives investors an updated look at monetary policymakers' take on terminal.

Along with the discussion on terminal, the issue of balance sheet policy will likely at least be touched upon in Wyoming as well, and while QT has not yet reached its terminal rundown velocity that will take place next month, we continue to field questions on the likelihood the process will be amended. Despite liquidity distortions in the Treasury market that have been an increasingly lamented symptom of the process, given the outright size of the Fed's balance sheet and the Committee's communicated desire to bring SOMA's holdings down we think there is little chance of a near term slowing in the pace of the rundown. While certainly not our base case, the more likely outcome would be a more aggressive rundown, and even if we still think selling Treasuries is off the table, that does not mean the Fed could not raise or remove the caps to speed up the removal of accommodation. In more practical terms, we expect the furthest the Committee would go would be to acknowledge that they are monitoring the influence of the shrinking balance sheet, and for the time being they are committed to leaving the process on autopilot.

We'd be remiss not to acknowledge the strength of the bid that met the 30-year TIPS auction and impressive willingness by primary market participants to add long-dated real yield exposure after 30-year reals came back within striking distance of 1%. While the liquidity value of the auction deserves some of the credit for the significant stop through, more broadly the result reinforces the notion that subsequent pullbacks in duration (inflation protected or otherwise) are going to be increasingly viewed as buying opportunities. This does not take a return to 3-handle nominal 10s off the table, but it does bolster our conviction that any such move will be short lived. - Ben Jeffery and Ian Lyngen

Wall Street Bets the Fed Is Bluffing in High-Stakes Inflation Game (WSJ) The market rebound reflects a belief that inflation has peaked and rates will go down sometime next year, an outlook Fed officials have tried to dismiss

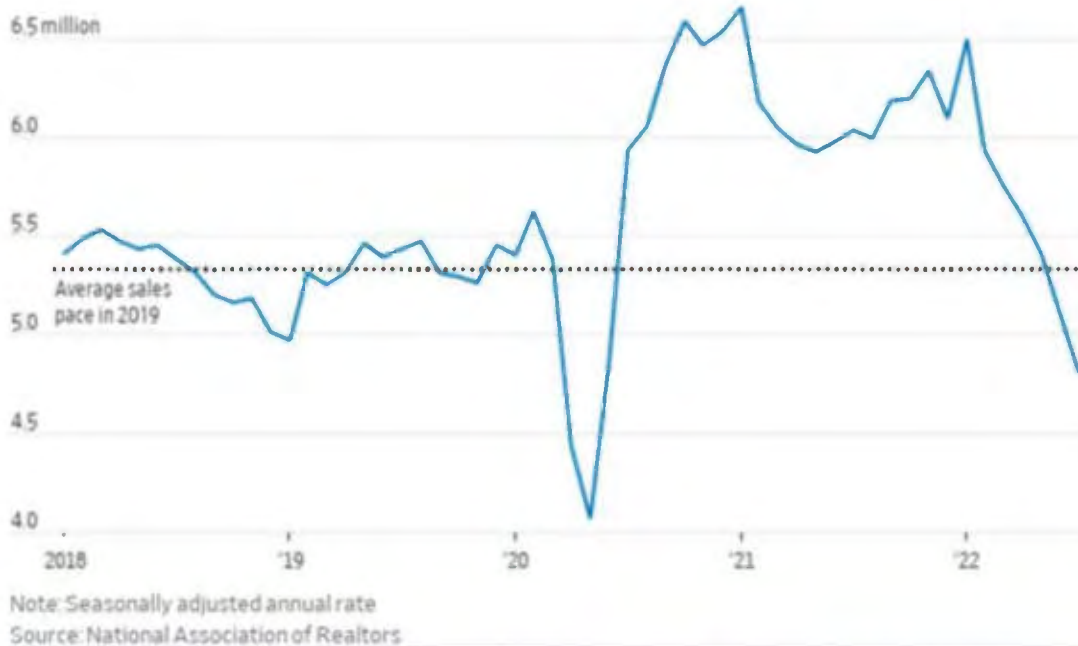
A \$2 Trillion Options Deadline (Today) Is Make-Or-Break Moment for Bulls (Bloomberg, attached)

- ☐ Options trading seen having lifted stocks, capping volatility
- ☐ Brace for price swings in both directions: Nomura strategist

'Very Few Fear Fed': BofA Says Cash Flooding Into Stocks, Bonds (Bloomberg, attached)

- ☐ US stocks saw a second week of inflows at \$9.2 billion
- ☐ BofA bull, bear indicator remains max bearish for tenth week

U.S. Home Sales Dropped in July for Sixth Straight Month (WSJ) Median sale price eased last month to \$403,800 from June record of \$413,800



A Funny Thing Happened on the Way to the Fed's QT: Macro Man (Bloomberg, attached) We're only a couple of weeks away from a significant acceleration in the pace of the Fed's balance sheet reduction ... or are we? It all depends on your perspective.
Layoffs Are in the Works at Half of Companies, PwC Survey Shows (Bloomberg, attached)

- More than half are freezing hiring, others rescinding offers
- Contradictions abound, with pay hikes and remote work for some

Ether is up 100% since its bottom in June, massively outperforming bitcoin (CNBC, Ling Yu) Bitcoin hit a low of \$17,601 on June 19 and is up around 31% since then as of Friday's trading price, according to CoinDesk data. Ether also hit its recent low on June 19 at \$880.93, but has surged 106% since then. The huge divergence in performance in the two cryptocurrencies come down to one major factor: a big upgrade in the ethereum blockchain called the "merge."

The Dollar Will Stay Strong. That Spells More Pain for Companies. (Barron's) Investors need only take a vacation this summer to understand the market exuberance back home. In Europe, there is drought, [wildfires](#) and the cost of energy has soared. In China, residents and tourists are being caught up in [shutdowns](#) from a zero-tolerance policy toward fresh Covid-19 outbreaks. The knock-on effect is stark. China's economy is forecast to grow at the lowest level for more than 40 years. In the U.K., consumer confidence has sunk to a [record low](#). The safe-haven dollar is good news for travelers, buying 14% more on a London trip compared to a year ago and 16% more in Paris or Rome thanks to euro parity. The greenback won't weaken soon, as rates continue tightening globally, delivering shocks to some economies such as [Turkey](#). The [U.S. Dollar Index](#), which had eased as investors bet on a slower pace of U.S. interest rate rises, is up 1.9% this week alone. Federal Reserve minutes signaled there is more to do to tackle inflation. The variables are how fast and how high officials should go. Their job has been made harder as the [S&P 500](#) has powered 17% higher from its mid-June nadir. Confidence that the U.S. is doing better than the rest of the world comes despite some weak economic indicators, such as [slow home sales](#). And it is worth noting the U.S. was the [worst-performing](#) of the major G-7 countries, the seven largest rich countries, in the second quarter, contracting by 0.2%. Some market [bulls](#) think global recession fears are overblown and that inflation will clear up largely on its own. But the strong dollar will still feed through to blue chips regardless. Analysts at [Morgan Stanley](#) wrote last month that the 16% jump in the dollar at the time implied a fall of about 8% in S&P 500 company earnings. Now that would be no holiday.

Financial Conditions Tighten as Thin Liquidity Bites (Bloomberg) The euro's almost back to parity, equity futures are down, and gold is at its lowest level of the month. It kind of feels like asset markets have seen that Jerome Powell's remarks at Jackson Hole are not called "Rate Cuts and Why I Love Them" and are reacting with some surprise. **OK, maybe that's a bit flippant, but for sure today is seeing a fairly consistent tightening of financial conditions across the board.** As discussed a few days ago, though, the real burden of proof will come once the opening bell rings, given that essentially all of the cumulative gains from the low have come during regular trading hours. What complicates that equation today is of course option expiry, and while that might make the intraday price action more erratic, it doesn't necessarily follow that overnight trading becomes more reliable. Still, **the performance of the past couple of days suggests that the 200-day moving average of the SPX (now at 4322) is being used as a risk parameter or pivot point, offering a platform for fresh shorts and turning the flow a little more symmetrical.** Poor liquidity has been a net positive for equity investors over the past couple of months as net buying has pushed prices a long way. But thin trading conditions can taketh away as well as giveth, as today may well demonstrate.

Highlights From the 8-19-22 Issue of the Asset Backed Alert (attached, Ling Yu)

Biden Plan Would Return Student Loan Borrowers in Default to Good Standing (WSJ) Under 'Fresh Start' initiative, 7.5 million

loan borrowers would once again be eligible for federal student aid.
Case 1:24-cv-01858-ACR Document 34-5 Filed 06/20/25 Page 231 of 672
'The Godfather' Insight on What's Driving Markets: John Authers (Bloomberg, attached) It's hard to read the events of the last few months any other way — it was the oil price all along.

Mortgage Lenders Are Starting to Go Broke as Loan Volumes Plunge (Bloomberg, attached)

- After crisis, banks account for less of the mortgage business
- Independent mortgage lenders are seeing their credit lines cut

FT/ignites.com - Mass. Regulator Probes Single-Stock ETFs (attached, Ling Yu) **'Under no circumstances should an investor use these products as a long-term investment,'** Secretary of the Commonwealth William Francis Galvin said.

FT/ignites.com - SEC Proposal Says Every Fund Is ESG: SSGA, DFA (attached, Ling Yu) A draft rule would require shops to categorize funds based on how environmental, social and governance factors fit into their investment strategies

Citrix Debt Pitched at 7.1x Leverage With \$2.1 Billion Ebitda (Bloomberg, attached) The big buyout that has been difficult for The Street to sell...

CREDIT DAYBOOK AMERICAS: Primary Market to Wind Down After Rush (Bloomberg) -- US high-grade bond supply has exceeded estimates for the week after a busy Thursday. With nearly \$110 billion priced in August, the market is now expected to wind down with no more heavy issuance days until after the US Labor Day holiday.

- The spread on the Markit CDX North American Investment Grade Index, which increases as perceived credit risk rises, widened by two basis points to 79.2 as of 7:24 a.m. in New York
- No high-grade deals are expected to be announced on Friday, but in a week where supply has surprised to the upside, it wouldn't be a shock, Bloomberg's Michael Gambale writes
 - Estimates had called for around \$15 billion
- In high-yield, banks are pre-marketing the \$15 billion Citrix buyout financing
 - Total leverage on the buyout financing for Citrix Systems is 7.1 times, based off LTM adjusted Ebitda of \$2.1 billion discussed during pre-marketing meetings this week with debt investors, according to people with knowledge of the matter
- Credit valuations remain in focus after a sharp rally since lows reached in June
 - "Next week's Jackson Hole symposium could reinforce that the fight against inflation is far from done. With spreads near multi-month tights and the macro environment still challenging, we remain negative on valuations," Barclays strategists led by Brad Rogoff wrote Friday
- Pimco has spent more than \$2 billion in recent months to buy leveraged loans and junk bonds tied to buyouts of consumer companies, debt that banks had struggled to offload
- Bed Bath & Beyond hired law firm Kirkland & Ellis to help it address a debt load that's become unmanageable amid a sales slump, according to a person with knowledge of the decision
- Royal Philips had its outlook cut to negative from stable by Moody's on the risk that credit metrics will remain weak for a prolonged period
- US leveraged loan funds posted an inflow for the week ended Aug. 17, breaking nine straight weeks of withdrawals, according to Refinitiv Lippe

US HY OPEN: Junk Poised to End 6-Week Gains as Rally Loses Steam (Bloomberg) -- US junk bonds are on track to end the six-week gaining streak after steadily falling for three consecutive sessions, with a week-to-date loss of 0.67%. Yields jump 16bps week-to-date to 7.59%, rising for the first time in seven weeks and the biggest weekly leap since early July after Federal Reserve minutes noted risks from the central bank tightening more than necessary. The losses stretched across the high yield market, with CCCs headed toward its first weekly loss, falling by a modest 0.29% and snapping the four-week rally. The losses followed a three-day decline, the longest losing streak in five weeks.

- CCC yields are headed toward the biggest weekly surge since July 1, rising 28bps week-to-date to 12.51%
- Junk bond losses accelerated after mixed signals from different FOMC voting members, causing uncertainty over the extent of rate hikes in the coming months and its impact on growth
 - Kansas City Fed President Esther George said the US central bank had already "done a lot" on raising interest rates while her St. Louis colleague James Bullard backed another 75 basis-point move next month

Read Fed's George Says Hike Pace Under Debate; Bullard Backs Big Move

- While the initial headlines from the July FOMC minutes seemed dovish as it suggested that members were concerned about risks of over-tightening, there were hawkish elements too, Barclays' strategist Brad Rogoff cautioned on Friday
 - With spreads near multi-month tights and the macro environment still challenging, we remain negative on valuations, Rogoff and Dominique Toublon wrote on Friday
 - **As financial conditions have loosened meaningfully in three weeks, with S&P 500 up more than 9% and spreads sharply tighter, next week's Jackson Hole symposium will give Chair Jerome Powell "an opportunity to reconfirm his resolve to fight inflation, even in a slowing economy," Barclays emphasized in note on Friday**
- While the broader junk bond rally stalled after gaining for six straight weeks amid renewed concerns the Fed may disrupt

- growth and even cause a recession at some point, investors still seemed to be in a risk-on mood.
- o Investors gave their vote of confidence to the asset class, with high yield funds reporting a cash intake of \$1.46b, the fourth successive week of inflows
 - o US high yield funds took in a cash haul of \$7.76b in weeks ended ended July 27 and August 3, the most since June 2020
 - The primary market saw some borrowers rush in a hurry to take advantage of the risk-on move ahead of Jackson Hole symposium next week where the Fed could reiterate that it was focused on taming inflation and the fight against inflation continues
 - o The issuance volume this week totals more than \$5b, the busiest since early June
 - o The month-to-date supply tally was at a modest \$8b, the slowest August since 2014
 - The junk bond market may extend the decline on Friday amid a broader risk-off move. US equity futures sank with Treasuries after a chorus of Federal Reserve officials reiterated their resolve to continue rate hikes and traders raised tightening wagers for other major central banks

STRUCTURED PIPELINE: Recovery Bond Prices; Debut Auto Next Up (Bloomberg) -- The Oklahoma Development Finance Authority priced a new recovery bond on Thursday. YTD issuance for the sector is approximately \$16.4 billion versus \$2.3 billion for all of last year, according to data compiled by Bloomberg News. PenFed is expected to price its debut auto deal on Friday. Newtek is also marketing on its latest small business securitization.

- Kroll has issued a presale report for an upcoming subprime auto from Pagaya Structured Products, a 100% owned subsidiary of Pagaya Technologies. "Pagaya Technologies is a financial technology company in the lending marketplace that uses machine learning, big data analytics, and AI-driven credit and analysis technology," the rating agency wrote in its presale report. Deutsche Bank is leading the transaction
- Barclays (structuring), Performance Trust, and Cantor Fitzgerald issued guidance on a non-QM RMBS for Change Mortgage
- Invictus Capital Partners priced a non-prime investor cash flow RMBS secured by 853 rental property mortgages

Structured Highlights:

- Mortgage Lenders Are Starting to Go Broke as Loan Volumes Plunge
- CIBC Adds Wicker as Chief Compliance Officer, Promotes Richards
- Marathon Hires Former Onex CLO Head Lau to Manage Portfolio
- Severe Housing Slump Odds Growing But Not Yet Probable: Fitch
- Barclays Sees Credit Pain in Return to 1970s Inflation Regime
- CLO Participation From US Banks Should Remain Low, BofA Says

DISTRESSED DAILY: Crestview's Accuride Faces Refinancing Risks (Bloomberg) -- Commercial truck parts maker Accuride Corp.'s refinancing risk is rising as it faces looming debt maturities next year and weak liquidity. The company has an asset-based lending facility expiring in August 2023 and a first-lien loan due November 2023, according to Moody's Investors Service. Refinancing those obligations may be "difficult," leaving the company at risk of a potential restructuring or distressed exchange, analyst Mike Cavanagh wrote in a note Thursday. Accuride supplies wheels and wheel-ends for commercial vehicles, and has seen its revenue increase as new vehicle production has risen in recent years. Still, it relies heavily on its ABL to fund its business and has weak liquidity. Its profitability has also taken a hit as it struggles with supply chain problems and inflationary pressures. The company's entire debt load comes due in the next 12 to 15 months. Before then, the company may have trouble meeting a leverage covenant on its loan if earnings don't improve, according to Cavanagh. Accuride is based in Livonia, Michigan and is owned by Crestview Partners. Its first-lien term loan due next year is quoted at around 87 cents on the dollar.

- QUOTABLE
 - "We like to say that we run into every house that's on fire, and we then choose to stay in some."
 - o Dan Zwirn, chief executive officer of Arena Investors, on the opportunity presented by busted convertible bonds
- READING LIST
 - o News, research and insight relevant to distressed investing
- Endo Bondholders to Offer Rival Bankruptcy Plan for Drugmaker
- Mortgage Lenders Are Starting to Go Broke as Loan Volumes Plunge
- Pimco Spends Billions Buying Assets Depressed by Recession Fears
- Air Methods Earnings Plunge 58% on Billing Law, Cost Pressures
- Cohen Makes Millions on Bed Bath & Beyond as Meme Traders Recoil
- Bath & Beyond Is Said to Tap Kirkland for Debt Help

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To: (b)(6) [redacted]@iosco.org]
From: Szczepanik, Valerie
Sent: 2023-02-15T23:40:21Z
Subject: Fwd: (b)(5) Paper
Received: 2023-02-15T23:40:27Z
(b)(5) Paper.docx

Hi (b)(6) [redacted] can do march 9 at 7 am. (b)(6) [redacted] has authorized me to distribute the paper to the working group.

From: (b)(6) [redacted]
Sent: Wednesday, February 8, 2023 6:40:20 PM
To: Szczepanik, Valerie (b)(6) [redacted]@SEC.GOV>
Subject: (b)(5) Paper

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Great seeing you again! Would love to see how I can be a resource to your team.

Thanks

(b)(6) [redacted]

From: Marchak, Margaret
Sent: 2023-01-31T22:04:40Z

Subject: FW: docs
Received: 2023-01-31T22:04:40Z

- [FTF SG - IOSCO DeFi WG Roundtable- Panelist questions and timing.docx](#)
- [FTF SG - IOSCO DeFi WG Roundtable- List of Participants - 1 February.docx](#)
- [Wednesday Name Tags.docx](#)

(b)(6)

I've printed the attached X 30 just so we have enough documents. And it will be in 106, where I've been sitting, overnight. Adding the name tags file as well. Should I add (b)(6) to the list of participants as well? (I noticed (b)(6) not on there but I did make a name tag for (b)(6) Edits/additions etc. I can do tomorrow morning when I arrive at 8.

Margaret
From: (b)(6) <(b)(6)@iosco.org>

Sent: Tuesday, January 31, 2023 4:06 PM
To: Marchak, Margaret (b)(6) <(b)(6)@SEC.GOV>
Subject: docs

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To: Harrington, James (b)(6); Busdoj.gov); Hansen, Lars (b)(6); Bloch, David (b)(6); Millman, Phillip (b)(6)
From: Nigro, Daniel
Sent: 2023-01-03T13:44:08Z
Subject: Markets Daily: What Will the Economy Look Like in 2023? Big Banks Predict Recession, Fed Pivot in 2023; IMF's Georgieva Expects Third of World to Suffer Recession; Law 360 Trends to Watch
Received: 2023-01-03T13:44:08Z
[What Could Go Wrong for the Federal Reserve in 2023 - Bill Dudley.pdf](#)
[Borrowers Make Fast Start to January's Debt Sales Bonanza.pdf](#)
[IMF's Georgieva Expects Third of World to Suffer Recession.pdf](#)
[Law360 - 5 Compliance Trends To Watch In 2023 - 01-02-2023.pdf](#)
[Law360 - Fintech Litigation To Watch In 2023 - 01-02-2023.pdf](#)
[Law360 - Fintech Litigation To Watch In 2023 - 01-02-2023.pdf](#)
[Fear of Global Gas Crisis Eased by Warm Start to Winter.pdf](#)
[FT - Business trends, risks and people to watch in 2023 - 01-02-2023.pdf](#)
[FT - Cathie Wood's Ark sheds almost \\$50bn in assets since 2021 peak - 12-21-2022.pdf](#)
[FT - Asset managers brace for tough year of cost-cutting in 2023 - 01-03-2023.pdf](#)
[FT - UK faces worst and longest recession in G7, say economists - 01-02-2023.pdf](#)
[Ignites - Valkyrie Seeks to Take Helm of Grayscale Bitcoin Trust - 01-03-2023.pdf](#)
[Ignites - Steady Sales for Bitcoin Futures ETFs amid 'Crypto Winter' - 01-03-2023.pdf](#)
[Navigating 2023 With Seven Charts and a Cat.pdf](#)

Wall St. Breakfast Summary: A new year. A fresh start. After one of the worst years in some time for Wall Street, 2023 is launching with a more positive tone. Futures are pointing higher, bond yields are edging lower and the dollar is strengthening. But beware of first impressions. Today is also the one-year anniversary of the S&P 500 hitting its all-time closing high. **Read our [live coverage of markets for the latest](#)**

2023: What will economic growth look like? Risk: With inflation peaking at 9.1% in June, a recession is now the No. 1 economic concern going into 2023. When businesses make less money due to lower consumer spending (triggered by dwindling reserves, price pressures and an aggressive Fed), companies lay off workers and more people are hesitant to spend. Weak expectations or prior over-investing also factor into the equation, with many firms feeling that large swaths of the economy could, or are already, experiencing worsening macro forces and a series of unknown variables (war, pandemic, energy prices, etc.). *"The new year is going to be tougher than the year we leave behind," said Kristalina Georgieva, Managing Director of the International Monetary Fund. "Why? Because the three big economies - U.S., EU, China - are all slowing down simultaneously. We expect one-third of the world economy to be in recession. Even countries that are not in recession, it would feel like recession for hundreds of millions of people." (see story below & attached)* **Opportunity:** Many corporations haven't slashed their profit forecasts, while hiring remains surprisingly robust and the unemployment rate is sitting near historical lows at 3.7%. If that resilience holds up and inflation continues to cool down, a soft landing could be in the making. The Fed also won't hike interest rates to the moon (and has even begun to take its foot off the accelerator), which could mean that somewhat of a slowdown is in store, but not one that slams the brakes on the economy. *"The U.S. may avoid a downturn in part because data on economic activity is nowhere close to recessionary," according to Jan Hatzius, chief economist at Goldman Sachs. "GDP grew 2.6% (annualized) in the third quarter," while the country added 261,000 jobs last month. "Even as financial conditions have tightened, the rise in real income is likely to be the stronger force next year. Unlike other bouts of high inflation, supply chains are normalizing as will housing rental markets - a source of disinflation that wasn't there during the 1970s - while spending is rotating from goods to services and inventories are rebounding."*

Will central banks begin to pivot? Risk: While inflation has eased recently, it is still way higher than the central bank's desired 2% target. "We will stay the course until the job is done," Fed Chair Jerome Powell declared at December's policy meeting, while ECB President Christine Lagarde added that, "we're not pivoting, we're not wavering." Last month, the Fed even raised its benchmark interest rate to the highest level in 15 years, and some fear that heightened geopolitical risks or uncontrollable events could happen again, causing inflation to spring back and return to its upward ascent. *"Inflation forecasts were nowhere near high enough in 2022, and there's no reason to believe they'll be materially better in 2023. There's more risk of a high-side surprise," BMO Capital Markets macro strategist Benjamin Reitzes said in a research note. "In the future, it seems likely that supply chains will be shorter, more diversified and more resilient. Trade will likely narrow to more trusted partners and these changes will increase resilience, but at the cost of efficiency. And through this adjustment, production costs could rise, increasing price pressures."* **Opportunity:** The Fed raised rates seven times in 2022, pushing its benchmark from a range of 0% to 0.25%, to the current 4.25% to 4.50%. However, smaller increases were implemented in December and officials signaled that they only plan to keep raising rates to between 5% and 5.5% in 2023. Better outlooks are already materializing, with many seeing the Fed continuing to raise rates in the first quarter, pausing in the second and possibly cutting rates in Q3 or Q4. *"Slowing demand, price discounts due to elevated inventories and declining housing prices, among other factors, will help temper inflation, which should in turn prompt major central banks to pause and assess their recent historic string of rate rises," Morgan Stanley wrote in its 2023 Global Macro Outlook. "As consumer goods' supply chains recover and labor markets see less friction, we could see a sharper and broader fall in inflation, which would imply a somewhat easier path for policy and higher growth globally."*

What will the year look like for stocks? Risk: "Don't fight the Fed," is alive and well, with equities coming off a bruising year. Curtains have closed on the easy money era as investors demand cash generation and revalue unprofitable growth companies.

Predicting a bottom is tough and many wouldn't be surprised if volatility still remains the name of the game. According to a recent analysis from 34 Seeking Alpha contributors, stocks are not likely to rebound in 2023, with the median expecting the S&P 500 to end the year at 3,799 (-1.0%) and the average seeing the benchmark index at 3,755 (-1.2%). *Many contributors predict that the S&P 500 will bottom-out at a much lower level than it is today, sometime in mid-2023, followed by some sort of rebound. The most optimistic forecast for the S&P 500 for 2023 is a rise of +35.8%, while the most pessimistic contributor who submitted a prediction for 2023 expects the index to close at 2685, or -30.1% lower. The Seeking Alpha Quant Rating for the SPY (SPDR S&P 500 Trust ETF) is also a Hold.* **Opportunity:** Some are more bullish on stocks, especially when looking at individual sectors. They highlight last year's outperformers, like energy (NYSEARCA:IYE) and defense (BATS:ITA), as well as insurance players (NYSEARCA:IAK) and some basic materials (NYSEARCA:SLX). When polled in late December, more than 62% of the over 2,400 respondents to Wall Street Breakfast's "Survey Monday" said that they would tilt most of their investments to equities in 2023, compared to cash (17.4%), bonds (12.2%), commodities (5.5%) and crypto (2.8%).

Futures at 6:30, Dow +0.8%. S&P +0.8%. Nasdaq +1.1%. Crude -1.6% to \$78.98. Gold +0.7% to \$1839.40. Bitcoin flat at \$16,720.

Ten-year Treasury Yield -7 bps to 3.76%

BMO Commentary: Treasuries are ringing in the new year with a meaningful rally that has brought 10-year yields as low as 3.73% during the overnight session. The primary trigger was another sizeable decline in German regional CPIs during December; further evidence supporting the European peak inflation narrative. On the margin, the incremental need for a more aggressive ECB stance is offset by moderating consumer prices in Germany, although there remains ample data between now and the ECB's February 2 rate decision. The pullback in global energy prices has also been supportive of the bid in Treasuries as the mild start to the winter has allayed concerns regarding the prospect for significant energy shortages. Risk assets have started 2023 on strong footing with lower yields prompting a solid overnight performance in European equities and US stock futures. The operating assumption being that anything which limits the aggressiveness of global central banks from here (such as negative regional CPIs in Germany), will be a net positive for risk assets.

It's a variant of the 'bad news is good' mantra and one that we expect will define trading in US rates and risk assets for the bulk of January as the Fed's next rate hike approaches. Payrolls is this week's data highlight and the consensus anticipates a solid but slowing pace of growth at +200k – such an eventuality would represent the lowest print since NFP dropped -115k in December 2020. That said, a +200k gain in payrolls is a solid reading in a typical (or pre-pandemic) environment and as such we'd struggle to envision a consensus print deterring the FOMC from continuing on with its objective of reaching terminal in the coming months. At present, the fed funds futures market is pricing in 33 bp for February 1 – 100% on 25 bp with a ~32% probability the Fed delivers another half-point hike.

Friday's employment report will be instrumental in further refining expectations for the magnitude of Powell's next move and thereby the prospects for achieving the 5.00%-5.25% terminal signaled via the recent SEP update. Said differently, the potential to fall short of target increases in the event the FOMC downshifts to a pace of 25 bp in February. The overnight release of moderating German inflation is certainly consistent with the notion that global tightening is showing signs of success; although, on the other hand the German employment data illustrates the jobs market (at least in Germany) can withstand tighter financial conditions – a sentiment echoed in the US. Moderating inflation combined with ongoing strength in NFP is the setup most likely ahead of the Fed's next rate hike decision; implying another key uncertainty will be the extent to which wage growth shows signs of slowing during December. Market expectations are for a +0.4% monthly gain in average hourly earnings; which would lead the yearly pace to downtick to 5.0%. Encouraging from the Fed's perspective, but unlikely to convince the Committee wages are sufficiently under control in the context of the much-feared wage-inflation spiral.

In light of the prevailing macro environment, this morning's bid in Treasuries is all the more encouraging. After all, the Fed has more tightening to execute before a satisfactory terminal is achieved and meanwhile investors are increasingly biased to buy the dips in Treasuries. To be fair, the last two weeks of 2022 can be aptly characterized as a bearish phase in US rates. That said, the year-end turn has historically been a volatile period of financial markets and as investors return from the long weekend we're anticipating 'cooler heads' will prevail. Which, in this context, implies a continued bid for Treasuries that results in a drift lower in US rates as the market consolidates further in the runup to Friday's employment report. In keeping with the theme, the steepening of the curve during late-December has been challenged as 2023 begins – it's too soon to fade the flattening. Moreover, as with the consolidation in outright yields favoring lower rates, a comparable period of stability will bias the curve back toward the prior range. In the case of 2s/10s we're watching the 40-day moving-average at -66.7 bp as an initial target before reentering the -70 bp to -80 bp zone.

Tactical Bias: *The final trading week of 2022 did not offer any especially compelling takeaways from a macro perspective, and as the new year commences, the operative themes driving the US rates market remain firmly intact. The Fed has more tightening to deliver, but terminal will be achieved at some point in the first half of 2023, at which point Powell's challenge will shift from actively raising rates to a battle to stay on hold even as the real economy and labor market begins to deteriorate. This will bring investors to Friday's payrolls print and the jobs update that will help inform whether another 50 bp hike in February is in the offing, or if the FOMC will take another step down in terms of hiking cadence to a quarter point move in the target band. Any*

This week's marquee event will clearly be payrolls and the December employment situation report, but the FOMC Minutes of the last meeting will also contribute to framing the monetary policy backdrop early in the year. While the language of the statement itself was remarkably little changed, it was the SEP and update to the dotplot that was most tradable. On the one hand, the forecasted terminal rate of a 5.25% upper bound surpassed what most were anticipating in terms of additional tightening in 2023. With Powell signaling an openness to bring rates even higher if needed, a further discussion on this topic within the Minutes and any greater clarity on the distribution of risk surrounding the hiking finish line certainly holds tradable potential. Additionally informative will be the consensus among policymakers on the size of future move, and the criteria for more 50 bp hikes or justification for future tightening to be of the quarter point variety. At this stage, given the progress made on the inflation front we suspect the bar for additional 75 bp moves is prohibitively high.

On the other hand, there was the widening of the spread between the 2023 and 2024 dots and the increase in forecasted easing in 2024 from 75 bp in the September SEP to 100 bp in the December one. We interpreted this as a tacit acknowledgement from the Committee that the extent of their tightening now will necessitate larger removal of accommodation later. Within the Minutes, a larger discussion on the risk of overtightening or more worry on the demand destruction that will follow from the Fed's actions would disproportionately benefit the belly of the curve and exacerbate the richening in intermediate Treasuries. In pondering the timeframe for the long-awaited steepening of the curve, this dynamic is a key driver of our expectations to see 5s/30s and 5s/10s begin their steepening sooner than shorter curves like 2s/5s or 2s/10s.

3.875% represented 2022's closing level for 10-year yields, but more relevantly for early 2023 trading will be how the stretched oversold momentum landscape resolves in favor of greater buying interest in the benchmark of all benchmarks in the near term. We expect the overnight opening gap from 3.827% to 3.875% will offer the most immediately relevant support level of note, and beyond 4% with the remnants of an unfilled opening gap at 4.242% a noteworthy subsequent bearish target. On the other hand, resistance is now the 40-day moving average at 3.726% that stemmed the overnight bid ahead of the 100-day moving average at 3.610% -- not a zone we suspect will be challenged before payrolls, but in the event of a disappointment within the BLS data, not an unreasonable target in the runup to the February jobs numbers. - Ian Lyngen and Ben Jeffery

Big Banks Predict Recession, Fed Pivot in 2023 (WSJ) More than two-thirds of economists at 23 major financial institutions expect the U.S. to have a downturn this year

FT - Business trends, risks and people to watch in 2023 (attached, Ling Yu) What to look for this year in the corporate world in sectors from energy to private capital and technology

Get Ready for the Richcession (WSJ) Well-off Americans could get hurt more than usual in the next downturn. Bottom incomes better off than usual - [Federal Reserve figures show](#) that the net worth of households in the bottom fifth by income was 42% higher in the third quarter than at the end of 2019, and up 17% from the end of 2021. [A wage tracker developed by the Federal Reserve Bank of Atlanta](#) shows that the 12-month moving average of annualized monthly wage growth for workers in the bottom quartile by income was 7.4% as of November.

IMF's Georgieva Expects Third of World to Suffer Recession (Bloomberg, attached)

- Georgieva warns of 'tough year' for world economy in 2023
- Kristalina Georgieva comments in CBS's 'Face the Nation'

Investors Brace for More Market Tumult as Interest Rates Keep Rising (WSJ) ...what went wrong in 2022 and how investors think this year will bring its own set of challenges. Era of ultralow bond yields and accommodative Fed policy has ended, money managers say

Navigating 2023 With Seven Charts and a Cat: Ashworth & Gilbert (Bloomberg, attached) Markets are praying for a Goldilocks economy.

Robust Job and Wage Growth Showed Signs of Cooling in Late 2022 (WSJ) Federal Reserve projects unemployment rate to rise during year ahead

What Could Go Wrong for the Federal Reserve in 2023: Bill Dudley (Bloomberg, attached) The central bank faces three significant risks in its ongoing battle to get inflation back under control.

Global Trade Is Shifting, Not Reversing (WSJ) Mexico is one country best-placed to take advantage of U.S.-China trade war

Fear of Global Gas Crisis Eased by Warm Start to Winter (Bloomberg, attached)

- Milder weather seen from Europe to China over next few weeks
- Gas rationing unlikely as top importers have built stockpiles

FT - Cathie Wood's Ark sheds almost \$50bn in assets since 2021 peak (attached, Ling Yu) Flagship innovation strategy represents 'canary in the coal mine' for regime shift in markets, says Morningstar

FT/Ignites.com - Steady Sales for Bitcoin Futures ETFs amid 'Crypto Winter' (attached, Ling Yu) Investors plowed \$241 million into the six Bitcoin futures ETFs during the first 11 months of 2022, according to data from Morningstar Direct. And most of that money -- \$198 million -- was added after June, which Bitcoin payment service provider Bitpay marks as the start of a crypto "deep freeze."

Crypto Magnates Cameron Winklevoss and Barry Silbert Trade Barbs (WSJ) Silbert's Genesis is a lending partner of the earn program at Winklevoss's Gemini

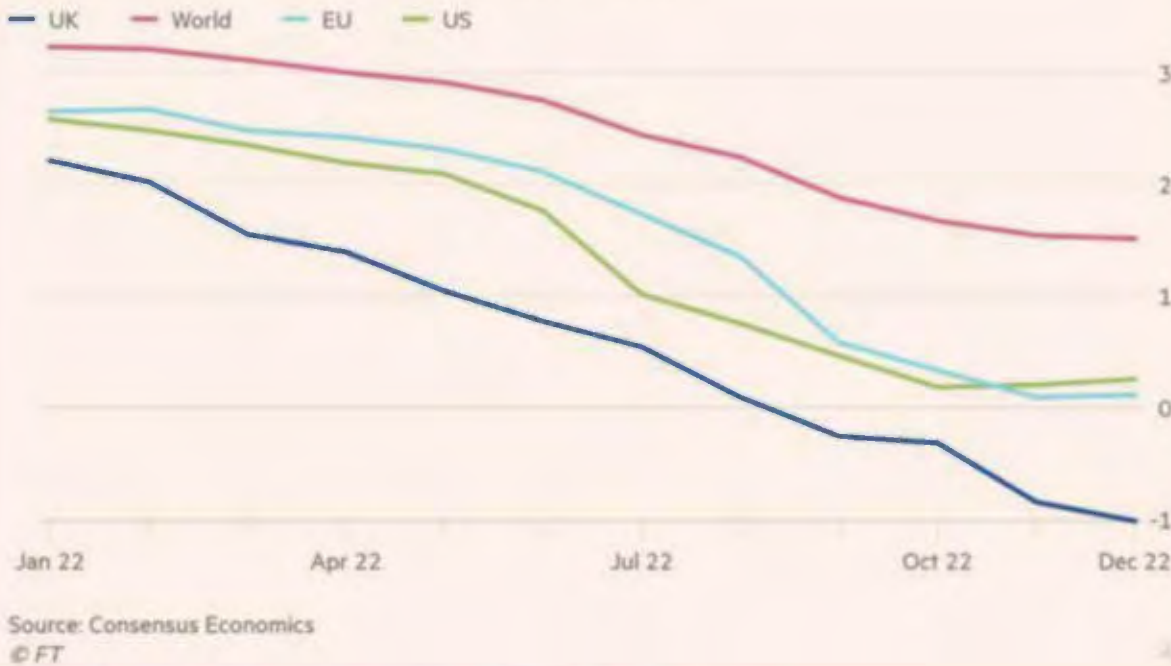
FT/Ignites.com (attached, Ling Yu) Valkyrie Seeks to Take Helm of Grayscale Bitcoin Trust - It is 'time for a change,' Valkyrie stated

FT - Asset managers brace for tough year of cost-cutting in 2023 (attached, Ling Yu) Long-delayed reckoning comes after falling markets hit both management and performance fees last year

FT - UK faces worst and longest recession in G7, say economists (attached, Ling Yu)

Economists have become more pessimistic about the UK economy than other countries

GDP annual growth forecast for 2023, by date of forecast



Law360 - 5 Compliance Trends To Watch In 2023 (attached, Ling Yu)

- The DOJ's Revised Corporate Enforcement Strategy
- Cracking Down On Personal Device Use At Financial Firms
- Amplified Sanctions Concerns
- ESG Developments And Pushback
- Looming Threat Of Economic Downturn

Law360 - Fintech Policy & Regulation To Watch In 2023 (attached, Ling Yu)

- Crypto Legislation's New Urgency
- Regulating Crypto
- Standing Up Stablecoin Regulation
- Don't Bank On A Central Bank Digital Currency?

Law360 - Fintech Litigation To Watch In 2023 (attached, Ling Yu)

- SBF and the Crypto Bankruptcies
- SEC and Ripple Battle It Out
- SEC v. Wahi
- Tornado Cash
- CFTC v. Ooki DAO

Borrowers Make Fast Start to January's Debt Sales Bonanza (Bloomberg, attached)

- European banks, Asia dollar deals return after holidays
- As much as \$40b of US high-grade sales expected this week

CREDIT DAYBOOK AMERICAS: 2023 Kicks Off With Bond-Deal Blitz (Bloomberg) -- Blue-chip firms are expected to raise as much as \$40 billion in the US investment-grade market this week, more than four times the volume for all of December. There's slim prospects of a repeat returns performance for high-grade debt this year while risk repricing may prove harder to navigate for total-return seekers in high yield, according to Bloomberg Intelligence.

- The spread on the Markit CDX North American Investment Grade Index, which rises with increased credit risk, tightened 1.51 basis points to 81.14 as of 7:12 a.m. New York time
- Companies from all sectors are expected to sell bonds, with at least one issuer said to be looking with a jumbo trade in the first week of 2023
 - January is typically busy for borrowers and a drop in funding costs from recent peaks should spur them to get ahead of higher rates and what could be a hard landing in the US

- Syndicate desks predict about \$130 billion of issuance for the month, in line with the \$126 billion average for the first month of the last 10 years
- Four overnight issuers in the US bond market added to the global blitz of deals as issuers including European lenders and Asian governments seized on attractive borrowing costs
- US corporate investment-grade bonds suffered their their worst year on record in 2022 while junk bonds suffered their worst losses since 2008 and supply shrunk to a level unseen in more than a decade
 - The trickier aspects of 2022 persist for junk bonds and ought to keep investors from “prematurely toasting auld lang syne” to the 11.2% losses of last year, Bloomberg Intelligence credit strategists Noel Hebert and Sam Geier wrote in a note on Tuesday
- Tesla delivered fewer vehicles than expected last quarter despite offering hefty incentives in its biggest markets, reinforcing demand concerns that contributed to the worst month and year for the electric-car maker’s stock since its 2010 initial public offering
 - The electric-vehicle maker is one step closer to clinching overall blue-chip status and has paid down its debt while remaining the world’s leading maker of electric cars in recent quarters
- Canada’s merger court released its full decision allowing Rogers Communications’ takeover of rival Shaw Communications, starting the clock on a critical four-week period to close the deal
- Cineworld Group said it hasn’t held talks about selling its theater assets individually as part of its bankruptcy proceedings and denied reports that it’s spoken to rival chain AMC Entertainment Holdings about its cinemas
- Less than six months before Libor is slated to finally end, there are still issues to be worked out to ensure its painless demise. Those involved in laying the groundwork for the transition away from London interbank offered rates in dollar markets made considerable headway in 2022

US HY OPEN: Junk Bonds Set to Rebound From Worst Year Since 2008 (Bloomberg) -- US junk bonds suffered their worst losses since 2008 and supply shrunk to a level unseen in more than a decade spurred by now familiar themes: fears of high inflation, a sharp rise in the cost of debt as the Federal Reserve began the campaign for rate hikes, continuing concerns about an energy crisis triggered by Russia’s war on Ukraine, and forecasts of an impending recession. The high yield market is poised to rebound on expectations that China’s recovery will act as an engine for global growth as it steadily ends its zero-Covid policy.

- US junk bonds are likely to kick off 2023 on a cautious but positive note as US equity futures advance on signs of Europe and China showing promise for global growth
- The primary market may see a cautious revival early next week as traders and bankers return after the holidays to digest the impact of China’s potential recovery
- Banks project high yield supply to double as estimates range from \$180b-\$200b. Analysts expect returns to range from a modest loss of 3.3% to gains of 14%
- Read JUNK BOND OUTLOOK: Returns, Supply and Themes to Watch in 2023
- US junk bond yields rose 475bps to close at 8.96% and spreads widened 186bps to +469, the most increase in a year since 2008
- While junk bonds were thrashed with the worst losses in 14 years, they beat investment grade and equities
- CCCs, the riskiest of junk bonds, were down 16.29%, which may still put them on track to beat the S&P 500

STRUCTURED PIPELINE: Sales Lower Across the Board in 2022 (Bloomberg) -- US ABS new issue volume last year came to approximately \$276.7 billion, according to data compiled by Bloomberg News, about 11.5% below 2021. Despite the lower sales total, issuance was still the second highest since at least 2014. The first week of the year has traditionally been slow in structured finance primary markets, and 2023 should be no exception. For the past several years GM Financial has been one of the first issuers out of the gate and 2023 appears to be no exception as the auto issuer filed an ABS-15G.

- Deutsche Bank is projecting sales of US ABS to decline 15% in 2023 to roughly \$210 billion as rising interest rates may deter some borrowers and a slowing economy squeezes consumers
 - Strategists at Bank of America are calling for a 7% decline to \$225 billion while JPMorgan forecasts \$230 billion
 - NOTE: Bloomberg News may have different criteria than researchers when determining ABS classifications
- Private-label CMBS supply was down about 36% in 2022, at \$99.1 billion, according to deals seen by Bloomberg News
 - Citigroup analysts are recommending investors begin 2023 defensively and be prepared to shift into selectively to higher-yielding sectors as the Federal Reserve nears its terminal rate; the bank forecasts \$105 billion in private-label supply in 2023
- New issue CLO sales were roughly 29.4% lower at \$129.8 billion, but fell just short of the second highest year ever (\$130.4 billion in 2018)
 - 2022 US CLO refi/reset/reissue supply plunged over 90% to just over \$24 billion
 - CLO analysts at JPMorgan expect the global CLO market to swell about 10% to \$1.31 trillion by the end of 2023 as net supply outweighs paydowns; US new issue forecast is \$120 billion
 - Barclays is calling for a base case \$117 billion estimate in US primary supply

- Private-label RMBS issuance was down 41.7% from 2021 at \$128 billion, according to Bloomberg LEAG
 - Non-agency RMBS likely faces a widening of risk in early 2023 and if the economy deteriorates, residential credit may place a significant strain on late 2021 and early 2022 collateral, according to Dec. 2 report from Barclays
 - Based on recent filing activity, JPMorgan, Onslow Bay and New Residential Funding may be the first issuers out of the gate

Structured Highlights: 2023 Outlooks

- Asset-Backed Bond Sales Set to Drop in 2023: Structured Weekly
- CLO Risk May Shift to Fundamentals in 2023, BNP Paribas Says
- CMBS Buyers Should Start Defensive Before 2023 Pivot, Citi Says
- CLOs Brace for Credit Risk in Loans Next Year: Structured Weekly
- Avoid RMBS Going Into 2023, Hedge With IG Debt, Barclays Says
- CMBS Investors to Shift to Credit Risks in 2023, JPMorgan Says
- JPMorgan Sees Global CLO Market Growing by 10% to \$1.3 Trillion
- CLO Activity to Pick Up in Second Half of 2023, Barclays Says

DISTRESSED DAILY: New Year Begins With \$297 Billion of Distress (Bloomberg) -- The new year is poised to carry plenty of opportunities for distressed investors as debt markets indicate that corporate defaults are primed to pick up. The pile of troubled bonds and loans outstanding finished the year at nearly \$300 billion, dwarfing 2021's tally of \$62 billion, according to data compiled by Bloomberg. The biggest distressed debt stacks belong to Bausch Health Cos., Carnival Corp. and Diamond Sports Group LLC. Meanwhile, there was some movement in existing distressed situations while much of Wall Street was away for the holidays. S&P Global ratings slashed AMC Entertainment Holdings Inc.'s credit grade one notch further into junk territory after the theater operator proposed swapping \$100 million of for preferred equity. The company's board of directors is also changing, with Silver Lake's Lee Wittlinger stepping down. In the cryptocurrency space, Argo Blockchain Plc. sold its Helios Bitcoin mining facility to Galaxy Digital Holdings for about \$65 million, buying the troubled company some time for a turnaround. The deal includes a \$35 million loan from Galaxy to Argo. All told, the transaction is expected to cut Argo's debt \$41 million. Diebold Nixdorf Inc., the ATM maker, finished swapping certain notes in a deal that provides \$400 million in fresh capital, according to the company. The move will help Diebold normalize operations and meet supplier commitments, Chief Executive Officer Octavio Marquez said in a statement. McDermott International Ltd. tapped investment bank Credit Suisse Group AG to help explore options for its letter of credit facility coming due in 2024, Bloomberg News reported. The company went bankrupt in 2020 and emerged later that year with \$2.4 billion in letter of credit capacity. Finally, Tuesday Morning Corp. is delisting its stock from Nasdaq Capital Markets amid lower than forecast sales, increased insurance costs and tightened liquidity. The off-price retailer is "facing near-term capital constraints and is actively seeking to raise additional capital," according to a statement.

- DATA POINTS
- QUOTABLE
 - "It is very difficult to see how the default cycle will not run its course, given the level of interest rates."
 - Will Nicoll, chief investment officer of Private & Alternative Assets at M&G, on the state of credit markets as distressed debt grows
- DEADLINES AND DOCKETS
 - All times are U.S. Eastern unless specified and are subject to late revision or cancellation.
- Tuesday, Jan. 3
 - Core Scientific, bankruptcy hearing, noon
- READING LIST
 - News, research and insight relevant to distressed investing
- Study Up: These Trades Will Shape Distressed Investing in 2023
- Times Square Crowne Plaza Building Goes Bankrupt, Eyes Sale
- Guitar Center Earnings Drop Nearly 44% Amid Weakening Demand
- FTX Customers Sue Sam Bankman-Fried as Part of Chapter 11 Case
 - Click here to keep track of breaking news on distressed debt and bankruptcies. First Word is curated to give you actionable news from Bloomberg News, Bloomberg Intelligence, Bloomberg Law and select independent sources, including Dow Jones and Twitter. First Word can be customized to your Worksheet, sectors, geography or other criteria by clicking into Actions on the toolbar or hitting the HELP key for assistance.

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To: (b)(6) @occ.treas.gov (b)(6) @occ.treas.gov
From: Case 1:24-cv-01858-ACR Document 34-5 Filed 06/20/25 Page 243 of 672
Pierce, Lauren
Sent: 2023-04-19T21:19:46Z
Subject: FW: Money Stuff: Betterment Missed Some Tax Trades
Received: 2023-04-19T21:19:47Z

Third, there was pushback against Gensler for not *owning* or *using* crypto. “It is hard to understand something without using it,” writes Anthony Pompliano. “The idea that we have regulators who are actively making rules for something that they have never used seems confusing.”

This seems like a simple mistake. Nobody asks the administrator of the Drug Enforcement Administration if she has ever used meth. “How can you regulate meth if you have never used meth” is a non sequitur. “How can you understand meth if you have never used meth,” similarly, has easy answers: You can look at the science and sociology of how it affects people, decide that it’s bad, and regulate it accordingly.

From: Matt Levine <noreply@mail.bloombergview.com>
Sent: Wednesday, April 19, 2023 2:49 PM
To: Pierce, Lauren (b)(6) SEC.GOV>
Subject: Money Stuff: Betterment Missed Some Tax Trades

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“Any one may so arrange his affairs that his taxes shall be as low as possible,” said Learned Hand; “he is not bound to choose that pattern

Betterment

“Any one may so arrange his affairs that his taxes shall be as low as possible,” said Learned Hand; “he is not bound to choose that pattern which will best pay the Treasury; there is not even a patriotic duty to increase one’s taxes.” But what about the reverse? If you are an investment adviser with a fiduciary duty to your clients, do you have an obligation to *minimize* their taxes? You do have a duty to be loyal and diligent and do a good job for them; you try to maximize their risk-adjusted return, and generally speaking reducing taxes increases returns more *reliably* than does, like, having a lot of investment skill. “I will buy stocks that go up, so my clients have high returns”: hard to do. “I will sell stocks that have gone down and rotate into similar stocks to generate losses to shield my clients’ capital gains”: pretty straightforward as these things go.

On the other hand, if you fail to minimize your client's taxes, it would be a little weird for a government regulator to come in and punish you. It's not clear that government regulators have, you know, an interest in encouraging tax minimization? But here is a **US Securities and Exchange Commission enforcement action** fining Betterment LLC \$9 million for not fulfilling its fiduciary duty to minimize its customers' taxes. Well, technically the fine is for *advertising* that it did a better job of minimizing taxes than it actually did:

The SEC's order finds that, from 2016 to 2019, Betterment, in communicating with clients, misstated or omitted several material facts concerning [*tax loss harvesting*], a service that scans clients' accounts for opportunities to reduce their tax burden. According to the order, at different times, Betterment failed to disclose a change in the software related to its scanning frequency, failed to disclose a programming constraint affecting certain clients, and had two computer coding errors that prevented TLH from harvesting losses for some clients. Collectively, these issues adversely impacted more than 25,000 client accounts, resulting in those clients losing approximately \$4 million in potential tax benefits.

For instance, for a while Betterment told clients that it **scanned their portfolios every day** for tax-loss-harvesting opportunities, but in fact it was only scanning them every *other* day. Eventually it fixed this problem and went back to scanning them every day, but in the meantime "approximately 25,000 clients lost approximately \$1.9 million in potential tax benefits as a result of the undisclosed change in scanning frequency." The US government got \$1.9 million more in revenue because Betterment was not checking every client's portfolio every day to minimize taxes. Which was bad I guess.

We talked a while back about a **ProPublica investigation** into tax-loss harvesting that big banks like Goldman Sachs Group Inc. do on behalf of their ultra-high-net-worth clients. ProPublica confronted Goldman with its findings and Goldman basically said, oh, right, a few of these trades were probably too aggressive, but for the most part (in ProPublica's words) "the bank will continue its broader practice of finding similar stocks that achieve the same effect." "It would be irresponsible not to," I wrote: Goldman is a fiduciary, its customers are paying it for tax optimization, so it does the best job it can do of optimizing their taxes. One could object, on public-spiritedness grounds, but that really is the job. And if you don't do it diligently, you will get in trouble.

against Bed Bath & Beyond Inc. is, like, two weeks away. Bloomberg News reports:

Bed Bath & Beyond Inc. is once again laying the groundwork for a bankruptcy filing as its last-ditch efforts to raise cash come up short.

The retailer is holding talks with advisers and lenders ahead of a Chapter 11 filing that could come in the next few weeks, according to people with knowledge of the conversations, who asked not to be named discussing private plans. Bed Bath & Beyond is also looking at financing options to help fund itself during bankruptcy, the people added.

The filing could come before an April 26 deadline by which the company sought to raise another \$300 million from equity investors, the people said, adding that a decision isn't final and plans could change.

Bed Bath & Beyond has shocked investors before: earlier this year, the company staved off a bankruptcy filing after raising \$360 million from a hedge fund investor that bought shares at a discount. ...

Even as the retailer prepares for bankruptcy, shares staged another rally in a move reminiscent of meme-stock mania two years ago, where wild swings in stocks became commonplace. Bed Bath & Beyond spiked 41% in the first 40 minutes of trading on Wednesday, bringing the stock price to nearly 49 cents, more than double its closing price last week.

Bed Bath & Beyond has been **pounding out** tens of millions of dollars of stock to retail investors in at-the-market stock offerings as **all this has been going on**; for all I know it has been selling stock into *today's* rally. Why not? In all of its public disclosure, Bed Bath has been reasonably clear about the risks that investors face, with the main one being that the company is probably going to go bankrupt with no recovery for the equity. "We expect that we will likely file for bankruptcy protection notwithstanding the sale of common stock pursuant to the Purchase Agreement," **Bed Bath** said in the risk factors to its stock offering prospectus last week. And now the stock has gone *up* today on reports that bankruptcy is closer.

Somebody is buying Bed Bath stock today at \$0.46, *possibly from the company itself*, [1] and if that stock becomes worthless in a week because of a bankruptcy filing that person is going to sue. Though of course the stock will probably rally even more if the company actually files. (Will the company keep selling stock

On the one hand: If you are a company, you have some fiduciary obligations to your shareholders, and it seems like poor form to sell them stock moments before you file for bankruptcy and render the stock worthless. They will definitely be mad at you, and they will definitely be able to make some argument of the form “you knew more about the risks than you told us, and you tricked us into buying stock.” “Everything is securities fraud,” I often say; every bad thing that happens to a company can also be characterized as securities fraud. Going bankrupt is bad, so there you go.

On the other hand: You absolutely did not trick them. They tricked themselves, if anything, though you took advantage of their self-deception. US securities law is basically founded on full disclosure, and if you say “hey here’s some stock but FYI we’re about to go bankrupt,” then arguably you have done all that the law requires of you. (Also saying that might make people *more* likely to buy the stock? People love a dare.) Also if you are a company and you are moments away from bankruptcy, arguably your fiduciary obligations are to your *creditors*, not your shareholders, so going out and raising more money from shareholders so that you can immediately hand it over to creditors is exactly what you are supposed to be doing.

Duration

Bank runs are largely a self-reinforcing phenomenon: If people worry about a bank, they will take their money out, which will lead to the bank not having enough money, which will make more people worry and take their money out, etc.

But the recent set of **bank runs** in the US were caused largely by regional banks’ unrealized losses on their long-term bond portfolios as interest rates rose: The banks borrowed short-term from depositors to invest long-term in safe bonds, and as interest rates went up those bonds lost value, leaving the banks undercapitalized and causing depositors to flee. That is a partially self-reinforcing phenomenon: If your depositors are all fleeing, you have to sell bonds to get cash to give to the depositors, further driving down the bonds’ prices. (And the Fed stepped in to break this cycle in part by **promising to lend money against those bonds**, so they don’t have to be sold.)

But it is also a partially self-limiting phenomenon, because if rising interest rates cause a banking crisis, then the banking crisis will cause (long-term expectations of) interest rates to fall, so **your bonds will go back up again**:

Rising rates over the past year saddled banks with losses on their massive portfolios of bonds. Those losses helped sink Silicon Valley Bank last month. But since that failure sparked turmoil across the

Bank of America Corp., which released its first-quarter earnings Tuesday, is the latest to benefit. The bank is still deeply underwater on its bonds that it is holding to maturity, but unrealized losses shrank by \$9.5 billion from three months ago and \$17.1 billion from six months ago, when rates were peaking. ...

After the banking turmoil began, bond yields dropped sharply. Between March 9, the day before SVB failed, and the end of the quarter, the yield on the 10-year Treasury note fell 0.43 percentage point to 3.49%. It edged up to 3.59% on Monday.

That yield, which is the benchmark for many types of bonds stowed in banks' securities portfolios, has been falling largely because the banking turmoil heightened fears of a recession.

In turn, unrealized losses have been shrinking.

If rising interest rates cause banks to fail, that will lead to a recession, which will cause interest rates to drop, which will rescue those banks. The trick is the timing.

Elsewhere in **banks and interest-rate risk**:

Few U.S. banks protected themselves against rising interest rates during the Federal Reserve's monetary-tightening campaign last year, according to a research paper that says unhedged securities holdings are more widespread than investors might realize.

The paper—"Limited Hedging and Gambling for Resurrection by U.S. Banks During the 2022 Monetary Tightening?"—contends that hundreds of other banks share that risk, which played a role in the collapse last month of Silicon Valley Bank. The paper didn't single out individual institutions, instead presenting an analysis of aggregate data.

Here is **the paper**, by Erica Jiang, Gregor Matvos, Tomasz Piskorski and Amit Seru:

We analyze the extent to which U.S. banks hedged their asset exposure as the monetary policy tightened in 2022. We use call reports data for interest rate swaps covering close to 95% of all bank assets and supplement it with hand-collected data on broader hedging activity from 10K and 10Q filings for all publicly traded banks (68% of all bank assets). Interest rate swap use is concentrated among larger banks who hedge a small amount of their assets. Over three

swaps. Swap users represent about three quarters of all bank assets, but on average hedge only 4% of their assets and about one quarter of their securities. Only 6% of aggregate assets in the U.S. banking system are hedged by interest rate swaps. We also find limited hedging of interest rate exposure by publicly traded banks and by banks which report the duration of their assets. The use of hedging and other interest rate derivatives was not large enough to offset a significant share of the \$2.2 trillion loss in the value of U.S. banks' assets (Jiang et al. 2023). The duration of bank assets increased during 2022, exposing banks to additional interest rate risk. We find slightly less hedging for banks whose assets were most exposed to interest rate risk. Banks with the most fragile funding – i.e., those with highest uninsured leverage -- sold or reduced their hedges during the monetary tightening. This allowed them to record accounting profits but exposed them to further rate increases. These actions are reminiscent of classic gambling for resurrection: if interest rates had decreased, equity would have reaped the profits, but if rates increased, then debtors and the FDIC would absorb the losses.

There was a lot of this discussion when SVB failed — a lot of people asking “why didn't they just hedge their interest-rate risk?” — and honestly I find it a bit strange. Banks are **in some deep sense** *in the business of maturity transformation*; their whole function is to borrow short-term from depositors (who *can* take their money back any time, but mostly *don't*) and invest long-term in loans and bonds. The way they get paid for doing that business, most of the time, is through the yield curve [2] : Short-term interest rates are usually lower than long-term rates, so a bank that borrows short to lend long makes money from the difference in rates. And then if rates suddenly go up a lot (and invert, so that short-term deposit rates are *higher* than long-term bond rates) the banks lose a ton of money, whoops.

I guess they should have hedged, but broadly speaking if you were a bank in 2020 and you were taking deposits at 0% and investing them in Treasuries and then swapping the Treasuries to floating, you weren't earning any money: You were paying 0% on deposits, earning like 0.6% on your Treasuries, and then giving up most of that yield on the swap. [3] “Borrow short to lend long and then swap all your long-term assets back to short-term rates” is economically the same as “borrow short to lend short,” which is not really a core banking business model because it doesn't make money, certainly not enough money to pay for branches and tellers. [4] The banking business model is inherently risky, and hedging it so that it is no longer risky also makes it no longer a business model.

hearing of the House Financial Services hearing yesterday about crypto regulation. We have talked a lot about SEC regulation of crypto recently, and I want to point out three things about his testimony.

First of all, my general view of crypto regulation in 2023 has been that Gensler and the SEC want to crack down on crypto, and the financial crisis in crypto last year — especially the failure of FTX Trading Ltd., whose now-indicted leaders gave a lot of money to politicians to try to shape crypto regulation — has given them the political cover to do so. In 2021, people in crypto would say that the SEC’s posture was stifling innovation, and they’d get a sympathetic hearing in Congress and the press; in 2023, we have more data on how that innovation turned out, and there is less sympathy.

But yesterday’s hearing undermines my view. There *are* members of Congress who seem to think that crypto is valuable and innovative, that the SEC is stifling innovation, etc., all the stuff that was standard in 2021 and that retreated after the high-profile crypto frauds and failures in 2022. Ahead of the hearing, all the Republicans on the committee sent Gensler a letter “slamming the Commission’s approach to digital asset regulation and attempts to force digital asset trading platforms to ‘come in and register’ under the ill-fitting national securities exchange (NSE) framework.” “To date,” they write, “the SEC has forced digital asset market participants into regulatory frameworks that are neither compatible with the underlying technology nor applicable because the firms’ activities do not involve an offering of securities.”

This is the crypto industry view, that (1) most crypto tokens are not securities and (2) even if they are securities, the SEC should adapt its rules to make it more feasible to register crypto tokens (and crypto exchanges), because it is basically impossible to register tokens under existing securities rules. I assumed that, after FTX, most politicians would not want to loudly endorse that view, but apparently I am wrong. Seems relatively bullish — more bullish than I thought, anyway — for crypto, and for crypto exchanges.

Second, Gensler was asked if Ethereum is a security, and he declined to answer directly. I have mentioned this problem before; basically:

- It seems widely accepted in the US regulatory world that Ethereum is treated as a commodity, not a security: It is regulated by the Commodity Futures Trading Commission, Ether futures trade on commodities exchanges, it can be sold without securities registration, etc.
- This seems to be largely a historical accident, a grandfathering-in of Ethereum because it got too big and too popular before the SEC paid attention to it, and there’s a pretty good argument that if most crypto tokens are securities (because

that promised to make the investors rich), then so is Ethereum. [5]

Gensler *surely* thinks it's a security — how could he not, he thinks every crypto is a security — but he can't come out and say that because it would contradict the accepted view. “One pet theory of mine,” I wrote last month, “is that if you hung out with SEC Chair Gary Gensler and got a few drinks into him, he would tell you ‘obviously Ethereum is a security.’”

Anyway I previously thought all of that due to Gensler's, like, body language, but now we have him saying it — or, rather, declining to say it — before Congress.

Third, there was pushback against Gensler for not *owning* or *using* crypto. “It is hard to understand something without using it,” writes Anthony Pompliano. “The idea that we have regulators who are actively making rules for something that they have never used seems confusing.”

This seems like a simple mistake. Nobody asks the administrator of the Drug Enforcement Administration if she has ever used meth. “How can you regulate meth if you have never used meth” is a non sequitur. “How can you understand meth if you have never used meth,” similarly, has easy answers: You can look at the science and sociology of how it affects people, decide that it's bad, and regulate it accordingly.

If you start from the assumption that crypto is the future of payments, or of the financial system, or of art or identity or the web or whatever, then, sure, the people regulating it should understand its mechanics and possibly be users and enthusiasts themselves. If you don't start from that assumption, though, it seems reasonable to let the regulators examine the *effects* of crypto and decide whether it's good or bad. I think it is plausible for a regulator to look at crypto's track record in 2022 and say “we need much more restrictive anti-fraud enforcement in crypto” without using crypto himself, or understanding the technical workings of a blockchain, or whatever. He can judge by the effects. Nobody would say to the prosecutors looking into the FTX bankruptcy, “how can you prosecute this case if you never even owned any FTT tokens?” Owning FTT tokens is not a prerequisite to understanding or prosecuting FTX. Arguably owning FTT tokens is proof that you *didn't* understand FTX.

T-Swift vs. FTX

I do feel like if I were an enormously wealthy celebrity — like, Tom Brady- or Taylor Swift-level celebrity — and someone came to me with a large bag of money and said “hi we will give you this bag of money in exchange for recording a brief message endorsing our company,” I would probably ask questions like “is your company doing crime?” I am not saying that every celebrity should have a detailed due diligence checklist and ask penetrating legal or business questions of

wealthy celebrity, (1) you have a lot of money, so one more bag of money doesn't matter *that* much and (2) your reputation is very valuable, so lending your credibility to a crime is very expensive for you. Anyway **good for Taylor Swift**:

Taylor Swift was one of the only celebrities who did their due diligence on crypto exchange FTX, according to the lawyer suing the now-bankrupt company's celebrity promoters.

Attorney Adam Moskowitz has gone after basketball legend Shaquille O'Neal, football star Tom Brady, "Seinfeld" creator Larry David and more than a dozen other FTX promoters in a class action lawsuit that accuses them of promoting the sale of unregistered securities.

Moskowitz is seeking \$5 billion in the lawsuit, he said during an episode of The Scoop podcast with Frank Chaparro. He claims the exchange's celebrity boosters didn't do their due diligence to check whether they may be breaking the law before cutting TV and digital ads for FTX.

"The one person I found that did that was Taylor Swift. In our discovery, Taylor Swift actually asked them, 'Can you can you tell me that these are not unregistered securities?'" Moskowitz said. Swift reportedly came close to inking a \$100 million sponsorship deal with FTX, but the partnership never materialized. Swift did not immediately respond to a request for comment.

I will say that, among FTX's problems, "selling unregistered securities" doesn't rank very high. Did FTX sell unregistered securities? Oh *probably*, [6] but no one has bothered to come after it for that, [7] what with the **bigger problem** of FTX **going bankrupt** because billions of dollars of customer money was missing. Taylor Swift did not exactly ask FTX the *correct* due diligence questions. And there are some frauds that are designed to be robust to the *obvious* due diligence questions, to trap superficially sophisticated investors, to reassure you that they are not doing the illegal thing that you think they're doing, and to misdirect you from the fact that they are doing a different illegal thing.

On the other hand there are lots of other frauds where they ask you for money, and you ask them if they are doing a particular crime, and they say "eep, gotta go!" even though they are in fact doing some entirely different crime. If you are doing a fraud, it's probably easier not to deal with people who have any sort of suspicions, even the wrong ones. If you ask a crypto exchange "are you selling unregistered securities" and they say "oh no, we would never do that, here is a legal opinion from a reputable firm," that doesn't mean that you are safe; they

“mumble mumble look over there” and run away, then you dodged a bullet.

Things happen

Morgan Stanley Profits Slide Amid Investment-Banking Slump. Goldman Sachs Misses Out on Lending Bonanza. Banks Betting on Paris Say There Really Is Life After London. Deutsche Bank Mulls Shrinking Executive Board in Cost Drive. Denmark Arrests Eight People on Power Price Manipulation Charge. Credit Suisse files High Court claim against SoftBank in \$440mn dispute. Credit Suisse Failed to Probe Nazi Past, Senate Committee Says. Office Building Owners Snubbed by Life Insurance Lenders. FTX US’s Former Head Kicks Off Trading Hub for Futures and Crypto. The Repo Man Returns as More Americans Fall Behind on Car Payments. Tesla Slashes Prices of Key Models Again Ahead of Earnings. Ray Dalio Set to Open Branch of Family Office in Abu Dhabi. “I feel better as a creditor in China than I do in Switzerland.” MillerKnoll CEO Sparks Viral Outrage After Telling Staff to ‘Leave Pity City.’ Coming Soon From the Producers of *The Wolf of Wall Street*: NFTs.

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[1] No, technically, from its broker/investment banker, B. Riley Principal Capital II LLC, who is buying the stock to sell it into the market, and who will presumably also be named in the lawsuit.

[2] And through credit spreads, though that too can be hedged, and if banks had huge credit losses people would complain that they should have hedged more. The stylized model of a modern US bank is less “the bank takes deposits, makes mortgages, and earns a spread for taking the credit risk of the mortgages” and more “the bank takes deposits, makes mortgages, sells the credit risk to Fannie Mae or Freddie Mac and earns money for taking the duration risk of the mortgages.”

[3] For some pretty fake numbers: The 10-year Treasury yielded about 0.63% in April 2020, the Secured Overnight Financing Rate was in the neighborhood of 0.02% to 0.03%, and Bloomberg tells me (USOSFR10 Curncy GP) that 10-year SOFR swaps were trading at about 0.4%. So you’d be earning about 0.25%.

[4] Arguably “borrow short to lend short” is the business model of a money-market fund, which does not have branches or tellers or capital requirements, so it can live on a few basis points of income.

[5] Another possible issue here is that originally Ethereum was proof-of-work, but

last year it switched to being proof of stake. It seems clear that proof of stake blockchains, which pay “dividends” or “interest” of tokens to holders of tokens who lock them up to validate transactions, are *more* security-like than proof-of-work blockchains; I don’t think the difference is absolute, but there’s a difference. “Ethereum was not a security when it launched, but is now because now it’s PoS” is a coherent position, though I don’t think it’s right. I think Ethereum was a security when it launched, because it raised money in an offering that obviously met the Howey test, and it is not a security now because that ship has sailed and everyone kind of agreed not to treat it like a security.

[6] FTX is a largely offshore exchange that sold crypto assets mostly to non-US persons, making them mostly exempt from US registration requirements. But it did have a US exchange that sold crypto assets to US persons, and presumably all of its, like, Super Bowl advertising was targeted at US persons. Were some FTX-listed crypto assets securities? My view is that the SEC’s view is that virtually all crypto assets are securities, and virtually all US crypto exchanges are breaking the law by operating unregistered securities exchanges, so if FTX hadn’t imploded and lost its customers’ money the SEC would eventually have gotten around to suing FTX for offering unregistered securities. But, again, not the biggest problem!

[7] In particular, the SEC *has* brought an enforcement action against FTX, but for defrauding its equity investors, not for offering unregistered securities. This doesn’t mean that the SEC concedes the point that all of its token listings were not securities, just that it’s not top of mind for anyone.

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Subject: FW: Firm publications on cryptocurrency accounting
Received: 2018-05-08T17:27:17Z
[cryptocurrency-bitcoin-accounting.pdf](#)
[EY-IFRS-Accounting-for-crypto-assets.pdf](#)

Brian and Amy,
As discussed, attached are the 2 firm publications we have distributed to C1 members.

The document that Cameron will provide referenced the work of the Accounting Standards Board of Japan, as well as the Australian Accounting Standards Board paper to the ASAF in Dec 2016.

Thanks again for your time, and let me know if you have questions.

Regards,
Jenifer

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IFRS (#)

Accounting for crypto-assets



Building a better
working world

Contents

1. Introduction	1
<hr/>	
2. What are crypto-assets?	2
<hr/>	
2.1. Cryptocurrencies	3
2.2. Tokens (crypto-assets other than cryptocurrencies)	5
3. Accounting for crypto-assets	10
<hr/>	
3.1. Selected activities of standard setters	10
3.2. Special situations	13
3.3. Conclusion	15
4. Supporting details	16
<hr/>	
5. Contacts	21

1

Introduction

Crypto-assets experienced a breakout year in 2017. Cryptocurrencies, such as bitcoin and ether, have seen their prices surge as the public's awareness has increased, and financial market participants have thus increasingly turned their attention to the phenomenon. Simultaneously, a wave of new crypto-asset issuance has been sweeping the start-up fundraising world, sparking the interest of regulators in the process.

Accountants have thus far been notable by their relative absence from that narrative. Perhaps, most notable is the fact that the Australian Accounting Standards Board (AASB) has submitted a discussion paper on "digital currencies" to the International Accounting Standards Board (IASB), and the Accounting Standards Board of Japan (ASBJ) has issued an exposure draft for public comment on accounting for "virtual currencies".¹ In addition, the IASB discussed certain features of transactions involving digital currencies during its meeting in January 2018, and will discuss in future whether to commence a research project in this area.²

This also highlights the lack of a standardized crypto-asset taxonomy, which makes it difficult to determine the applicability of standard setters' published perspectives. Furthermore, due to the diversity and pace of innovation associated with crypto-assets, the facts and circumstances of each individual case will differ, making it difficult to draw general conclusions on the accounting treatment.

Despite the market's increasingly urgent need for accounting guidance, there have been no formal pronouncements on this topic to date.

In this report, we aim to first briefly introduce cryptocurrencies and other types of crypto-assets. Then, we discuss some of the recent activities by accounting standard setters in relation to crypto-assets.

This structure highlights the fact that dealing with crypto-assets requires a detailed understanding of the technical intricacies of distributed ledger technology (often referred to as blockchain) on one hand, and relevant accounting concepts on the other.

However, we do not aim to specifically address the merits and potential of the underlying blockchain technology here. For that, we would recommend consulting the recent EY-sponsored **Global blockchain benchmarking study**.

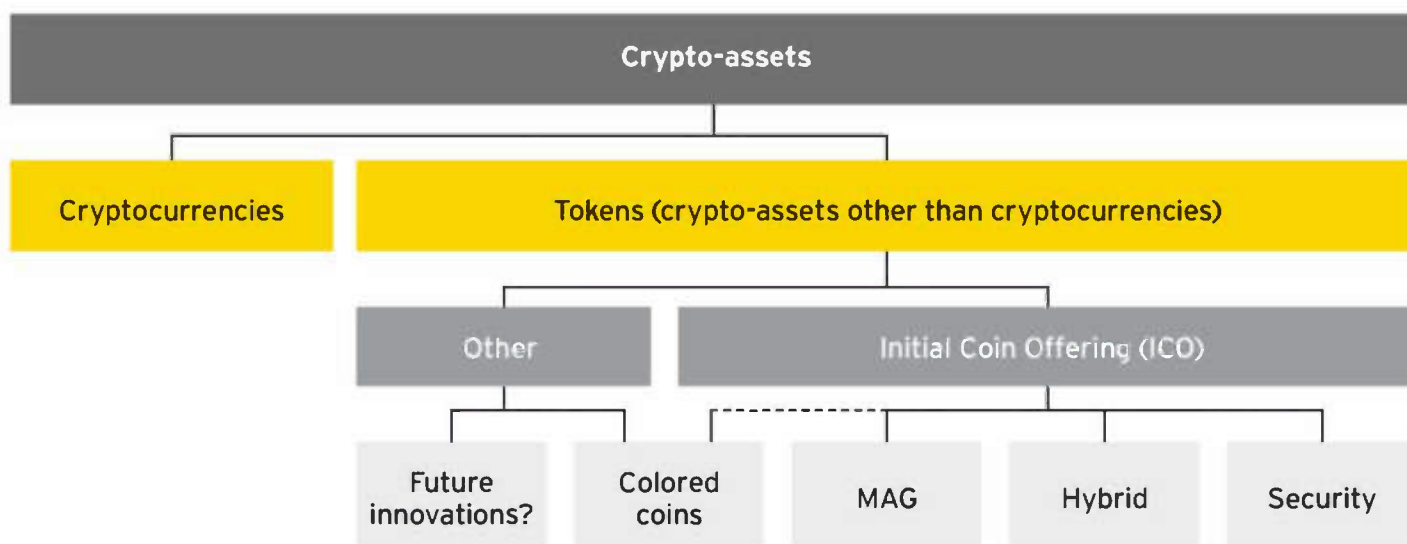
2

What are crypto-assets?

Crypto-assets are digital assets recorded on a distributed ledger. They derive their name from the cryptographic security mechanisms used within public, permission-less distributed ledgers. In many cases, they pose a challenge to established beliefs about money, economic relationships and investing, thereby also raising questions about their appropriate financial reporting.

Cryptocurrencies, such as bitcoin and ether, constitute the earliest and best-known examples of crypto-assets, but the space continues to grow and evolve, producing new types of assets that are commonly called tokens.

In such a fast-moving environment, it is difficult to create any lasting taxonomy of crypto-assets. For the purposes of our analysis, we deliberately have shown below a distinction between cryptocurrencies and non-cryptocurrency tokens. We do so in full acknowledgment of the fact that all crypto-assets may commonly be referred to as “tokens” and a hard boundary between our two categories may at times be difficult to draw. We elaborate further on these definitions in the relevant sections below.



2.1. Cryptocurrencies

The word “cryptocurrencies” is often used as a blanket term for all crypto-assets. However, we use it specifically to mean those crypto-assets that are meant to constitute a peer-to-peer alternative to government-issued fiat currency; a general-purpose medium of exchange independent of any central bank. These were the first types of crypto-assets to emerge, rising to prominence with the launch of Bitcoin in 2009.

2.1.1. Bitcoin

Bitcoin was one of the first cryptocurrencies, fostered at the height of the global financial crisis by a libertarian community deeply distrustful of governments and central authorities. It has spawned many imitators, but remains the leading cryptocurrency by market capitalization.

In the Bitcoin blockchain, anyone can view the ledger which records ownership of bitcoins and transact upon it. Privacy is thus achieved only through pseudonymity, i.e., a lack of connection between the Bitcoin address and an identifiable legal or natural person.²

Crucially, anyone with sufficient computing power can participate in the validation of transactions by using one’s computer to solve complex cryptographic equations. The equation solutions enable “blocks” of transactions to be added to the “chain” in return for newly “mined” bitcoins. There is no need for mutual trust

or central authority (e.g., a bank) to enforce rules and maintain the “golden source” of transactions. Each computer maintains, or has access to, a full record of every transaction since the blockchain’s inception. Whenever a transfer of bitcoins is made, this public record is used to verify availability of funds and the new transaction is encoded into the consensus ledger through the mining process described above. Therefore, the ledger is virtually immutable. There is almost no risk of fraud or manipulation in participant-to-participant transactions on the blockchain itself (though there may be when trading the asset, and there is also potential for market manipulation or theft of private keys, for example).

Bitcoin is specifically designed as a currency and payment system, but it is worth pointing out that in a public, permission-less distributed ledger, it is customary to offer a form of on-chain value to incentivize transaction validation.

In the Bitcoin blockchain, this incentive currently takes the form of not only transaction fees, but also newly-mined bitcoins. When every block is mined, the miner receives a predetermined amount of bitcoin, but the supply of bitcoins is actually finite by design. Once the last bitcoin is mined, the system will switch to an exclusively transaction fee-based incentive. This forms part of the allure of Bitcoin to the libertarian crypto community. Its finite, deflationary money supply can be likened to a digital gold standard.

In spite of that principle, it is important to note that Bitcoin is dynamic rather than static. The reference implementation code is open source, i.e., it is managed and updated by volunteers who must achieve consensus among nodes for a change to be adopted. The Bitcoin community has continuously advocated for more widespread adoption, and has even made changes to the Bitcoin blockchain to that end. Over the course of 2017, this created philosophical divisions in the community over the future direction of the technology, pitting adherence to founding principles against increased acceptance by the mainstream.

One such division led to the August 2017 “hard fork” (i.e., backward-incompatible system upgrade) that created two competing versions of the Bitcoin blockchain: one adopted by the majority of users, which is bitcoin (BTC), and a new offshoot labeled Bitcoin Cash (BCH). This highlights the decentralized, consensus-driven nature of the technology.

2.1.2. Ether

Ethereum went live in July 2015, having been funded by a crowd sale not dissimilar to some of today’s initial coin offerings (ICOs). It is a decentralized platform similar to an operating system like those found in smartphones; anyone can build applications on top of the platform to perform various tasks. This distinguishes Ethereum from Bitcoin. Bitcoin was designed specifically to be limited to simple logic – as a peer-to-peer electronic cash system. Ethereum supports programming code for any type of decentralized application; its capability is wider. The platform runs smart contracts – computer protocols that enforce or negotiate contracts through code.

Despite its primary function as an enabler of decentralized applications, Ethereum, like any public permission-less blockchain, requires a form of on-chain value to incentivize transaction validation, or in other words pay the machines that execute the operations that build and maintain the ledger. This payment comes in the form of a cryptocurrency called ether.

Ethereum currently functions using a proof-of-work system, much like Bitcoin. In the near future (2018), it is expected to gradually move to a new proof-of-stake consensus algorithm³ called Casper.

The public Ethereum platform relies on the consensus of its participants in the same way as Bitcoin does, and this has proved equally problematic. There have been multiple hard forks in the Ethereum ledger – in 2014, 2015 and 2016. For a further discussion of hard forks, refer to the “Special situations” section below.

The last fork received widespread news coverage, as it caused a deep divide in the Ethereum community over the decision to return US\$50m in stolen Ether to investors in The Distributed Autonomous Organization (the DAO).⁴

The case of the DAO has been useful in furthering the broader public debate on ICOs (discussed within the “Tokens” section on the next page), as it prompted an investigation by the U.S. Securities and Exchange Commission (SEC) into whether ICO tokens (such as those held by investors in the DAO) constitute securities. The SEC released its Report of Investigation in July 2017 stating that the DAO tokens were securities and should thus have been subject to securities laws and regulations.⁶

Proof of work³

In a proof-of-work system, network participants compete to be the fastest to solve the cryptographic puzzles required to add a new block to the blockchain. When the puzzle is solved, the machine involved proves that it completed the work, and is rewarded in any given system with a token of value.

Proof of stake³

In a proof-of-stake system, a validator must prove ownership of a certain amount of coins in order to participate in transaction validation. The validator’s probability of validating the next block is equal to its share of all coins in existence. Transaction fees earned by the validator are paid by the transacting parties.

2.1.3. Other cryptocurrencies

Bitcoin and Ether represent two of the most widely used cryptocurrencies, but many alternatives exist. Examples from the top 10 cryptocurrencies by market capitalization at the time of writing are:

- ▶ Bitcoin Cash
- ▶ Ripple (XRP)
- ▶ Litecoin

These highlight the myriad design choices available within the umbrella of distributed ledger technology – choices that imply trade-offs in terms of functionality, transaction speed, energy consumption, security and trust (or centralization).

2.2. Tokens (crypto-assets other than cryptocurrencies)

We use “tokens” as an umbrella term for a wide variety of crypto-assets. In contrast to cryptocurrency, which is designed as a general-purpose medium of exchange across applications, tokens tend to be designed to support a more narrowly-defined, specific use case of distributed ledger technology. Although cryptocurrencies may also commonly be referred to as “tokens”, we deliberately draw the above distinction here, defining the term tokens herein to mean non-cryptocurrency tokens providing something other than purely general-purpose value transfer.

The market’s focus has recently been on tokens issued in ICOs, but one should note that other types of tokens exist. An ICO is the process by which some of them are brought to market, but tokens are not necessarily simply a capital-raising tool. We discuss some examples below while acknowledging that new types of tokens may yet be developed.

2.2.1. Ether

In the “Cryptocurrencies” section above, we noted that Ethereum’s native cryptocurrency, ether, is necessary to incentivize transaction validation in the network and thereby acts as a medium of exchange similar to bitcoin. Yet, ether also fulfills the role of “crypto-fuel” to run smart contracts, i.e., it is an enabler of decentralized applications built on Ethereum.

This might invite the argument that ether has a specific application and should thus fall under “tokens” as opposed to “cryptocurrencies” within our taxonomy. However, we would emphasize the general-purpose nature of the Ethereum platform, and by extension ether, which contrasts with the more narrowly defined use cases seen among other tokens. This is underscored by the fact that ether is widely used as a means of payment for ICO tokens. It is strongly characterized by its role as a medium of exchange.

Therefore, although we acknowledge the technological distinction between bitcoin and ether, we deem it more appropriate to classify ether as a cryptocurrency for the purposes of an accounting discussion.

2.2.2. Initial Coin Offerings (ICOs)

The term “ICO” evokes the concept of an IPO, i.e., an initial public offering of a company’s shares on a stock exchange.

An ICO involves the issuance of new coins recorded on a distributed ledger (virtually always Ethereum).⁵ The public decides whether to purchase them on the basis of information set out in a “white paper” published by the issuing developer, among

other considerations. The white paper typically sets out the technical details of the tokens' functionality and explains the value proposition of the system they underpin.

However, the tokens issued in an ICO may or may not be securities, depending on the underlying economic relationships involved. It is crucial to understand that many ICO tokens do not fit the standard investing paradigm at all, which requires preparers of financial information to make unique and complex judgments in relation to their appropriate reporting.

ICOs' ambiguity and novelty also complicate the determination of how to approach them from a regulatory perspective, as many jurisdictions lack codified legislation or legal precedent upon which to base consistent rulings.

2.2.2.1. Securities on a blockchain

Perhaps, the most straightforward form of ICO is one where the tokens issued represent economic interests in the issuing business, such as ordinary shares. That is, the white paper will set out the token holder's right to receive distributions of profit from the activity carried out by the issuing organization (see Figure 1).

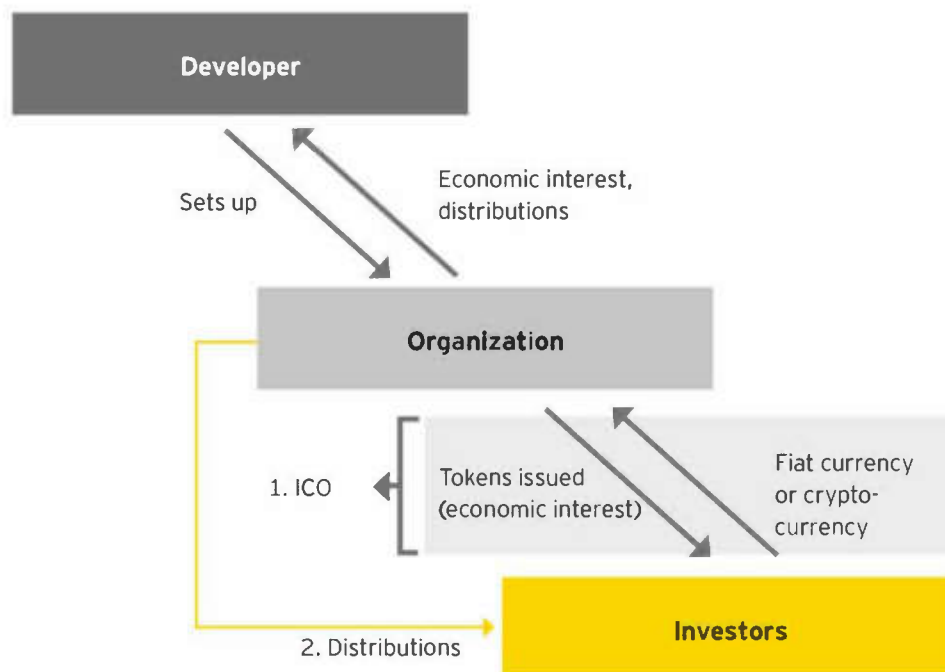
Such distributions might be discretionary or subject to a formulaic calculation. Voting rights may or may not be attached to the

tokens, as is the case even for traditional ordinary shares (Snap, Inc. being a recent example of an IPO of shares lacking voting rights). The investor ultimately has the choice of either holding the token to collect the cash flows from the issuer or selling it in the secondary market.

In such a scenario, the ICO is in substance an IPO of shares or debt, i.e., securities, as was recently highlighted by the SEC's ruling in relation to the DAO.⁶ The innovation is thus "merely" technological, consisting of the immediate settlement and reconciliation-free record-keeping of transactions facilitated by the distributed ledger. There is likely to be little incremental ambiguity in relation to the appropriate accounting treatment, for both the issuer and the investor, as in the case of a more conventional investment. In essence, the concept is similar to crowdfunding, though perhaps one (thus far) targeting a more technologically literate audience.

An ICO represents an attractive source of financing for a start-up business, as it eschews the cost, time and perceived discomfort involved in obtaining finance through traditional means such as banks, venture capitalists or the stock market. This also benefits investors who can use ICO investments to gain exposure to early-stage investments without paying high management and performance fees to VC funds.

Figure 1: Securities on a blockchain



Ultimately, however, this key disintermediation advantage constitutes a pitfall. In most countries, there are strict regulations on not only the marketing and issuance but also the subsequent trading of securities, and ICOs may fall within the scope of these regulations.

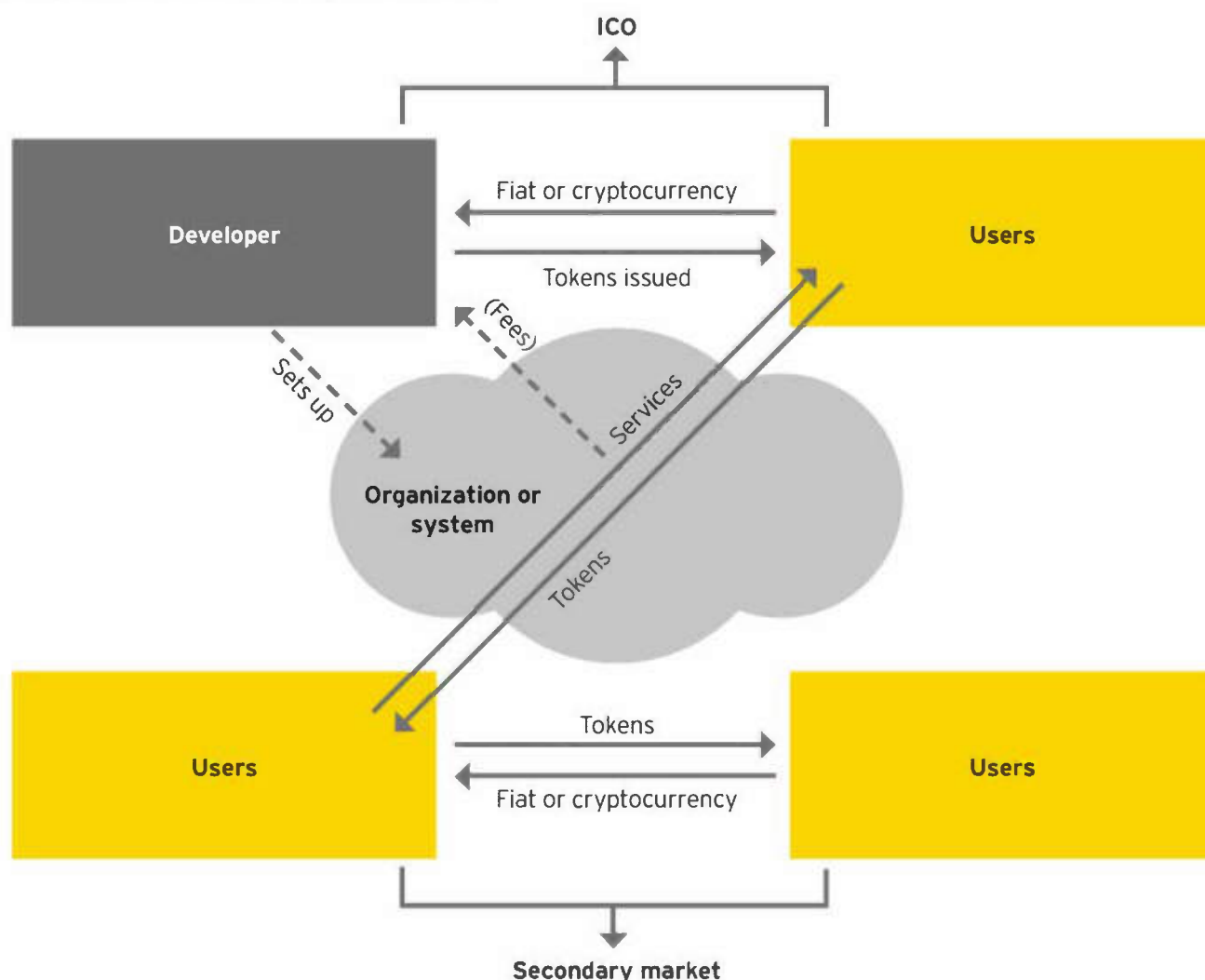
In addition to the common risks relating to investment in any early-stage company, risks for investors include the potential failure of the formation of a secondary market and also the prevalence of scam ICOs taking advantage of the hype surrounding crypto-assets and distributed ledger technology. To this end, multiple governments around the world have issued investor warnings around ICOs during the second half of 2017, including the [Financial Conduct Authority \(UK\)](#), [Bundesanstalt für Finanzdienstleistungsaufsicht \(Germany\)](#) and the [SEC \(US\)](#).

2.2.2.2. "Miniature autocratic government" (MAG) tokens

Many ICOs break the mold of financial markets entirely by offering what has come to be known as a "utility token".

This ICO model involves the development of a distributed organization designed to share some resource in a peer-to-peer fashion (e.g., hard drive storage space, Storj being an example of such a system). Here, a developer designs a miniature economy of sorts, in which the token to be issued is to constitute the medium of exchange (e.g., the means of payment for the hard drive storage space).

Figure 2: Miniature autocratic government





The developer (company) sells tokens in exchange for fiat currency or cryptocurrency, thus earning a return on the resources expended to set the system up. The developer may also earn commissions on transactions involving the tokens, and the proceeds may be further reinvested in the marketing of the system, thereby attracting demand for it and its tokens. For an illustration of this system, please refer to the MAG tokens diagram.

We derive our name for this ICO model from the fact that within it, the developer acts much like, if anything, a miniature autocratic government. Issuance gains can be likened to the seigniorage gains governments earn when they sell banknotes at a premium over the cost of cotton, paper and ink. Transaction commissions, which can be set unilaterally by the developer, function much like taxes. Reinvestment of commissions in the system and its marketing is akin to the roles played by public infrastructure investment and foreign direct investment promotion agencies.

The autocracy assertion stems from the fact that there are no voting rights and, legally, the developer owes nothing to token holders. At the point of issuance, the developer gains the right to the ICO proceeds and can do with them as it wishes. Token holders have no recourse and no right to receive interest or dividends.

Maintaining a miniature autocracy of this kind hinges on the attraction and retention of user demand. This, in turn, depends on the fundamental viability of the value proposition and the ongoing maintenance of user satisfaction. The investment case for MAG token ICOs, thus, builds upon an assessment of anticipated performance against these criteria, with the token price falling at the intersection of a variable demand and finite supply. Price discovery occurs through the secondary market, i.e., through crypto-exchanges, in the same way as for other types of crypto-assets.

2.2.2.3. Hybrids

It is crucial to note that security tokens and MAG tokens represent two ends of a continuum, rather than a binary choice. Ongoing innovation in the crypto-asset space continues to produce hybrid tokens that are part MAG token, part security. Volumes could be written on the variety of technologies observed and approaches taken, but we encourage companies to seek tailored professional advice if they wish to incorporate crypto-assets into their business models.

2.2.3. Colored coins (e.g., Ripple issuances)

A distributed ledger can be used as a platform for maintaining a distributed record of any kind of data. Physical or financial assets, such as gold or stocks, can be "tokenized", i.e., recorded as tokens on a distributed ledger. The aim of this tokenization is to streamline trading through immediate settlement of transactions and the elimination of reconciliation processes.

Details of existing assets can be inscribed into a distributed ledger through the “coloring” of the ledger’s tokens. This is technically possible even within the Bitcoin blockchain, but a system exists that has been specifically set up to facilitate it: Ripple.

Ripple is a distributed ledger technologically similar to Bitcoin or Ethereum, but conceptually much less radical. It effectively serves as a system of credit limits and a payment protocol.

“Gateways” on the network operate much like banks. They can issue tokens (colored coins) called “issuances”. These issuances are distinguished from Ripple’s native cryptocurrency XRP in that they constitute digital IOUs representing any off-ledger asset (preferably a non-perishable, fungible one). Issuances are always tied to a specific issuer, meaning that all currencies, such as euros or US dollars recorded on the Ripple ledger, take the form of issuances tied to a specific “issuing gateway”.

Each user sets up “trust lines” to specific parties for specific amounts in specific instruments – effectively a form of counterparty risk management. Even if two users do not trust each other, they can transact as long as a trust path can be found between them, no matter how many gateways are involved. This is the concept of “rippling” payments, essentially a digital version of the hawala network, which has been used as a payment medium in the Arab world for centuries.

If there is no trust line between two parties, the native cryptocurrency, XRP, serves as a trustless fallback medium. This is possible because Ripple requires every gateway to quote XRP prices for any issuance it deals in.

Colored coins are relevant to our discussion of crypto-assets in that they benefit from distributed ledger technology and may, therefore, play a part in the innovation of market infrastructure and processes. However, the fundamental novelty lies not in the substance of these assets, but in the systems used to record and transact them. They can be thought of as “garden variety” crypto-assets.

2.2.4. Future innovations?

As a final note, we should reiterate that we have discussed various examples of tokens above, namely ICO tokens and colored coins. While the latter category is rather broad and could thus be expected to capture many new tokens, we acknowledge that ongoing innovation in the crypto-asset space may produce still other types of tokens in the future. We would therefore highlight that these two broad groups of tokens are not intended to be collectively exhaustive.



3

Accounting for crypto-assets

3.1. Selected activities of standard setters

3.1.1. Overview

Crypto-assets constitute an evolving, fast-growing, but still relatively new, asset class. As a result, there are no specific pronouncements from accounting bodies that deal with the accounting of such assets from the holder's perspective.

The purpose of this section is to provide a summary of selected activities by standard setters. Due to the diversity and pace of innovation associated with crypto-assets, the facts and circumstances of each individual case will differ, making it difficult to draw generally applicable conclusions on the accounting treatment. The accounting for crypto-assets has to be evaluated on the basis of individual fact patterns. However, the perspectives of the standard setters, as shown below, are general in nature and may not be applicable to all crypto-assets. It is further observed that there is currently no standardized definition of crypto-assets and the terminology and, hence, the definitions used by standard setters vary.

3.1.2. Perspectives from the AASB

In December 2016, the AASB released the paper, *Digital currency – A case for standard setting activity*.¹ The AASB examined the current IFRS literature and evaluated whether digital currencies should be accounted for as cash or cash equivalents, financial assets (other than cash), intangible assets, or inventories.

The paper concluded that, at present, digital currencies should not be considered as cash or cash equivalents under IAS 7 *Statement of Cash Flows*.⁷ Specifically, it was commented that a digital currency lacks broad acceptance as a means of exchange⁸ (at present) and it is not issued by a central bank.⁹ In addition, a digital currency is not a financial instrument, as defined in IAS 32 *Financial Instruments: Presentation*, due to the lack of contractual relationship that results in a financial asset for one party and a financial liability for another.¹⁰

The paper further found that a digital currency meets the definition of intangible assets, as defined in IAS 38 *Intangible Assets*, because a digital currency is an identifiable nonmonetary asset without physical substance. Paragraph 3 of IAS 38 includes a scope exception for intangible assets held for sale in the ordinary course of business. Such intangibles are subject to IAS 2 *Inventories* and, hence, are accounted for at the lower of cost and net realizable value (except for inventories held by commodity broker-traders, as discussed below) rather than using the cost or revaluation model under IAS 38.¹¹ The paper commented, however, that it is not necessarily clear how “held in the ordinary course of business” should be interpreted in the context of digital currencies more broadly. For example, it is not necessarily clear if entities that accept digital currencies as a means of payment should be considered to hold them for sale in the ordinary course of business.

Furthermore, IAS 2 does not apply to the measurement of inventories held by commodity broker-traders who measure their inventories at fair value less costs to sell and recognize changes in fair value less costs to sell in profit or loss in the period of the change. Broker-traders are those who buy or sell commodities for others or on their own account. However, it is not necessarily clear whether digital currencies should be considered a commodity in the context of IAS 2.

The AASB also notes that there is currently a lack of accounting guidance around intangible assets and commodities held for investment purposes.

The AASB concludes that there is a lack of guidance on digital currencies and that the measurement guidance under IAS 2 and IAS 38 does not provide relevant and useful information to users of financial statements (except for instances where an entity is



considered to be a commodity broker-trader). It proposes that the digital currencies be accounted for at fair value with changes in fair value recognized in profit or loss. Thus, standard setting activity is needed.

The AASB's paper was discussed at the Accounting Standards Advisory Forum (ASAF), a consultative body of the IASB (the Board), in December 2016. It was suggested that the IASB continue to monitor developments in this area.¹

3.1.3. Research performed by the FASB

The Financial Accounting Standards Board (FASB) noted in the *Report of the FASB Chairman 1 July, 2017 through 30 September 2017*¹ that the FASB staff performed significant research activities on digital currencies. However, the FASB has yet to discuss this research.

3.1.4. Exposure draft issued by the ASBJ

In December 2017, the ASBJ issued for public comment, the Exposure Draft, *Practical Solution on the Accounting for Virtual Currencies under the Payment Services Act*.¹ The public comment period ends in early February 2018.

3.1.4.1. Accounting for virtual currencies held by an entity on its own behalf

According to the Exposure Draft, a holder of virtual currencies as defined by the Payment Services Act,¹² excluding those held by a virtual currency dealer on behalf of its customers, measures the virtual currency at market price at the balance sheet date if there is an active market. Any difference between the market price and the carrying amount is recognized as a gain or loss. If an active market does not exist for the virtual currency, it is measured at the lower of the cost or the estimated disposal value (including zero or a memorandum value). To the extent that the estimated disposal value is used for measurement purposes, the difference between the estimated disposal value and the carrying amount is recognized as a loss, which is not reversible in subsequent periods.

3.1.4.2. Accounting for virtual currencies held by a virtual currency dealer on behalf of its customers

The Exposure Draft states that a virtual currency dealer is required to recognize an asset when a virtual currency is deposited from the customer on the basis of an agreement between the virtual currency dealer and the customer. Upon initial recognition, the virtual currency should be measured using the market price at the date when the virtual currency was deposited. At the same time, a virtual currency dealer is required to recognize the obligation to return the virtual currency to the customer as a liability. The liability is measured at the same amount as the corresponding asset.

At the balance sheet date, a virtual currency dealer is required to measure the virtual currency held on behalf of its customers consistent with the measurement requirement in section 3.1.4.1 Accounting for virtual currencies held by an entity on its own behalf, on the basis of whether an active market exists for that virtual currency. A virtual currency dealer is also required to measure the liability recognized in relation to the virtual currency held on behalf of its customers on the balance sheet at the same amount as the corresponding asset. Accordingly, no gain or loss should arise from virtual currencies held by a virtual currency dealer on behalf of its customers.

3.1.5. Discussion at the IASB

In January 2018, the IASB discussed a number of issues, including transactions such as those involving digital currencies that might form part of a research project to be added to its agenda. The Board will discuss, at a future meeting, whether to add a research project on some or all of these transactions.¹



3.2. Special situations

3.2.1. Forked currencies (and short-selling)

Certain cryptocurrencies have experienced an event described as a “fork” in the past few years. A fork is a change to the underlying protocol in the relevant blockchain. It requires all nodes connected to the blockchain to update to the new version of protocol software, and adopt that version going forward.

There are currently two possible types of forks. A hard fork and a soft fork. A hard fork changes the protocol code to create a new version of the blockchain, alongside the old version. This also potentially creates new coins. A soft fork is also an update to the blockchain protocol; however, one version (assumed the updated or new version) is supposed to be adopted by the majority and will become the dominant one.

For example, the Bitcoin blockchain has experienced multiple forks. The “Segwit” fork occurred in August 2017 and changed the data stored within each block in order to improve scalability and speed. There were two other forks in 2017 which produced two alternative Bitcoins: Bitcoin Cash (BCH) and Bitcoin Gold (BTG). In these cases, new bitcoins were created and, for example, as a result of the first fork, the holder of each BTC in the “core” blockchain received one BCH for every original bitcoin held.

From a financial reporting perspective, the occurrence of a hard fork can be likened to a spin-off. When a parent spins off its subsidiary by distributing the subsidiary’s shares pro rata to investors in the parent, the parent investors record a stock dividend. This is recorded in the holder’s financial statements as a new asset (debit) and dividend income (credit). Similarly, if a cryptocurrency is subjected to a hard fork, the holder is left with an existing asset (most likely now worth less than before) and a new asset. Because the relationship is not one of equity ownership, one cannot speak of dividend income. It is probable that, as in the case of Bitcoin and Bitcoin Cash, the existing and new assets will be of the same type and will therefore be classified identically on their holder’s statement of financial position. However, it is possible that future forks of different cryptocurrencies will not adhere to this principle.



Another interesting situation arises where an investor holds a short position in a cryptocurrency. There is no way to record short positions in a cryptocurrency directly on the blockchain, and therefore the short position will take the form of a separate contract to sell in the future. That would be akin to a more traditional type of asset and liability to buy or sell a financial instrument. This would typically be an asset or liability as at fair value through profit or loss (FVTPL).

When a fork occurs, the cryptocurrency short-seller's position should be similar to that of a short-seller of an equity instrument, which pays a dividend while the short position is outstanding. Securities lending agreements typically specify that the short-seller shall be liable to not only surrender the share to its owner but also reimburse the amount of the dividend. However, no best practice appears to have been established in this area for cryptocurrency as yet. It is therefore uncertain whether the short-seller has any additional liability in the case of a hard fork.

3.2.2. Token presale (vs. ICO)

A distinction can be drawn between those tokens issued in an ICO at the same time as or after the network or service is launched, and those issued before the launch in a "presale". The Simple Agreement for Future Tokens (SAFT) project by Protocol Labs and Cooley sets out a framework for the use of such future tokens.

The token itself (if a MAG token) does not constitute a security, as discussed elsewhere in this paper. However, a presale involving the agreement to purchase future tokens gives rise to a security according to Cooley and Protocol Labs. The agreement essentially represents a forward contract on the token that is yet to be created. Therefore the contract itself constitutes a security under US law, and would be subject to securities regulation under the SEC (in the US), according to Cooley and Protocol Labs.

It is worth mentioning this distinction in the context of financial reporting because it shows the wide range of legal and regulatory interpretations of different types and structures of tokens. The fact that the industry is growing rapidly means that new and complex structures will be possible, requiring companies to consider up front how they operate in the token space along with legal and accounting implications.



3.3. Conclusion

The nuanced, constantly evolving nature of the crypto-asset phenomenon, coupled with the lack of relevant formal accounting pronouncements, presents complex challenges for preparers of financial information. Underlying economic relationships must be understood in their substance, and the best fit found under existing accounting standards. Dealing with crypto-asset accounting therefore requires a detailed understanding of both distributed ledger technology and relevant accounting concepts. In the absence of further action by accounting standard setters, holders of crypto-assets may be unable to achieve the accounting treatment they consider most appropriate. We caution that each individual situation will require a unique approach, tailored with appropriate professional advice.

4

Supporting details

1. Perspectives from accounting standards boards

"About the Exposure Draft: Practical Solution on the Accounting for Virtual Currencies under the Payment Services Act," *ASB*, https://www.asb.or.jp/en/wp-content/uploads/2017-1206_2_e.pdf, accessed 6 February 2018.

"Digital currency – A case for standard setting activity. A perspective by the Australian Accounting Standards Board (AASB)," *AASB*, http://www.aasb.gov.au/admin/file/content102/c3/AASB_ASAF_DigitalCurrency.pdf, accessed 6 February 2018.

"IASB Update January 2018," *IFRS*, <http://www.ifrs.org/news-and-events/updates/iasb-updates/january-2018/>, accessed 26 January 2018.

"Summary Note of the Accounting Standards Advisory Forum," *IFRS*, <http://www.ifrs.org/-/media/feature/meetings/2016/december/asaf/asaf-summary-dec-2016.pdf>, accessed 5 February 2018.

"Report of the Chairman July 1, 2017 through September 30, 2017," *FASB*, http://www.fasb.org/jsp/FASB/Document_C/DocumentPage&cid=1176169470918, accessed 8 February 2018.

2. Of pseudonymity and privacy

There is a prevalent misconception that all transactions on a blockchain are anonymous, but this is not the case. Transactions on public, permission-less blockchains such as the Bitcoin blockchain are pseudonymous. Anyone can view the ledger, which records ownership of bitcoins and all transactions that have occurred upon it, but there is still a lack of connection between the Bitcoin address and an identifiable legal or natural person.

Therefore, with enough information or data overview, one could track activity to particular addresses, and addresses to individuals or parties involved in the blockchain.

A number of cryptocurrencies have been created specifically to solve the issue of privacy and pseudonymity. These include Z-Cash and Monero, which use various methods to mask the identity of participants. These methods involve "zero-knowledge proofs" in the case of Z-Cash and ring signatures, ring confidential transactions (RingCT), and stealth addresses for Monero.

The technical workings of each method are beyond the scope of this paper, but the principle is that the amounts involved as well as all parties to a transaction are not made public on either network. This is despite the fact that both Z-Cash and Monero operate on public, permission-less blockchains.

3. Proof of work vs. proof of stake (vs. other mechanisms)

Proof of work

Proof of work is the original blockchain consensus protocol, pioneered by Bitcoin. In a proof-of-work system, network participants compete to be the fastest to solve the cryptographic puzzles required to add a new block to the blockchain. The input to these puzzles consists of all previously recorded information on the blockchain, along with the new set of transactions to be added in the next block. Therefore, the input becomes larger and the calculation more complex over time, necessitating increased processing power. This causes the high energy intensity discussed above.

When the puzzle is solved, the machine involved proves that it completed the work, and is rewarded in any given system with a token of value. In the Bitcoin blockchain, this comes in the form of a newly-mined bitcoin.

Note that while successful mining is rewarded with new bitcoins, one does not have to own any bitcoins as a prerequisite to engage in bitcoin mining.

Proof of stake

Proof of stake is the most common consensus protocol after proof of work. We have chosen to illustrate its functionality on the example of the NXT cryptocurrency, which uses a pure proof-of-stake system in transaction validation.

In the NXT system, anyone can set up a node and buy NXT cryptocurrency. A validator must prove ownership of a certain amount of NXT in order to participate in forging, i.e., transaction validation. The validator's probability of forging the next block is equal to its share of all NXT in existence. This is a clear distinction from proof of work, in that NXT ownership is a prerequisite to participation in "forging" and therefore to earning the associated fees. Note that transaction fees earned by the validator are paid by the transacting parties. Forging creates no new tokens, as all NXT is pre-mined.

"Transparent forging" constitutes a recent improvement to the protocol, its aim being to increase the threshold for an attack on the system from 51% to 90%, i.e., with transparent forging, a bad actor would have to own over 90% of all NXT in issue in order to manipulate the ledger. Under this system, the node which will validate the next block is randomly selected in advance, but only the next 10 validators are known. A node that fails to take up its role is penalized by temporary exclusion from forging.

One node forges each block, which allows data to be sent directly to it, speeding up the forging process. Unlike proof-of-work mining, forging requires little computing power and electricity. Even the simplest computers, such as the Raspberry Pi, can forge.

Proof-of-stake systems such as NXT's can thus deliver transaction speeds approaching those of the Visa network, and may therefore prove useful in driving wider adoption of cryptocurrency. In that context, it is worth noting that the already popular Ethereum network is expected to adopt proof of stake in 2018.

Other mechanisms

A range of other mechanisms exist, such as proof of activity, proof of burn, proof of capacity or proof of elapsed time. Details of these mechanisms fall outside the scope of this paper, as they would not directly support the primary discussion of financial reporting.

4. The DAO hack

For further information on the DAO hack, refer to the following outline by Coindesk:

"Understanding The DAO Attack," *Coindesk*, <https://www.coindesk.com/understanding-dao-hack-journalists/>, accessed 15 January 2018.



5. ERC-20: crypto-fueling the ICO phenomenon

Ethereum was created as a platform to enable the creation of decentralized applications, and ICOs simply constitute one such application. Their proliferation has been fueled by the availability of a token protocol called ERC-20, which was designed to create a standardized list of rules to which all Ethereum tokens must conform. This creates a welcome island of predictability within the ICO wilderness.

6. US SEC report of investigation regarding the DAO

U.S. Securities and Exchange Commission Release No. 81207, Report of Investigation Pursuant to Section 21(a) of the Securities Exchange Act of 1934: *The DAO*, United States Securities and Exchange Commission, 2017

7. "Money has no intrinsic value*", and yet we consider it an asset

* While this statement is intuitively acknowledged by many, it appears explicitly in, e.g., Niall Ferguson's *The Ascent of Money*: "Banknotes ... are pieces of paper which have next to no intrinsic worth". Leading investment valuation authority, NYU Stern Professor Aswath Damodaran, states that "currencies cannot be valued. ... May be [one] can set fire to it if [one is] cold, [but] paper currency does not fulfill any fundamental need" other than as a medium of exchange. He goes on to make the distinction that currencies can only be priced against each other, and this is most appropriately based on their purchasing power and adoption.

Money is a social construct, used to facilitate the exchange of goods and services humans deem valuable to them. Trading via a mutually recognized medium of exchange is much smoother than barter exchange of, e.g., shirts for cauliflowers. Historically, various forms of money have been used, some with a real use value (e.g., salt) and some with virtually no use value (e.g., paper banknotes, which might otherwise only be used as wallpaper or kindling). Gold falls far closer to the latter end of the spectrum, as it has few industrial applications and its use in consumer products, such as jewelry, is itself dependent on social acceptance of the material as valuable and therefore suitable for displaying wealth. Indeed, financial market participants frequently describe gold as more similar to currencies than to other metals.

This is therefore also a counterargument to those who would deem a new, digital medium of exchange, such as cryptocurrency, not to constitute an asset at all due to its "virtual" nature and the lack of "backing" by a real asset. One might state that modern

fiat currencies are backed by the gold held by their issuing central banks, but this fails to consider the fact that one cannot actually exchange banknotes for gold at the central bank and the fact that the central bank typically has the authority to issue an indeterminate amount of banknotes "backed" by its finite supply of gold (as was the case in Weimar Germany or, more recently, in Zimbabwe). Thus, the value of fiat currency is a matter of its social acceptance and of trust in the central bank – hence the term "fiat". And even if it were not (as in the case of a gold (or salt, or colored bead) standard), it would be a matter of social acceptance of and trust in the value of gold (or salt, or colored beads).

As a final note, consider the recent discussion regarding the appropriate path of monetary policy as developed economies emerge from the financial crisis. One popular protagonist of this debate, the Taylor Rule, effectively calls for an automatic formula to determine the level of interest rates, the fundamental lever in the government's control over the money supply. What is Bitcoin, then, but a radical Taylor-Rule-driven Fed?

Sources:

"The Bitcoin Boom: Asset, Commodity, Currency or Collectible?"
YouTube – Aswath Damodaran, https://www.youtube.com/watch?v=8iNeXCAM_1k, accessed 24 October 2017.

Niall Ferguson, *The Ascent of Money: A Financial History of the World* (The Penguin Press, 2008).

8. Pseudo-acceptance of cryptocurrency by multinationals

Some might present the counterargument that a number of large, multinational corporations have announced their acceptance of payments in cryptocurrency (specifically Bitcoin). However, closer examination reveals that for this to function, they, in fact, require an intermediary that converts the cryptocurrency to fiat currency. That is, these firms do not truly accept cryptocurrency and hold it for their own transactional needs.

9. "Insignificant risk of changes in value" counterargument

An argument can be made that not all fiat currencies are as stable as those in the developed world, as evidenced by hyperinflation in economies such as Zimbabwe or Venezuela. This does not prevent the classification of the Zimbabwean dollar or Venezuelan bolivar as "cash".

We note above that cryptocurrency is not cash because of its lack of widespread acceptance as a medium of exchange (as institutionalized by the almost universal lack of recognition as legal tender by governments and central banks), and therefore it is seen as existing as another asset alongside fiat money. Therefore, the "insignificant change in value" argument is directed at comparing cryptocurrency with other cash equivalents and not cash itself. These other cash equivalents are characterized by insignificant fluctuations in value relative to the currency they are denominated in, which would remain true for, e.g., a certificate of deposit denominated in Zimbabwean dollars or Venezuelan bolivars. This is consistent with the arguments presented by the AASB, which goes on to clarify that since the significance of the risk of changes in value of a digital currency can only be assessed with "cash" existing in the same currency, cryptocurrency, therefore, also fails the definition of a cash equivalent as it is not "cash".

10. Cryptocurrency as an investment

This is despite the fact that millennials in particular have highly favorable views of bitcoin, even compared to traditional investments in stocks and bonds. Some financial advisors have gone so far as to suggest a portfolio allocation to cryptocurrency as a distinct asset class.

According to Bloomberg, a survey by venture capital firm Blockchain Capital found that only 2% of Americans have ever owned cryptocurrency.

Perhaps more interestingly, however, about 30% of people aged 18 to 34 would rather own US\$1,000 worth of bitcoins than US\$1,000 of government bonds or stocks.

Even some investment managers have suggested a specific portfolio allocation to cryptocurrency. For example, a separate Bloomberg article quoted a Union Square Ventures managing partner's recommended range of 0% to 10% of one's assets, on the basis of individual risk appetite.

These observations underscore the argument that the public sees cryptocurrency as an effective store of value, but has not (yet) adopted it as a medium of exchange.

Source:

"Nearly a Third of Millennials Say They'd Rather Own Bitcoin Than Stocks," *Bloomberg*, <https://www.bloomberg.com/news/articles/2017-11-08/millennials-ready-to-ditch-stocks-to-keep-bitcoin-rally-alive>, accessed 8 November 2017.

"Early Bitcoin Investor Has Some Advice On How Much Money to Hold in Bitcoin," *Bloomberg*, <https://www.bloomberg.com/news/articles/2017-10-16/with-bitcoin-pushing-6000-early-investor-says-how-much-to-buy>, accessed 16 October 2017.

11. IAS 38 cost and revaluation models

Under the cost model, an intangible asset is carried at its cost less any accumulated amortization and any accumulated impairment losses. Under the revaluation model, an intangible asset is carried at a revalued amount, being its fair value at the date of the revaluation less any subsequent accumulated amortization and any subsequent accumulated impairment losses. IAS 38 includes specific guidance as to when the revaluation difference should be recognized in profit or loss or other comprehensive income.

12. Payment Services Act (Japan)

In 2016, the Payment Services Act (Act No. 59 of 2009) was amended to define virtual currencies and to introduce a registration system for virtual currency dealers. From the annual period following the annual period to which 1 April, 2017 belongs, the financial statements of registered virtual currency dealers will be subject to financial statement audit by a certified public accountant or an audit corporation.

5. Contacts

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To: Brett Kitt [Brett.Kitt@nasdaq.com]
Cc: Alison Doyle [Alison.Doyle@nasdaq.com]
From: Schandler, Sarah
Sent: 2024-05-20T15:28:57Z
Subject: RE: File Nos. Nasdaq-2023-045 and Nasdaq-2023-035
Received: 2024-05-20T15:28:58Z

We are free at 12PM. If that works for you I can send around a dial in.

From: Brett Kitt <Brett.Kitt@nasdaq.com>
Sent: Monday, May 20, 2024 11:25 AM
To: Schandler, Sarah (b)(6)@SEC.GOV>
Cc: Alison Doyle <Alison.Doyle@nasdaq.com>
Subject: FW: File Nos. Nasdaq-2023-045 and Nasdaq-2023-035
Importance: High

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hi, Sarah. Jonathan Cayne passed along your email and message below about these two filings. Are you available for a call sometime between now and 3?

Brett M. Kitt
Vice President, Deputy General Counsel
Direct: +1 301 978 8132
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Fax: +1 301 978 8472

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From: Schandler, Sarah (b)(6)@SEC.GOV>
Sent: Monday, May 20, 2024 10:34 AM
To: Jonathan Cayne <Jonathan.Cayne@nasdaq.com>
Cc: Kim, Molly (b)(6)@SEC.GOV>; Remus, David (b)(6)@SEC.GOV>; Sowerby, Stacia (b)(6)@SEC.GOV>
Subject: File Nos. Nasdaq-2023-045 and Nasdaq-2023-035

WARNING - External email; exercise caution.

Jonathan,

Staff has reviewed the filings referenced above and our initial comments to the 19b-4s are attached. Please review and address each of these comments. As a reminder, although staff has tried to be comprehensive, there may be comments relevant across the filings that were inadvertently left off. If a comment in one 19b-4 is applicable to another, please address it in all relevant contexts. Material comments that apply to all filings (to the extent not already addressed by the filing) include:

- Include a representation that “Neither the Trust, nor the Sponsor, nor the Custodian, nor any other person associated with the Trust will, directly or indirectly, engage in action where any portion of the Trust’s ETH becomes subject to the Ethereum proof-of-stake validation or is used to earn additional ETH or generate income or other earnings.”
- Include a representation to the effect that the Trust will not acquire and will disclaim any IR Assets or Incidental Rights received as a result of forks or airdrops, and that such assets will not be taken into accounts for purposes of determining NAV
- Make clear that the Trust will only process creations and redemptions in cash, describe this process accurately, and include representations requested in the spot BTC ETP filings relating to the cash creation/redemption process
- Identify all relevant parties and benchmarks (e.g., trustee, custodian, Index)
- Define all capitalized terms and use defined terms consistently throughout document

- Use “Ethereum” when referring to the network or blockchain; use “ether” or “ETH” when referring to the digital asset that is native to that network (and that would be held by the Trust)
- Use “platform” rather than “exchange” in the context of spot ether or spot bitcoin trading venues

We are requesting that you send us the revised draft Amendments by 10:00 AM on Tuesday, May 21st with the expectation that the final Amendments would be filed by Tuesday evening. Please feel free to reach out with any questions or concerns.

Thanks in advance,
Sarah

Sarah E. Schandler
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To: (b)(6); (b)(7)(C) @usdoj.gov (b)(6); (b)(7)(C) @usdoj.gov
From: (b)(6); (b)(7)(C)
Sent: 2023-10-10T17:23:08Z
Subject: RE: (b)(5)
Received: 2023-10-10T17:23:08Z

(b)(6); (b)(7)(C) pdf
(b)(6); (b)(7)(C) pdf

Hi (b)(6); (b)(7)(C)
Here are the transcripts from the (b)(6); (b)(7)(C) testimony. Let me know if you would like to discuss.
Hope all is well.

(b)(6); (b)(7)(C)

From: (b)(6); (b)(7)(C) @usdoj.gov
Sent: Friday, October 6, 2023 10:56 PM
To: (b)(6); (b)(7)(C) @SEC.GOV
Subject: (b)(5)

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hi, (b)(6); (b)(7)(C) - Hope all is well. When you get a chance, can you send the transcript of (b)(6); (b)(7)(C) testimony? Thanks, (b)(6); (b)(7)(C)

To: 'Karen' (b)(6)
From: Kahl, Daniel
Sent: 2018-03-06T14:47:16Z
Subject: RE: Brilliant Analysis of the limits of Blockchain technology
Received: 2018-03-06T14:47:17Z

Sure..

11, or so, it is.

From: Karen [mailto:(b)(6)]
Sent: Tuesday, March 06, 2018 9:44 AM
To: Kahl, Daniel
Subject: Re: Brilliant Analysis of the limits of Blockchain technology

Just getting on the train — not my fault. (b)(6) stole my key... 11?

Sent from my iPhone
On Mar 6, 2018, at 9:14 AM, Kahl, Daniel (b)(6) @SEC.GOV> wrote:

The end of Blockchain...and I was just beginning to understand it!

Coffee before 10? If not 11ish?

From: Fisher, Robert
Sent: Tuesday, March 06, 2018 7:56 AM
To: #OCIE Leadership Team
Subject: Brilliant Analysis of the limits of Blockchain technology

All: This article is well worth a read if you have any interest in the potential impact of Blockchain technologies to finance and in cryptocurrencies. (The piece is from Project Syndicate.) Nouriel Roubini is a brilliant economist, who always cuts to the chase. I think he has hit the mark on this one. Rob

The Blockchain Pipe Dream

Mar 5, 2018 [Nouriel Roubini](#) , [Preston Byrne](#)

Even after a sharp correction earlier this year, the price of Bitcoin and other cryptocurrencies has remained unsustainably high, and techno-libertarians have continued to insist that blockchain technologies will revolutionize the way business is done. In fact, blockchain might just be the most over-hyped technology of all time.

NEW YORK – Predictions that Bitcoin and other cryptocurrencies will fail typically elicit a broader defense of the underlying blockchain technology. Yes, the argument goes, over half of all “initial coin offerings” to date have already failed, and most of the 1,500-plus cryptocurrencies also will fail, but “blockchain” will nonetheless revolutionize finance and human interactions generally.<image003.png>In reality, blockchain is one of the most [overhyped technologies ever](#). For starters, blockchains are less efficient than existing databases. When someone says they are running something “on a blockchain,” what they usually mean is that they are running one instance of a software application that is replicated across many other devices.

The required storage space and computational power is substantially greater, and the latency higher, than in the case of a centralized application. Blockchains that incorporate “proof-of-stake” or “zero-knowledge” technologies require that all transactions be verified cryptographically, which slows them down. Blockchains that use “proof-of-work,” as many popular cryptocurrencies do, raise yet another problem: they require a huge amount of raw energy to secure them. This explains why Bitcoin “mining” operations in Iceland are on track to consume [more energy](#) this year than all Icelandic households combined.

Blockchains can make sense in cases where the speed/verifiability tradeoff is actually worth it, but this is rarely how the technology is marketed. Blockchain investment propositions routinely make wild promises to

Consider the many schemes that rest on the claim that blockchains are a distributed, universal “world computer.” That claim assumes that banks, which already use efficient systems to process millions of transactions per day, have reason to migrate to a markedly slower and less efficient single cryptocurrency. This contradicts everything we know about the financial industry’s use of software. Financial institutions, particularly those engaged in algorithmic trading, need fast and efficient transaction processing. For their purposes, a single globally distributed blockchain such as Ethereum would never be useful.

Another false assumption is that blockchain represents something akin to a new universal protocol, like TCP-IP or HTML were for the Internet. Such claims imply that this or that blockchain will serve as the basis for most of the world’s transactions and communications in the future. Again, this makes little sense when one considers how blockchains actually work. For one thing, blockchains themselves rely on protocols like TCP-IP, so it isn’t clear how they would ever serve as a replacement.

Furthermore, unlike base-level protocols, blockchains are “stateful,” meaning they store every valid communication that has ever been sent to them. As a result, well-designed blockchains need to consider the limitations of their users’ hardware and guard against spamming. This explains why Bitcoin Core, the Bitcoin software client, processes only 5-7 transactions per second, compared to Visa, which reliably processes 25,000 transactions per second.

Just as we cannot record all of the world’s transactions in a single centralized database, nor shall we do so in a single distributed database. Indeed, the problem of “blockchain scaling” is still more or less unsolved, and is likely to remain so for a long time.

Although we can be fairly sure that blockchain will not unseat TCP-IP, a particular blockchain component – such as Tezos or Ethereum’s smart-contract languages – could eventually set a standard for specific applications, just as Enterprise Linux and Windows did for PC operating systems. But betting on a particular “coin,” as many investors currently are, is not the same thing as betting on adoption of a larger “protocol.” Given what we know about how open-source software is used, there is little reason to think that the value to enterprises of specific blockchain applications will capitalize directly into only one or a few coins.

A third false claim concerns the “trustless” utopia that blockchain will supposedly create by eliminating the need for financial or other reliable intermediaries. This is absurd for a simple reason: every financial contract in existence today can either be modified or deliberately breached by the participating parties. Automating away these possibilities with rigid “trustless” terms is commercially non-viable, not least because it would require all financial agreements to be cash collateralized at 100%, [which is insane](#) from a cost-of-capital perspective.

Moreover, it turns out that many likely appropriate applications of blockchain in finance – such as in securitization or supply-chain monitoring – will require intermediaries after all, because there will inevitably be circumstances where unforeseen contingencies arise, demanding the exercise of discretion. The most important thing blockchain will do in such a situation is ensure that all parties to a transaction are in agreement with one another about its status and their obligations.

It is high time to end the hype. Bitcoin is a slow, energy-inefficient dinosaur that will never be able to process transactions as quickly or inexpensively as an Excel spreadsheet. Ethereum’s plans for an insecure proof-of-stake authentication system will render it vulnerable to manipulation by influential insiders. And Ripple’s technology for cross-border interbank financial transfers will soon be left in the dust by [SWIFT](#), a non-blockchain consortium that all of the world’s major financial institutions already use. Similarly, centralized e-payment systems with almost no transaction costs – Faster Payments, AliPay, WeChat Pay, Venmo, Paypal, Square – are already being used by billions of people around the world.

Today’s “coin mania” is not unlike the railway mania at the dawn of the industrial revolution in the mid-nineteenth century. On its own, blockchain is hardly revolutionary. In conjunction with the secure, remote automation of financial and machine processes, however, it can have potentially far-reaching implications.

Case 1:24-cv-01858-ACR Document 34-5 Filed 06/20/25 Page 284 of 672
Ultimately, blockchain's uses will be limited to specific, well-defined, and complex applications that require transparency and tamper-resistance more than they require speed – for example, communication with self-driving cars or drones. As for most of the coins, they are little different from railway stocks in the 1840s, which went bust when that bubble – like most bubbles – burst.

<image002.png>

Nouriel Roubini

Robert M. Fisher
Managing Executive
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US Securities and Exchange Commission

(b)(6)

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To: Christopher Lamirand (b)(6)
From: Lamirand, Charlotte Elizabeth
Sent: 2018-03-06T16:08:56Z
Subject: FW: Brilliant Analysis of the limits of Blockchain technology
Received: 2018-03-06T16:08:56Z

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From: Kahl, Daniel
Sent: Tuesday, March 06, 2018 9:14 AM
To: #OCIE Chief Counsel Legal; Boyd, Roberta; Cohan, Jeffrey; Lamirand, Charlotte Elizabeth; Meinertzhagen, Nicole D.
Subject: FW: Brilliant Analysis of the limits of Blockchain technology

FYI

From: Fisher, Robert
Sent: Tuesday, March 06, 2018 7:56 AM
To: #OCIE Leadership Team
Subject: Brilliant Analysis of the limits of Blockchain technology

All: This article is well worth a read if you have any interest in the potential impact of Blockchain technologies to finance and in cryptocurrencies. (The piece is from Project Syndicate.) Nouriel Roubini is a brilliant economist, who always cuts to the chase. I think he has hit the mark on this one. Rob

The Blockchain Pipe Dream

Mar 5, 2018 [Nouriel Roubini](#) , [Preston Byrne](#)

Even after a sharp correction earlier this year, the price of Bitcoin and other cryptocurrencies has remained unsustainably high, and techno-libertarians have continued to insist that blockchain technologies will revolutionize the way business is done. In fact, blockchain might just be the most over-hyped technology of all time.

NEW YORK – Predictions that Bitcoin and other cryptocurrencies will fail typically elicit a broader defense of the underlying blockchain technology. Yes, the argument goes, over half of all “initial coin offerings” to date have already failed, and most of the 1,500-plus cryptocurrencies also will fail, but “blockchain” will nonetheless revolutionize finance

and human interactions generally. In reality, blockchain is one of the most [overhyped technologies ever](#). For starters, blockchains are less efficient than existing databases. When someone says they are running something “on a blockchain,” what they usually mean is that they are running one instance of a software application that is replicated across many other devices.

The required storage space and computational power is substantially greater, and the latency higher, than in the case of a centralized application. Blockchains that incorporate “proof-of-stake” or “zero-knowledge” technologies require that all transactions be verified cryptographically, which slows them down. Blockchains that use “proof-of-work,” as many popular cryptocurrencies do, raise yet another problem: they require a huge amount of raw energy to secure them. This explains why Bitcoin “mining” operations in Iceland are on track to consume [more energy](#) this year than all Icelandic households combined.

Blockchains can make sense in cases where the speed/verifiability tradeoff is actually worth it, but this is rarely how the technology is marketed. Blockchain investment propositions routinely make wild promises to overthrow entire industries,

Consider the many schemes that rest on the claim that blockchains are a distributed, universal “world computer.” That claim assumes that banks, which already use efficient systems to process millions of transactions per day, have reason to migrate to a markedly slower and less efficient single cryptocurrency. This contradicts everything we know about the financial industry’s use of software. Financial institutions, particularly those engaged in algorithmic trading, need fast and efficient transaction processing. For their purposes, a single globally distributed blockchain such as Ethereum would never be useful.

Another false assumption is that blockchain represents something akin to a new universal protocol, like TCP-IP or HTML were for the Internet. Such claims imply that this or that blockchain will serve as the basis for most of the world’s transactions and communications in the future. Again, this makes little sense when one considers how blockchains actually work. For one thing, blockchains themselves rely on protocols like TCP-IP, so it isn’t clear how they would ever serve as a replacement.

Furthermore, unlike base-level protocols, blockchains are “stateful,” meaning they store every valid communication that has ever been sent to them. As a result, well-designed blockchains need to consider the limitations of their users’ hardware and guard against spamming. This explains why Bitcoin Core, the Bitcoin software client, processes only 5-7 transactions per second, compared to Visa, which reliably processes 25,000 transactions per second.

Just as we cannot record all of the world’s transactions in a single centralized database, nor shall we do so in a single distributed database. Indeed, the problem of “blockchain scaling” is still more or less unsolved, and is likely to remain so for a long time.

Although we can be fairly sure that blockchain will not unseat TCP-IP, a particular blockchain component – such as Tezos or Ethereum’s smart-contract languages – could eventually set a standard for specific applications, just as Enterprise Linux and Windows did for PC operating systems. But betting on a particular “coin,” as many investors currently are, is not the same thing as betting on adoption of a larger “protocol.” Given what we know about how open-source software is used, there is little reason to think that the value to enterprises of specific blockchain applications will capitalize directly into only one or a few coins.

A third false claim concerns the “trustless” utopia that blockchain will supposedly create by eliminating the need for financial or other reliable intermediaries. This is absurd for a simple reason: every financial contract in existence today can either be modified or deliberately breached by the participating parties. Automating away these possibilities with rigid “trustless” terms is commercially non-viable, not least because it would require all financial agreements to be cash collateralized at 100%, [which is insane](#) from a cost-of-capital perspective.

Moreover, it turns out that many likely appropriate applications of blockchain in finance – such as in securitization or supply-chain monitoring – will require intermediaries after all, because there will inevitably be circumstances where unforeseen contingencies arise, demanding the exercise of discretion. The most important thing blockchain will do in such a situation is ensure that all parties to a transaction are in agreement with one another about its status and their obligations.

It is high time to end the hype. Bitcoin is a slow, energy-inefficient dinosaur that will never be able to process transactions as quickly or inexpensively as an Excel spreadsheet. Ethereum’s plans for an insecure proof-of-stake authentication system will render it vulnerable to manipulation by influential insiders. And Ripple’s technology for cross-border interbank financial transfers will soon be left in the dust by [SWIFT](#), a non-blockchain consortium that all of the world’s major financial institutions already use. Similarly, centralized e-payment systems with almost no transaction costs – Faster Payments, AliPay, WeChat Pay, Venmo, Paypal, Square – are already being used by billions of people around the world.

Today’s “coin mania” is not unlike the railway mania at the dawn of the industrial revolution in the mid-nineteenth century. On its own, blockchain is hardly revolutionary. In conjunction with the secure, remote automation of financial and machine processes, however, it can have potentially far-reaching implications.

Ultimately, blockchain’s uses will be limited to specific, well-defined, and complex applications that require transparency and tamper-resistance more than they require speed – for example, communication with self-driving cars or drones. As



Nouriel Roubini

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To: Mark Hays[markhays@ourfinancialsecurity.org]

From: Frayer, Corey

Sent: 2024-05-23T21:20:46Z

Subject: Ethereum ETP Order

Received: 2024-05-23T21:20:47Z

[lk87adfs99.pdf](#)

For your awareness.

Corey Frayer

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SECURITIES AND EXCHANGE COMMISSION

(Release No. 34-100224; File Nos. SR-NYSEARCA-2023-70; SR-NYSEARCA-2024-31; SR-NASDAQ-2023-045; SR-CboeBZX-2023-069; SR-CboeBZX-2023-070; SR-CboeBZX-2023-087; SR-CboeBZX-2023-095; SR-CboeBZX-2024-018)

May 23, 2024

Self-Regulatory Organizations; NYSE Arca, Inc.; The Nasdaq Stock Market LLC; Cboe BZX Exchange, Inc.; Order Granting Accelerated Approval of Proposed Rule Changes, as Modified by Amendments Thereto, to List and Trade Shares of Ether-Based Exchange-Traded Products

I. INTRODUCTION

Pursuant to Section 19(b)(1) of the Securities Exchange Act of 1934 (“Exchange Act”)¹ and Rule 19b-4 thereunder (“Rule 19b-4”),² each of NYSE Arca, Inc. (“NYSE Arca”), The Nasdaq Stock Market LLC (“Nasdaq”), and Cboe BZX Exchange, Inc. (“BZX”, and together with NYSE Arca and Nasdaq, the “Exchanges”) filed with the Securities and Exchange Commission (“SEC” or “Commission”) proposed rule changes to list and trade shares of the following. NYSE Arca proposes to list and trade shares of (1) the Grayscale Ethereum Trust³ and (2) the Bitwise Ethereum ETF⁴ under NYSE Arca Rule 8.201-E (Commodity-Based Trust Shares); Nasdaq proposes to list and trade shares of (3) the iShares Ethereum Trust⁵ under Nasdaq Rule 5711(d) (Commodity-Based Trust Shares); and BZX proposes to list and trade

¹ 15 U.S.C. 78s(b)(1).

² 17 CFR 240.19b-4.

³ See Amendment No. 2 to Proposed Rule Change to List and Trade Shares of the Grayscale Ethereum Trust under NYSE Arca Rule 8.201-E (Commodity-Based Trust Shares) (SR-NYSEARCA-2023-70), filed May 21, 2024, available at <https://www.sec.gov/comments/sr-nysearca-2023-70/srnysearca202370-475871-1363474.pdf> (“Grayscale Amendment”).

⁴ See Amendment No. 1 to Proposed Rule Change to List and Trade Shares of the Bitwise Ethereum ETF under NYSE Arca Rule 8.201-E (Commodity-Based Trust Shares) (SR-NYSEARCA-2024-31), filed May 21, 2024, available at <https://www.sec.gov/comments/sr-nysearca-2024-31/srnysearca202431-475891-1363514.pdf> (“Bitwise Amendment”).

⁵ See Amendment No. 2 to Proposed Rule Change to List and Trade Shares of the iShares Ethereum Trust under Nasdaq Rule 5711(d) (Commodity-Based Trust Shares) (SR-NASDAQ-2023-045), filed May 22, 2024, available at <https://www.sec.gov/comments/sr-nasdaq-2023-045/srmasdaq2023045-475851-1363454.pdf> (“iShares Amendment”).

shares of (4) the VanEck Ethereum Trust,⁶ (5) the ARK 21Shares Ethereum ETF,⁷ (6) the Invesco Galaxy Ethereum ETF,⁸ (7) the Fidelity Ethereum Fund,⁹ and (8) the Franklin Ethereum ETF¹⁰ under BZX Rule 14.11(e)(4) (Commodity-Based Trust Shares). Each filing was subject to notice and comment.¹¹

Each of the foregoing proposed rule changes, as modified by their respective amendments, is referred to herein as a “Proposal” and collectively as the “Proposals.” Each trust (or series of a trust) described in a Proposal is referred to herein as a “Trust” and collectively as

⁶ See Amendment No. 2 to Proposed Rule Change to List and Trade Shares of the VanEck Ethereum Trust under BZX Rule 14.11(e)(4), Commodity-Based Trust Shares (SR-CboeBZX-2023-069), filed May 21, 2024, available at <https://www.sec.gov/comments/sr-cboebzx-2023-069/srcboebzx2023069-475811-1363394.pdf> (“VanEck Amendment”).

⁷ See Amendment No. 2 to Proposed Rule Change to List and Trade Shares of the ARK 21Shares Ethereum ETF under BZX Rule 14.11(e)(4), Commodity-Based Trust Shares (SR-CboeBZX-2023-070), filed May 21, 2024, available at <https://www.sec.gov/comments/sr-cboebzx-2023-070/srcboebzx2023070-475812-1363414.pdf> (“ARK Amendment”).

⁸ See Amendment No. 1 to Proposed Rule Change to List and Trade Shares of the Invesco Galaxy Ethereum ETF under BZX Rule 14.11(e)(4), Commodity-Based Trust Shares (SR-CboeBZX-2023-087), filed May 21, 2024, available at <https://www.sec.gov/comments/sr-cboebzx-2023-087/srcboebzx2023087-475831-1363395.pdf> (“Invesco Amendment”).

⁹ See Amendment No. 2 to Proposed Rule Change to List and Trade Shares of the Fidelity Ethereum Fund under BZX Rule 14.11(e)(4), Commodity-Based Trust Shares (SR-CboeBZX-2023-095), filed May 21, 2024, available at <https://www.sec.gov/comments/sr-cboebzx-2023-095/srcboebzx2023095-475791-1363374.pdf> (“Fidelity Amendment”).

¹⁰ See Amendment No. 1 to Proposed Rule Change to List and Trade Shares of the Franklin Ethereum ETF, a Series of the Franklin Ethereum Trust, under BZX Rule 14.11(e)(4), Commodity-Based Trust Shares (SR-CboeBZX-2024-018), filed May 21, 2024, available at <https://www.sec.gov/comments/sr-cboebzx-2024-018/srcboebzx2024018-475813-1363434.pdf> (“Franklin Amendment”).

¹¹ Comments received on SR-NYSEARCA-2023-70 are available at <https://www.sec.gov/comments/sr-nysearca-2023-70/srnysearca202370.htm>. Comments received on SR-NYSEARCA-2024-31 are available at <https://www.sec.gov/comments/sr-nysearca-2024-31/srnysearca202431.htm>. Comments received on SR-NASDAQ-2023-045 are available at <https://www.sec.gov/comments/sr-nasdaq-2023-045/srnasdaq2023045.htm>. Comments received on SR-CboeBZX-2023-069 are available at <https://www.sec.gov/comments/sr-cboebzx-2023-069/srcboebzx2023069.htm>. Comments received on SR-CboeBZX-2023-070 are available at <https://www.sec.gov/comments/sr-cboebzx-2023-070/srcboebzx2023070.htm>. Comments received on SR-CboeBZX-2023-087 are available at <https://www.sec.gov/comments/sr-cboebzx-2023-087/srcboebzx2023087.htm>. Comments received on SR-CboeBZX-2023-095 are available at <https://www.sec.gov/comments/sr-cboebzx-2023-095/srcboebzx2023095.htm>. Comments received on SR-CboeBZX-2024-018 are available at <https://www.sec.gov/comments/sr-cboebzx-2024-018/srcboebzx2024018.htm>.

the “Trusts.” As described in more detail in the Proposals’ respective amended filings,¹² each Proposal seeks to list and trade shares of a Trust that would hold spot ether,¹³ in whole or in part.¹⁴ This order approves the Proposals on an accelerated basis.¹⁵

II. DISCUSSION AND COMMISSION FINDINGS

After careful review, the Commission finds that the Proposals are consistent with the Exchange Act and rules and regulations thereunder applicable to a national securities exchange.¹⁶ In particular, the Commission finds that the Proposals are consistent with Section 6(b)(5) of the Exchange Act,¹⁷ which requires, among other things, that the Exchanges’ rules be designed to “prevent fraudulent and manipulative acts and practices” and, “in general, to protect investors and the public interest;” and with Section 11A(a)(1)(C)(iii) of the Exchange Act,¹⁸ which sets forth Congress’ finding that it is in the public interest and appropriate for the protection of

¹² See supra notes 3-10.

¹³ Ether is a digital asset that is native to, and minted and transferred via, a distributed, open-source protocol used by a peer-to-peer computer network through which transactions are recorded on a public transaction ledger known as “Ethereum.” The Ethereum protocol governs the creation of new ether and the cryptographic system that secures and verifies transactions on Ethereum.

¹⁴ All of the Trusts propose to hold spot ether. Additionally, all of the Trusts, except the Grayscale Ethereum Trust, propose to hold cash, and some Trusts also propose to hold cash equivalents, as described in their respective amended filings. See Bitwise Amendment at 5; iShares Amendment at 4; VanEck Amendment at 21; ARK Amendment at 20; Invesco Amendment at 22; Fidelity Amendment at 22; Franklin Amendment at 21.

¹⁵ See infra Section III.

¹⁶ In approving the Proposals, the Commission has considered the Proposals’ impacts on efficiency, competition, and capital formation. See 15 U.S.C. 78c(f). See also infra note 61 and accompanying text, discussing comments received regarding the efficiency of spot ether exchange-traded products (“ETPs”). See also Letter from Ryan Posey, dated Mar. 20, 2024, regarding SR-CboeBZX-2023-095 (“Posey Letter”) (stating that “[t]he history of [exchange-traded funds] in other asset classes demonstrates how competition drives fees down”). Additionally, a commenter states that the Commission should approve spot ether ETPs, but not all at once, so as not to “delay the innovators in order to allow free-riding copycats a free hand.” See Letter from James J. Angel, Georgetown University, dated Apr. 5, 2024, regarding SR-NYSEARCA-2023-70 (“Angel Letter”), at 3-4. The Commission believes that it is appropriate to approve all of the Proposals at the same time in order to foster competition by potentially providing investors with several spot ether-based ETPs from which to choose. The shares of any Trust, however, may not begin trading on its applicable Exchange unless and until its corresponding registration statement becomes effective.

¹⁷ 15 U.S.C. 78f(b)(5).

¹⁸ 15 U.S.C. 78k-1(a)(1)(C)(iii).

investors and the maintenance of fair and orderly markets to assure the availability to brokers, dealers, and investors of information with respect to quotations for and transactions in securities.

A. Exchange Act Section 6(b)(5)

When considering proposals to list bitcoin-based commodity trusts and bitcoin-based trust issued receipts, the Commission has explained that one way an exchange that lists bitcoin-based ETPs can meet the obligation under Exchange Act Section 6(b)(5) that its rules be designed to prevent fraudulent and manipulative acts and practices is by demonstrating that the exchange has a comprehensive surveillance-sharing agreement with a regulated market of significant size related to the underlying or reference assets.¹⁹ Such an agreement would assist in detecting and deterring fraud and manipulation related to that underlying asset.

The Commission has also consistently recognized, however, that this is not the *exclusive* means by which an ETP listing exchange can meet this statutory obligation.²⁰ A listing exchange could, alternatively, demonstrate that “other means to prevent fraudulent and manipulative acts and practices will be sufficient” to justify dispensing with a surveillance-sharing agreement with

¹⁹ See, e.g., Order Granting Accelerated Approval of Proposed Rule Changes, as Modified by Amendments Thereto, to List and Trade Bitcoin-Based Commodity-Based Trust Shares and Trust Units, Securities Exchange Act Release No. 99306 (Jan. 10, 2024), 89 FR 3008 (Jan. 17, 2024) (SR-NYSEARCA-2021-90; SR-NYSEARCA-2023-44; SR-NYSEARCA-2023-58; SR-NASDAQ-2023-016; SR-NASDAQ-2023-019; SR-CboeBZX-2023-028; SR-CboeBZX-2023-038; SR-CboeBZX-2023-040; SR-CboeBZX-2023-042; SR-CboeBZX-2023-044; SR-CboeBZX-2023-072) (“Spot Bitcoin ETP Approval Order”); Order Granting Approval of a Proposed Rule Change, as Modified by Amendment No. 2, To List and Trade Shares of the Teucrium Bitcoin Futures Fund Under NYSE Arca Rule 8.200-E, Commentary .02 (Trust Issued Receipts), Securities Exchange Act Release No. 94620 (Apr. 6, 2022), 87 FR 21676 (Apr. 12, 2022) (SR-NYSEARCA-2021-53). The Commission has provided an illustrative definition for “market of significant size” to include a market (or group of markets) as to which (a) there is a reasonable likelihood that a person attempting to manipulate the ETP would also have to trade on that market to successfully manipulate the ETP, so that a surveillance-sharing agreement would assist in detecting and deterring misconduct, and (b) it is unlikely that trading in the ETP would be the predominant influence on prices in that market. See Order Setting Aside Action by Delegated Authority and Disapproving a Proposed Rule Change, as Modified by Amendments No. 1 and 2, To List and Trade Shares of the Winklevoss Bitcoin Trust, Securities Exchange Act Release No. 83723 (July 26, 2018), 83 FR 37579, 37594 (Aug. 1, 2018) (SR-BatsBZX-2016-30) (“Winklevoss Order”).

²⁰ See Winklevoss Order, 83 FR at 37580; Spot Bitcoin ETP Approval Order, 89 FR at 3009.

a regulated market of significant size.²¹ Applying this same analytical framework to the spot ether to be held by the Trusts, the Commission finds that sufficient “other means” of preventing fraud and manipulation in this context have been demonstrated.

Each Exchange has a comprehensive surveillance-sharing agreement with the Chicago Mercantile Exchange (“CME”) via their common membership in the Intermarket Surveillance Group.²² This facilitates the sharing of information that is available to the CME through its surveillance of its markets, including its surveillance of the CME ether futures market. Spot ether, however, does not trade on the CME and the CME does not engage in surveillance of spot ether markets. As with the proposals approved in the Spot Bitcoin ETP Approval Order, this raises questions regarding the sufficiency of a surveillance-sharing agreement with the CME in preventing fraud and manipulation when the proposed ETPs hold spot ether.²³ If a would-be manipulator of a spot ether ETP engages in misconduct (such as fraud, manipulation, or other trading abuses) on the CME itself, the CME’s surveillance can be reasonably expected to detect such misconduct. But if the would-be manipulator is not transacting on the CME itself, the impacts of its misconduct would not necessarily be surveilled by the CME unless the misconduct also impacts the CME ether futures market. Thus, when assessing the sufficiency of a surveillance-sharing agreement with the CME, it is critical to establish whether, and to what extent, fraud or manipulation that impacts the spot ether market also impacts the CME ether futures market.²⁴

²¹ See Spot Bitcoin ETP Approval Order, 89 FR at 3009 (quoting Winklevoss Order, 83 FR at 37580).

²² See *id.* at 3009.

²³ See *id.*

²⁴ See *id.*

In the Spot Bitcoin ETP Approval Order, the Commission concluded that having a comprehensive surveillance-sharing agreement with a U.S.-regulated market that, based on evidence from robust correlation analysis, is consistently highly correlated with the ETPs' underlying assets (spot bitcoin) constituted "other means" sufficient to satisfy the Exchange Act Section 6(b)(5) standard.²⁵ Specifically, given the consistently high correlation between the CME bitcoin futures market and a sample of spot bitcoin markets—confirmed through robust correlation analysis using data at hourly, five-minute, and one-minute intervals—the Commission was able to conclude that fraud or manipulation that impacts prices in spot bitcoin markets would likely similarly impact CME bitcoin futures prices. And because the CME's surveillance can assist in detecting those impacts on CME bitcoin futures prices, the Exchanges' comprehensive surveillance-sharing agreement with the CME can be reasonably expected to assist in surveilling for fraudulent and manipulative acts and practices in the specific context of those proposals. The Commission indicated that the "robustness" of its correlation analysis rested on the pre-requisites of (1) the correlations being calculated with respect to bitcoin futures that trade on the CME, a U.S. market regulated by the Commodity Futures Trading Commission ("CFTC"), (2) the lengthy sample period of price returns for both the CME bitcoin futures market and the spot bitcoin market, (3) the frequent intra-day trading data in both the CME

²⁵ See *id.* at 3009-11. To be clear, this does not mean that such U.S.-regulated market is of "significant size" related to the ETP's underlying or reference asset. In particular, the Commission did not conclude in the Spot Bitcoin ETP Approval Order that the CME bitcoin futures market is of "significant size" related to spot bitcoin. See *id.* at 3010-11 ("[B]ecause the CME's surveillance can assist in detecting those impacts on CME bitcoin futures prices, the Exchanges' comprehensive surveillance-sharing agreement with the CME—a U.S.-regulated market whose bitcoin futures market is consistently highly correlated to spot bitcoin, *albeit not of 'significant size' related to spot bitcoin*—can be reasonably expected to assist in surveilling for fraudulent and manipulative acts and practices in the specific context of the Proposals.") (emphasis added).

bitcoin futures market and the spot bitcoin market over that lengthy sample period, and (4) the consistency of the correlation results throughout the lengthy sample period.²⁶

Several of the Proposals and some commenters offered correlation analyses in the ether context. Some Proposals provided correlation results that used data at a daily frequency. For example, the ARK Amendment finds a correlation between the daily returns of CME ether futures and daily returns on certain spot ether trading platforms of more than 99.89%;²⁷ the VanEck Amendment, Invesco Amendment, and Franklin Amendment find daily correlation of 99.8%;²⁸ and the iShares Amendment finds a daily correlation of 99.93%.²⁹ However, as explained in the Spot Bitcoin ETP Approval Order, calculating correlation using only *daily* price observations provides no information on how prices in the two markets are associated—if at all—*throughout* the trading day; and calculating correlation for only the full sample period does not provide evidence of a *consistently* high correlation over time.³⁰

The Fidelity Amendment performed rolling 90-day correlations between daily returns of CME ether futures and six spot ether trading platforms and found correlations ranged between 94% and 99.8%.³¹ As indicated above, however, calculating correlations using only daily price observations—even on a rolling basis—provides no information on how prices are associated—if at all—*throughout* the trading day. The Fidelity Amendment also examined correlation using

²⁶ See *id.* at 3010 n.38.

²⁷ See ARK Amendment at 14 (using data from Jan. 1, 2022, through Feb. 1, 2024).

²⁸ See VanEck Amendment at 13; Invesco Amendment at 14; Franklin Amendment at 13 (using data from Sept. 1, 2022, through Sept. 1, 2023).

²⁹ See iShares Amendment at 26 (using data from Oct. 13, 2022, through Oct. 13, 2023). Some commenters also assert that ether markets are highly correlated, but the commenters provide no evidence for this assertion. See Letter from Parker Jamieson, dated Mar. 12, 2024, regarding SR-CboeBZX-2023-095 (“Jamieson Letter”); Posey Letter.

³⁰ See Spot Bitcoin ETP Approval Order, 89 FR at 3009 n.30.

³¹ See Fidelity Amendment at 16 (the filing does not provide the exact range for its data sample, but based on the chart at 16, the range appears to be approximately July 2021 through Jan. 2024).

hourly returns data, and found such correlations for the full sample period to be above 98%.³² While the filing does not provide rolling correlations using the hourly data, the filing examined the “distribution of hourly returns” and finds that at least 97.9% of the hourly returns of the spot ether platforms and the CME ether futures market are within 50 basis points. The filing stated that “[t]his suggests a high degree of similarity in price movements between the regulated exchange and the spot platforms for most hours.”³³

The use of hourly data, however, provides no indication of how prices move at finer increments. For example, the results provide no indication of whether price movements—including price manipulations—in ether spot markets that persist for only a few minutes or less are likely to be reflected in CME ether futures prices. While the Fidelity Amendment’s results may suggest a high degree of similarity in price movements between the CME ether futures market and the spot ether platforms “*for most hours*,” the results suggest nothing about the degree of similarity in price movements *for most minutes* within the hours.

Two commenters and one Proposal examined correlation between the CME ether futures market and spot ether trading platforms at hourly, five-minute, and one-minute intervals. The Coinbase Letter used price returns data from March 1, 2021, through January 31, 2024, for the CME ether futures market and the Coinbase platform.³⁴ This commenter calculated Pearson correlation statistics³⁵ for the full sample period as well as for rolling three-month segments

³² See *id.* at 17-18.

³³ See *id.* at 18.

³⁴ See Letter from Paul Grewal, Chief Legal Officer, Coinbase Global, Inc., dated Feb. 21, 2024, regarding SR-NYSEARCA-2023-70 (“Coinbase Letter”), at 20-22.

³⁵ Pearson correlation is a measure of linear association between two variables and indicates the magnitude as well as direction of this relationship. The value can range between -1 (suggesting a strong negative association) and 1 (suggesting a strong positive association). Correlation should not be interpreted as an indication of a causal relationship or whether one variable leads or lags the other.

within the sample period. The commenter's correlation results for the full sample period are 99.3% using data at an hourly interval, 96.2% using data at a five-minute interval, and 84.7% using data at a one-minute interval.³⁶ The commenter states that these results "show an even greater correlation than what was reported by the Commission" in the Spot Bitcoin ETP Approval Order with respect to the CME bitcoin futures market and spot bitcoin trading platforms.³⁷ The commenter also sought to replicate the same correlation analysis of the bitcoin market that the Commission performed for the Spot Bitcoin ETP Approval Order. The commenter's replication results also found greater correlation than what was reported in the Spot Bitcoin ETP Approval Order.³⁸

The CF Benchmarks Letters used price returns data from February 2, 2022, through February 2, 2024, for the CME ether futures market and the Coinbase, Kraken, and LMAX Digital platforms.³⁹ This commenter also calculated Pearson correlation statistics for its full sample period as well as for rolling three-month segments within that sample period. This commenter's correlation results for the full sample period are no less than 98.0% using data at an hourly interval, 91.5% using data at a five-minute interval, and 84.9% using data at a one-minute interval.⁴⁰ The commenter states that these results are "on the whole stronger" than those that the Commission reported for the bitcoin market in the Spot Bitcoin ETP Approval Order.⁴¹

³⁶ See Coinbase Letter at 21. The Coinbase Letter's rolling correlation results ranged between 98.1% and 99.7% using data at an hourly interval, 93.8% and 97.1% using data at a five-minute interval, and 80.4% and 88% using data at a one-minute interval.

³⁷ See *id.*

³⁸ See *id.*

³⁹ See Letters from CF Benchmarks, dated Mar. 22, 2024, regarding SR-CboeBZX-2024-018, and dated Apr. 11, 2024, regarding SR-NASDAQ-2023-045 ("CF Benchmarks Letters"), at 5-6.

⁴⁰ See *id.* at 6. The CF Benchmarks Letters' rolling correlation results ranged between 96.1% and 99.4% using data at an hourly interval, 81.3% and 94.7% using data at a five-minute interval, and 81.0% and 88.1% using data at a one-minute interval.

⁴¹ See *id.* at 6.

The Bitwise Amendment used price returns data from August 1, 2021, through March 20, 2024, for the CME ether futures market and the Coinbase and Kraken platforms.⁴² This filing also calculated Pearson correlation statistics for its full sample period as well as for rolling three-month segments within that sample period. This filing's correlation results for the full sample period are no less than 98.6% using data at an hourly interval, 90.0% using data at a five-minute interval, and 70.9% using data at a one-minute interval.⁴³

The Commission undertook to verify the Bitwise Amendment's and these two commenters' correlation results for certain spot ether markets. For robust⁴⁴ results, the Commission used stationary time series of price returns data at hourly, five-minute, and one-minute intervals for the spot ETH/USD trading pair on Coinbase and Kraken, as well as for the closest-to-maturity CME ether futures contract, over a similarly lengthy sample period (October 1, 2021, through March 29, 2024).⁴⁵ Pearson correlation statistics were calculated for the full sample period as well as for rolling three-month segments within the sample period. The Commission's correlation analysis utilized frequent intra-day trading data over the lengthy

⁴² See Bitwise Amendment at 18-19.

⁴³ See *id.* The Bitwise Amendment's rolling correlation results ranged between 95.7% and 99.3% using data at an hourly interval, 86.8% and 92.9% using data at a five-minute interval, and 65.0% and 79.5% using data at a one-minute interval.

⁴⁴ See also *infra* note 49.

⁴⁵ Data were sourced from the CME via the SEC's Market Information Data Analytics System ("MIDAS") for the closest-to-maturity CME ether futures contract price and from Kaiko for the ETH/USD prices on Coinbase and Kraken. The MIDAS CME ether futures data are limited to the 3:00am – 5:00pm ET, Monday through Friday, trading hours. All data sets used in the Commission's analysis are publicly available (although some require subscriptions). One-minute, five-minute, and hourly price *level* time series were created using the last trade price over the given interval for the spot ETH/USD pairs and the closest-to-maturity CME ether futures contract. For those time intervals during which there were no trades in the closest-to-maturity CME ether futures contracts or spot ether, the last trade price for the closest-to-maturity CME ether futures contract (or last trade price for spot ether, as applicable) was used as the price for such time interval. Each price *level* time series was then log differenced to create price *returns* time series. The stationarity of each price *returns* time series was confirmed through Augmented Dickey-Fuller tests.

sample period on this subset of spot ether platforms⁴⁶ and—crucially—on the CME ether futures market as well.⁴⁷

The results of the Commission’s analysis confirm that the CME ether futures market has been consistently highly correlated with this subset of the spot ether market throughout the past 2.5 years. The correlation between the CME ether futures market and this subset of spot ether platforms for the full sample period is no less than 96.2 percent using data at an hourly interval, 85.7 percent using data at a five-minute interval, and 67.1 percent using data at a one-minute interval. The rolling three-month correlation results range between 86.4 and 98.4 percent using data at an hourly interval, 75.8 and 90.2 percent using data at a five-minute interval, and 58.6 and 75.9 percent using data at a one-minute interval.

⁴⁶ The spot ether market is a 24-hour, global marketplace. However, due to the unregulated and fragmented nature of the spot ether market, there are no authoritative published figures for spot ether trading. Nonetheless, multiple sources of pricing information for the spot ether market are available 24 hours per day on public websites and through subscription services. *See, e.g.*, Grayscale Amendment at 46 (stating that real-time price and volume data for ether is available by subscription from Reuters and Bloomberg).

⁴⁷ The CME ether futures market, which is regulated by the CFTC, has developed since its inception in February 2021 into an active market, growing from \$64.3 million in average monthly open interest in February 2021 to \$965.6 million in average monthly open interest in April 2024 (source: Refinitiv). Real-time trade information, including prices, for the CME ether futures market is made available through CME at: <https://www.cmegroup.com/markets/cryptocurrencies/ether/ether.quotes.html#venue=globex> and <https://www.cmegroup.com/markets/cryptocurrencies/ether/micro-ether.quotes.html#venue=globex>. *But see infra* note 49.

Full-Sample and Post-Merge Correlations between Certain Spot Ether Markets and the CME Ether Futures Market (MIDAS and Kaiko Data)

	Coinbase			Kraken		
	Hourly	5 Minutes	1 Minute	Hourly	5 Minutes	1 Minute
Full Sample: October 1, 2021, through March 29, 2024	96.2	85.7	67.1	96.3	86.5	69.0
Rolling Three-Month Correlations Over the Full Sample Period:						
Maximum	98.4	90.1	74.5	98.4	90.2	75.9
Minimum	86.4	75.8	58.6	86.6	77.1	61.6
The Commission also examined correlation between the CME ether futures market and the Coinbase and Kraken spot ether trading platforms at hourly, five-minute, and one-minute intervals, using the same data sources and methodology (see note 45), for the period after the Ethereum Network changed from a Proof-of-Work to a Proof-of-Stake consensus mechanism in September 2022 (“post-Merge”). The results indicate that correlation has been similarly high and consistent during just the post-Merge period.						
Post-Merge Sample: September 16, 2022, through March 29, 2024	94.1	84.1	68.0	94.1	85.0	69.9
Rolling Three-Month Correlations Over the Post-Merge Sample:						
Maximum	98.4	88.3	73.1	98.4	89.3	75.9
Minimum	86.4	75.8	61.0	86.6	77.1	62.8

The Commission further examined correlation between the CME ether futures market and the Coinbase and Kraken spot ether trading platforms at hourly, five-minute, and one-minute intervals in a recent month, March 2024, sourcing CME ether futures market data from Refinitiv.⁴⁸ The results indicate similar correlation: no less than 97.6 percent using data at an

⁴⁸ Data were sourced from Refinitiv for the closest-to-maturity CME ether futures contract price and from Kaiko for the ETH/USD prices on Coinbase and Kraken. The Refinitiv CME ether futures data cover the CME’s full 23 trading hours. All data sets used in the Commission’s analysis are publicly available (although some require subscriptions). The Commission used the same methodology as summarized in note 45 above.

hourly interval, 86.0 percent using data at a five-minute interval, and 62.5 percent using data at a one-minute interval.

Correlations between Certain Spot Ether Markets and the CME Ether Futures Market (Refinitiv and Kaiko Data)

	Coinbase			Kraken		
	Hourly	5 Minutes	1 Minute	Hourly	5 Minutes	1 Minute
March 2024	97.6	86.0	62.5	97.7	87.5	67.0

The results of the Commission’s robust correlation analysis⁴⁹ provide empirical evidence that prices generally move in close (although not perfect) alignment between the spot ether market and the CME ether futures market.⁵⁰ As such, based on the record before the Commission and the correlation analyses in the record, including the Commission’s own analysis, the Commission is able to conclude that fraud or manipulation that impacts prices in spot ether markets would likely similarly impact CME ether futures prices. And because the CME’s surveillance can assist in detecting those impacts on CME ether futures prices, the Exchanges’

⁴⁹ The robustness of the Commission’s correlation analysis rests on the pre-requisites of (1) the correlations being calculated with respect to ether futures that trade on *the CME*, a U.S. market regulated by the CFTC, (2) the lengthy sample period of price returns for both the CME ether futures market and the spot ether market, (3) the frequent intra-day trading data in both the CME ether futures market and the spot ether market over that lengthy sample period, and (4) the consistency of the correlation results throughout the lengthy sample period. The relatively low frequency of trading in CME ether futures, however, makes condition (3) particularly difficult to assess. Over the Commission’s full sample period from October 1, 2021, through March 29, 2024, using MIDAS data (see note 45 above), front-month CME ether futures traded on average only 3.05 times per minute, and did not trade during 47% of the one-minute intervals. For comparison, over this same sample, front-month CME bitcoin futures traded on average 5.11 times per minute, and did not trade during 37% of the one-minute intervals. As explained in note 45 above, the Commission (1) used prior prices for the 47% of minutes during which front-month CME ether futures did not trade, which likely affected the correlation results. Alternatively, the Commission could have (2) dropped this 47% of minutes from the sample, but this also likely would have affected the correlation results. As the portion of no-trade minutes increases, the correlation results from both methodologies (1) and (2) become increasingly unreliable, because a larger and larger percentage of data is either dropped altogether (methodology (2)) or estimated with prior prices, potentially from distant past time intervals (methodology (1)). Consequently, with respect to future proposed spot ETPs, if trading on the regulated market is even less frequent, it may be more difficult to use correlation analysis to establish the sufficiency of a surveillance-sharing agreement with the regulated market.

⁵⁰ Correlation should not be interpreted as an indicator of a causal relationship or whether one variable leads or lags the other.

comprehensive surveillance-sharing agreement with the CME—a U.S.-regulated market whose ether futures market is consistently highly correlated to spot ether, albeit not of “significant size” related to spot ether—can be reasonably expected to assist in surveilling for fraudulent and manipulative acts and practices in the specific context of the Proposals.⁵¹

B. Exchange Act Section 11A(a)(1)(C)(iii)

Each Proposal sets forth aspects of its proposed ETP, including the availability of pricing information, transparency of portfolio holdings, and types of surveillance procedures, that are consistent with other ETPs that the Commission has approved.⁵² This includes commitments regarding: the availability via the relevant securities information processor of quotation and last-sale information for the shares of each Trust; the availability on the websites of each Trust of

⁵¹ One commenter argues that the Commission’s use of correlation as a basis for approval is “problematic” because (1) it relies on a subset of spot markets which may not be representative of the entirety of the spot markets worldwide; (2) the fact that prices between the spot market and the CME futures market “generally move in close alignment does not account for the times when the prices are not aligned,” and thus “the entire premise that price correlation leads to reliable detection of manipulation is fatally flawed;” and (3) “the fact that two variables are correlated in the past does not mean they will continue to be correlated in the future.” See Letter from Dennis M. Kelleher, Co-Founder, President, and CEO, and Stephen W. Hall, Legal Director and Securities Specialist, Better Markets, Inc., dated Jan. 12, 2024, regarding SR-CboeBZX-2023-070 and SR-CboeBZX-2023-069 (“Better Markets Letter 1”), at 6-7. Regarding (1), the Commission selected the spot ether trading platforms of Coinbase and Kraken because these platforms have the largest volume of ETH/USD spot trading; whereas on other platforms, ETH trading typically occurs through so-called “stablecoins” and thus has prices that may be affected by USD/stablecoin rate fluctuations. Regarding (3), the Commission assessed the consistency of correlation over the full sample period through rolling 90-day correlations. The Commission does not detect any trends in the rolling correlations that would lead it to expect that the correlation would not be similarly high in the future. Both the post-Merge correlations and the March 2024 correlations using Refinitiv data indicate that correlations have recently been similar to the full sample period. Regarding (2), the Commission does not consider the use of correlation analysis in the context of the Proposals to be “fatally flawed.” However, the Commission agrees that the *lower* the frequency of trading in the CME futures market, the *greater* the risk that a price movement in spot markets would not be similarly reflected in a price movement in the CME futures market, notwithstanding seemingly high correlation results. For this reason, the Commission has explained that *robust* correlation analysis requires, among others, that there be *frequent* intra-day trading data in the CME futures market (see Spot Bitcoin ETP Approval Order, 89 FR at 3010 n.38).

⁵² See, e.g., Spot Bitcoin ETP Approval Order, 89 FR at 3011; Securities Exchange Act Release No. 61220 (Dec. 22, 2009), 74 FR 68895 (Dec. 29, 2009) (SR-NYSEARCA-2009-94) (Order Granting Approval of Proposed Rule Change Relating To Listing and Trading Shares of the ETFs Palladium Trust); Securities Exchange Act Release No. 94518 (Mar. 25, 2022), 87 FR 18837 (Mar. 31, 2022) (SR-NYSEARCA-2021-65) (Notice of Filing of Amendment No. 1 and Order Granting Accelerated Approval of a Proposed Rule Change, as Modified by Amendment No. 1, To List and Trade Shares of the Sprott ESG Gold ETF Under NYSE Arca Rule 8.201-E (Commodity-Based Trust Shares)).

certain information related to the Trusts' intra-day indicative values ("IIV") and net asset values; the dissemination of IIV by one or more major market data vendors, updated every 15 seconds throughout the Exchanges' regular trading hours; the Exchanges' surveillance procedures and ability to obtain information regarding trading in the shares of the Trusts; the conditions under which the Exchanges would implement trading halts and suspensions; and the requirements of registered market makers in the shares of each Trust.⁵³ In addition, in each Proposal, the applicable Exchange deems the shares of the applicable Trust to be equity securities, thus rendering trading in such shares subject to that Exchange's existing rules governing the trading of equity securities.⁵⁴ Further, the applicable listing rules of each Exchange require that all statements and representations made in its filing regarding, among others, the description of the applicable Trust's holdings, limitations on such holdings, and the applicability of that Exchange's listing rules specified in the filing, will constitute continued listing requirements.⁵⁵ Moreover, each Proposal states that: its issuer has represented to the applicable Exchange that it will advise that Exchange of any failure to comply with the applicable continued listing requirements; pursuant to obligations under Section 19(g)(1) of the Exchange Act, that Exchange will monitor for compliance with the continued listing requirements; and if the applicable Trust

⁵³ See ARK Amendment at 28-30, 33-39; Bitwise Amendment at 19-23; Fidelity Amendment at 25-28, 31-37; Franklin Amendment at 25-28, 30-36; Grayscale Amendment at 45-49; Invesco Amendment at 25-27, 30-36; iShares Amendment at 12-16, 34-41; VanEck Amendment at 25-28, 30-36.

⁵⁴ See ARK Amendment at 36; Bitwise Amendment at 21; Fidelity Amendment at 34; Franklin Amendment at 34; Grayscale Amendment at 46; Invesco Amendment at 33; iShares Amendment at 37; VanEck Amendment at 34.

⁵⁵ See Nasdaq Rule 5711(d)(iii); NYSE Arca Rule 8.201-E(e)(2)(vii); BZX Rule 14.11(a).

is not in compliance with the applicable listing requirements, that Exchange will commence delisting procedures.⁵⁶

The Commission therefore finds that the Proposals, as with other ETPs that the Commission has approved,⁵⁷ are reasonably designed to promote fair disclosure of information that may be necessary to price the shares of the Trusts appropriately, to prevent trading when a reasonable degree of transparency cannot be assured, to safeguard material non-public information relating to the Trusts' portfolios, and to ensure fair and orderly markets for the shares of the Trusts.

C. Other comments

One commenter asserts that the Commission should approve the Proposals because CME ether futures exchange-traded funds (“ETFs”) registered under the Investment Company Act of 1940 (“1940 Act”) are already trading on national securities exchanges “and possess much more potential for manipulation of the underlying asset.”⁵⁸ Another commenter states that the Commission should approve the Proposals because “[t]here is no difference between the [spot bitcoin ETP] approval and the [spot ether ETPs] at this point.”⁵⁹

The Commission has considered and, for the reasons described above, is approving the Proposals on their own merits and under the standards applicable to them; namely, the standards provided by Section 6(b)(5) and Section 11A(a)(1)(C)(iii) of the Exchange Act.⁶⁰ As described above, based on the record before the Commission and the Commission’s own correlation

⁵⁶ See ARK Amendment at 38; Bitwise Amendment at 23; Fidelity Amendment at 36; Franklin Amendment at 35; Grayscale Amendment at 49; Invesco Amendment at 35; iShares Amendment at 33; VanEck Amendment at 35.

⁵⁷ See *supra* note 52.

⁵⁸ See Letter from Patrick Turley, dated Apr. 3, 2024, regarding SR-NASDAQ-2023-045 (“Turley Letter”).

⁵⁹ See Jamieson Letter.

⁶⁰ 15 U.S.C. 78f(b)(5); 15 U.S.C. 78k-1(a)(1)(C)(iii).

analysis, the Commission concludes that fraud or manipulation that impacts prices in spot ether markets would likely similarly impact CME ether futures prices, such that a surveillance-sharing agreement with the CME can be reasonably expected to assist in surveilling for fraud and manipulation that may impact the proposed spot ether ETPs.

Some commenters state that the Commission should approve the Proposals for a variety of investor protection reasons, including that spot ether ETPs would be a less costly and more efficient,⁶¹ more convenient and secure,⁶² and more regulated⁶³ way to gain exposure to spot ether. The Exchanges make similar investor protection arguments in support of approval.⁶⁴

Another commenter disagrees that the ETP investment vehicle would protect investors, stating that the value of an investment in a spot ether ETP would be subject to the same risks of fraud and manipulation in the spot ether market as holding ether directly, and that ETPs are not subject to the Commission's examination authority, custody requirements, or conflicts of interest rules of ETFs registered under the 1940 Act.⁶⁵ This commenter further states that any purported

⁶¹ See, e.g., Posey Letter; Letter from William Entriken, dated Oct. 31, 2023, regarding SR-NYSEARCA-2023-70; Letter from Brent Wickenheiser, dated Apr. 3, 2024, regarding SR-NYSEARCA-2023-70 (“Wickenheiser Letter”); Letter from Dirk Hooley, dated Apr. 3, 2024, regarding SR-NYSEARCA-2023-70; Letter from Kevin Thompson, dated Apr. 3, 2024, regarding SR-NASDAQ-2023-045 (“Thompson Letter”).

⁶² See, e.g., Posey Letter; Wickenheiser Letter; Thompson Letter; Turley Letter; Letter from Anonymous, dated Apr. 3, 2024, regarding SR-CboeBZX-2023-095; Letter from Anonymous, dated Apr. 5, 2024, regarding SR-NASDAQ-2023-045.

⁶³ See, e.g., Posey Letter; Thompson Letter; Angel Letter at 7-8.

⁶⁴ See, e.g., ARK Amendment at 8-13; iShares Amendment at 18-20, 33-34; Bitwise Amendment at 17. However, another commenter states that the Commission should approve the Proposals because “when it comes to crypto, things happen so fast that there is no legitimate protection possible.” See Letter from El Norro, dated Dec. 1, 2023, regarding SR-CboeBZX-2023-095 (“Norro Letter”).

⁶⁵ See Better Markets Letter 1 at 4. While many of the Trusts use “ETF” or “Fund” in their names, none is registered under the 1940 Act.

investor protections from an ETP compared to an “even-worse over-the-counter market” do not neutralize concerns about fraud and manipulation.⁶⁶

This commenter also states that the price volatility of ether means that spot ether ETPs would threaten retail investors by exposing them to an unstable asset.⁶⁷ The commenter further states that approving spot ether ETPs “would threaten not just investors but also the broader financial system” by “further entangl[ing] the crypto industry with traditional finance and aggravat[ing]” risks similar to risks that the commenter claims are posed by spot bitcoin ETPs, such as bitcoin price volatility and dislocations between the price of a spot bitcoin ETP and bitcoin that can “cause stress for institutions heavily exposed to” or reliant on spot bitcoin ETPs.⁶⁸

The Commission has considered these potential benefits and concerns in the broader context of whether the Proposals meet the applicable requirements of the Exchange Act,⁶⁹ including the requirement in Section 6(b)(5)⁷⁰ that the Exchanges’ rules be designed to “prevent fraudulent and manipulative acts and practices.” For the reasons described above, the Commission has determined that the Proposals meet such requirements.

The Commission also finds that the Proposals are consistent with the Section 6(b)(5) requirement that the Exchanges’ rules be designed to protect investors and the public interest because, in addition to the factors discussed in Section II.A and II.B above, existing rules and

⁶⁶ See *id.* See also Letter from Senator Jack Reed and Senator Laphonza Butler, dated Mar. 11, 2024. But see Letter from Representatives French Hill, Josh Gottheimer, Tom Emmer, Wiley Nickel, and Mike Flood, dated May 22, 2024.

⁶⁷ See Letter from Benjamin L. Schiffrin, Director of Securities Policy, Better Markets, Inc., dated May 15, 2024, regarding SR-CboeBZX-2023-069 and SR-CboeBZX-2023-070 (“Better Markets Letter 2”), at 4-7.

⁶⁸ See *id.* at 8. The commenter, however, provided no data on financial institutions’ exposure to spot bitcoin ETPs or likely exposure to spot ether ETPs.

⁶⁹ See also Winklevoss Order, 83 FR at 37602.

⁷⁰ 15 U.S.C. 78f(b)(5).

standards of conduct would apply to recommending and advising investments in the shares of the Trusts. For example, when broker-dealers recommend ETPs to retail customers, Regulation Best Interest (“Reg BI”) would apply.⁷¹ Reg BI requires broker-dealers to, among other things, exercise reasonable diligence, care, and skill when making a recommendation to a retail customer to: (1) understand potential risks, rewards, and costs associated with the recommendation and have a reasonable basis to believe that the recommendation could be in the best interest of at least some retail customers; and (2) have a reasonable basis to believe the recommendation is in the best interest of a particular retail customer based on that retail customer's investment profile.⁷² In addition, investment advisers have a fiduciary duty under the 1940 Act comprised of a duty of care and a duty of loyalty. These obligations require the adviser to act in the best interest of its client and not subordinate its client's interest to its own.⁷³

Some commenters contend that the Commission should disapprove the Proposals because the nature of ether and the Ethereum Network makes them inherently susceptible to fraud and manipulation.⁷⁴ Other commenters argue that the nature of ether and the Ethereum Network

⁷¹ Exchange Act rule 15c-1(a).

⁷² Exchange Act rules 15c-1(a)(2)(ii)(A) and (B). Separately, under Reg BI’s Conflict of Interest Obligation, broker-dealers must establish, maintain, and enforce written policies and procedures reasonably designed to, among other things, identify and disclose or eliminate all conflicts of interest associated with a recommendation and mitigate conflicts of interest at the associated person level. See Exchange Act rules 15c-1(a)(2)(iii)(A) and (B). To the extent that broker-dealers recommend ETPs to customers who are not retail customers covered by Reg BI, FINRA Rule 2111 requires, in part, that a member broker-dealer or associated person “have a reasonable basis to believe that a recommended transaction or investment strategy involving a security or securities is suitable for the customer, based on the information obtained through the reasonable diligence of the [broker-dealer] or associated person to ascertain the customer’s investment profile.”

⁷³ See Commission Interpretation Regarding Standard of Conduct for Investment Advisers, Investment Advisers Act Release No. 5248 (June 5, 2019), 84 FR 33669 (July 12, 2019), at 33671; Investment Company Act Release No. 34084 (Nov. 2, 2020), 85 FR 83162 (Dec. 21, 2020), at 83217 (discussing the best interest standard of conduct for broker-dealers and the fiduciary obligations of investment advisers in the context of all ETPs).

⁷⁴ See, e.g., Better Markets Letter 1 at 3 (asserting that relays are responsible for adding blocks of transactions to the Ethereum Blockchain, and recently one infrastructure provider exited the network, which left “only

makes them inherently resistant to fraud and manipulation.⁷⁵ The Commission acknowledges commenters' concerns regarding fraud and manipulation. Pursuant to Section 19(b)(2) of the Exchange Act, however, the Commission must approve a proposed rule change filed by a national securities exchange if it finds that the proposed rule change is consistent with the

four other major relay players to handle most Ethereum blocks and raises concern of potential problems, ranging from censorship of transactions to stealing of other key operators' profits"; that in addition to relays, the Ethereum Network is run by "parties called builders, which compile most transactions into blocks, and validators, which order blocks into a blockchain," but that both "builder and validator functions are dominated by a handful of participants"; and that "[a] validator controlling 34% could potentially falsify transactions" and one validator currently controls 32.3% of validator power and four builders account for the majority of blocks built); Letter from Robert, dated Apr. 23, 2024, regarding CboeBZX-2023-095 (stating that proof-of-stake is centralizing because as the "pile of [validators'] ether token increases, so does their ability to capture control over the network"; and that "the founding entities never relinquished control over the network" despite the Ethereum Foundation's "deceptive affinity marketing" to the contrary); Letter from Brandon, dated Apr. 4, 2024, regarding SR-NYSEARCA-2023-70 ("Control of the network will inevitably centralize ... because only the largest holders are the ones rewarded with new coins"; and "the entire [Ethereum Blockchain] can be manipulated by the foundation, such as after the DAO attack where the chain was rolled back by the organization"); Letter from James Keeton, dated Apr. 3, 2024, regarding SR-NASDAQ-2023-045 ("[T]he merge to proof of stake in 2022 solidified the lack of decentralization of this blockchain"); Letter from Tyler Mazun, dated Mar. 5, 2024, regarding SR-NASDAQ-2023-045 ("Proof of stake is just another mechanism for more increased centralization and control over the network by the biggest stakers."); Letter from Luther, dated Apr. 3, 2024, regarding SR-NASDAQ-2023-045 ("The Ethereum [F]oundation is the centralized entity that controls the protocol ... [T]hey regularly push out hard forks to their centralized node infrastructure to make protocol changes. In a truly decentralized system this would not be possible.").

⁷⁵ See, e.g., Coinbase Letter at 2 (asserting that the technological and operational security mechanisms inherent in the Ethereum Blockchain significantly limit ether's susceptibility to fraud and manipulation); Letter from Laura Brookover, Matt Corva, and William C. Hughes, Consensys Software Inc., dated Mar. 29, 2024, regarding SR-NASDAQ-2023-045, SR-CboeBZX-2023-087, and SR-CboeBZX-2023-095 ("Consensys Letter"), at 2-7 (arguing that Ethereum's proof-of-stake consensus mechanism "has several built-in protections providing additional security against fraud and manipulation," including: its block finality model provides increased reliability and integrity; the division of labor between two groups of block validators, proposers and attestors, "serves as a check and balance against error and manipulation;" the cost to an attacker group of obtaining the percentage of Ethereum nodes required to compromise the network is greater than for the Bitcoin Network; and the "slashing" that "penalizes validators who violate protocol rules by docking their stakes ... serves as both a punitive measure and a deterrent." This commenter also states that the "active and sizable developer community" enhances Ethereum's resilience against attacks; the redundancy afforded by independent open source software clients means that "network integrity is maintained even if one software client fails due to a bug or malicious exploit;" and the "inherent transparency" of Ethereum's public protocol development "forms a significant barrier to fraud and manipulation at the protocol level."); Letter from Chris McCullough, dated Apr. 3, 2024, regarding SR-NASDAQ-2023-045 (citing unspecified "advanced safeguards inherent in Ethereum's design"); Letter from Anonymous, dated Mar. 24, 2024, regarding SR-NASDAQ-2023-045 ("Anonymous Letter"), at 4 (arguing that the decentralization of ether software clients "helps mitigate the risks posed by bugs, although some concentration is still observed in a few clients"); Letter from Nathan Yang, dated Apr. 7, 2024, regarding SR-NYSEARCA-2024-31.

applicable requirements of the Exchange Act.⁷⁶ For the reasons described above, the Commission finds that the Proposals satisfy the requirements of the Exchange Act, including the requirement in Section 6(b)(5)⁷⁷ that the Exchanges’ rules be designed to “prevent fraudulent and manipulative acts and practices.”

Commenters also address, among other things: investor demand for spot ether ETPs;⁷⁸ environmental considerations of Ethereum’s proof-of-stake consensus mechanism;⁷⁹ whether to permit a Trust to stake its ether;⁸⁰ and the potential disadvantage from Commission disapproval of spot ether ETPs to U.S. innovation⁸¹ and to U.S. investors compared to those in other countries.⁸² Ultimately, however, for the reasons described above, the Commission is approving the Proposals because it finds that the Proposals satisfy the requirements of the Exchange Act, including the requirement in Section 6(b)(5)⁸³ that the Exchanges’ rules be designed to “prevent fraudulent and manipulative acts and practices.”

⁷⁶ See Exchange Act Section 19(b)(2)(C), 15 U.S.C. 78s(b)(2)(C). The Commission does not apply a “cannot be manipulated” standard; rather, the Commission examines whether a proposal meets the requirements of the Exchange Act. See, e.g., Winklevoss Order, 83 FR at 37582. The Commission does not understand the Exchange Act to require that a particular product or market be immune from manipulation. Rather, the inquiry into whether the rules of an exchange are designed to prevent fraudulent and manipulative acts and practices and, in general, to protect investors and the public interest, has long focused on the mechanisms in place for the detection and deterrence of fraud and manipulation.

⁷⁷ 15 U.S.C. 78f(b)(5).

⁷⁸ See, e.g., Jamieson Letter; Letter from John, dated Apr. 4, 2024, regarding SR-CboeBZX-2023-095 (“John Letter”); Letter from Johannes Swenberg, dated Apr. 3, 2024, regarding SR-CboeBZX-2023-095; Letter from Shaun Cumby, dated Apr. 3, 2024, regarding SR-NASDAQ-2023-045.

⁷⁹ See, e.g., Anonymous Letter at 2; Consensys Letter at 6; John Letter; Letter from Brett, dated Apr. 4, 2024, regarding SR-NASDAQ-2023-045.

⁸⁰ See, e.g., Better Markets Letter 2 at 7-8; Anonymous Letter at 3; Turley Letter. The Proposals under consideration by the Commission in this order do not contemplate staking of the Trusts’ ether. Accordingly, the relative benefits or drawbacks of staking are outside the scope of this order. Any future proposal of a Trust to, directly or indirectly, engage in action where any portion of the Trust’s ether becomes subject to the Ethereum proof-of-stake validation or is used to earn additional ether or generate income or other earnings would require the applicable Exchange to submit a proposed rule change under Rule 19b-4.

⁸¹ See, e.g., Turley Letter.

⁸² See, e.g., Norro Letter.

⁸³ 15 U.S.C. 78f(b)(5).

III. ACCELERATED APPROVAL OF THE PROPOSALS

The Commission finds good cause to approve the Proposals prior to the 30th day after the date of publication of notice of the Exchanges' amended filings⁸⁴ in the Federal Register. The amended filings clarified the descriptions of the Trusts; further described the terms of the Trusts; and conformed various representations in the amended filings to the applicable Exchange's listing standards and to representations that the Exchanges have made for other ETPs that the Commission has approved.⁸⁵ These changes do not raise any novel regulatory issues. Further, the changes assist the Commission in evaluating the Proposals and in determining that they are consistent with the Exchange Act and the rules and regulations thereunder applicable to a national securities exchange, as discussed above. Accordingly, the Commission finds good cause, pursuant to Section 19(b)(2) of the Exchange Act,⁸⁶ to approve the Proposals on an accelerated basis.

IV. CONCLUSION

This approval order is based on all of the Exchanges' representations and descriptions in their respective amended filings, which the Commission has carefully evaluated as discussed above.⁸⁷ For the reasons set forth above, including the Commission's correlation analysis, the Commission finds, pursuant to Section 19(b)(2) of the Exchange Act,⁸⁸ that the Proposals are

⁸⁴ See supra notes 3-10.

⁸⁵ See also supra Section II.B.

⁸⁶ 15 U.S.C. 78s(b)(2).

⁸⁷ See supra notes 3-10. In addition, the shares of the Trusts in SR-NYSEARCA-2023-70 and NYSEARCA-2024-31 must comply with the requirements of NYSE Arca Rule 8.201-E (Commodity-Based Trust Shares) to be listed and traded on NYSE Arca on an initial and continuing basis; the shares of the Trust in SR-NASDAQ-2023-045 must comply with the requirements of Nasdaq Rule 5711(d) (Commodity-Based Trust Shares) to be listed and traded on Nasdaq on an initial and continuing basis; and the shares of the Trusts in SR-CboeBZX-2023-069, SR-CboeBZX-2023-070, SR-CboeBZX-2023-087, SR-CboeBZX-2023-095, and SR-CboeBZX-2024-018 must comply with the requirements of BZX Rule 14.11(e)(4) (Commodity-Based Trust Shares) to be listed and traded on BZX on an initial and continuing basis.

⁸⁸ 15 U.S.C. 78s(b)(2).

consistent with the requirements of the Exchange Act and the rules and regulations thereunder applicable to a national securities exchange, and in particular, with Section 6(b)(5) and Section 11A(a)(1)(C)(iii) of the Exchange Act.⁸⁹

IT IS THEREFORE ORDERED, pursuant to Section 19(b)(2) of the Exchange Act,⁹⁰ that the Proposals (SR-NYSEARCA-2023-70; SR-NYSEARCA-2024-31; SR-NASDAQ-2023-045; SR-CboeBZX-2023-069; SR-CboeBZX-2023-070; SR-CboeBZX-2023-087; SR-CboeBZX-2023-095; SR-CboeBZX-2024-018) be, and hereby are, approved on an accelerated basis.

For the Commission, by the Division of Trading and Markets, pursuant to delegated authority.⁹¹

J. Matthew DeLesDernier,

Deputy Secretary.

⁸⁹ 15 U.S.C. 78f(b)(5); 15 U.S.C. 78k-1(a)(1)(C)(iii).

⁹⁰ 15 U.S.C. 78s(b)(2).

⁹¹ 17 CFR 200.30-3(a)(12).

To: Harrington, James (b)(6) [redacted]; Busdoj.gov; Hansen, Lars (b)(6) [redacted]; Bloch, David (b)(6) [redacted]; Millman, Phillip [redacted]; Millman, Phillip [redacted];
From: Nigro, Daniel
Sent: 2022-04-19T12:49:47Z
Subject: Markets Daily: Hot Economy, Rising Inflation: The Fed Has Never Successfully Fixed a Problem Like This; Billions Are Being Wagered on Breakthrough Ethereum Revamping; Oil May Hit \$185 if EU Speedily Bans Russian Oil, JPMorgan Says
Received: 2022-04-19T12:49:47Z
[Billions Are Being Wagered on Breakthrough Ethereum Revamping 4-15-22.pdf](#)
[What will it cost to rebuild Ukraine The Economist.pdf](#)
[Are Markets Better Understood Without Equality.pdf](#)
[China's Promises to Support Covid-Hit Economy Fail to Impress.pdf](#)
[FT - Fed tightening sends US 'real yields' to brink of positive territory - 04-19-2022.pdf](#)
[Law360 - SEC Proposals May Harm Digital Asset Space. GOP Reps. Say - 04-18-2022.pdf](#)
[Corporate CLO Exchanged Traded Funds.docx](#)
[La360 - Banks Challenge FDIC's \\$624M Sale Calculation In RMBS Suit 04-18-2022.pdf](#)
[Oil May Hit \\$185 if EU Speedily Bans Russian Oil. JPMorgan Says.pdf](#)

Wall St. Breakfast Summary: Futures are wavering ahead of another volley of corporate results and data on the number of new housing construction projects. Investors say they are expecting earnings to moderate this quarter as it becomes harder for companies to continue raising consumer costs. Hasbro, Johnson & Johnson and Lockheed Martin are due to report before the open; Netflix and IBM will give updates after the close. [Read our full market wrap here.](#)

Investors will get more data on the U.S. housing market today as analysts point to signs of cooling in the red-hot sector. Housing starts and building permits numbers for April are due. Economists expect groundbreaking on new homes to drop to an annual rate of 1.745M, while permits are seen edging down to 1.825M. Demand for homes is strong, with many properties for sale going for well above asking price. But with a hawkish Fed and the Treasury yields jumping, the 30-year fixed-rate mortgage just topped 5% for the first time in a decade. Yesterday, the NAHB Housing Market Index fell to a seven-month low of 77 for April. "The housing market faces an inflection point as an unexpectedly quick rise in interest rates, rising home prices and escalating material costs have significantly decreased housing affordability conditions, particularly in the crucial entry-level market," NAHB Chief Economist Robert Dietz said. "We believe the housing risk is much less severe than occurred during the Great Financial Crisis since credit quality is healthy, home equity levels are high, and there is higher structural demand for the home than pre-pandemic," analyst Steve Zaccone wrote in a note.

Earnings worries Signs are emerging that Q1 earnings season will be more disappointing than expected, especially with regards to forward estimates and guidance, Morgan Stanley says. "Earnings revisions breadth for the S&P 500 has resumed its downtrend over the past 2 weeks and is once again approaching negative territory (which would mean more downward than upward out-year EPS revisions)," strategists wrote

Futures at 8:40, Dow & S&P flat. Nasdaq +.1%. Crude -2.36% to \$105.66. Gold -0.3% to \$1981.70 Bitcoin +.9% to \$41,025 Ten-year Treasury Yield +3 bps to 2.90%

8:30 announcement: U.S. Housing Starts Unexpectedly Rise to Fastest Pace Since 2006 (Bloomberg) New U.S. home construction rose unexpectedly in March to the highest level since 2006, boosted by multifamily projects and indicating that builders had greater success navigating labor and materials shortages. Residential starts rose 0.3% last month to a 1.79 million annualized rate from an upwardly revised February figure, according to government data released Tuesday. Applications to build, a proxy for future construction, climbed to an annualized 1.87 million units. The median estimate in a Bloomberg survey of economists called for a 1.74 million pace of housing starts

BMO Commentary: Treasuries were under pressure during the overnight session with 10-year yields establishing fresh highs at 2.907% as 30s reached 2.997%. The grinding nature of the selloff has been a notable aspect of the most recent leg toward higher US rates as the cycle unfolds. The weakness lacks the hurried or frantic pace of selling one might typically associate with a repricing of the magnitude seen thus far in 2022 – which is telling in an environment with relatively strained liquidity conditions. The flipside of the argument is that the lack of conviction has allowed the inertia created in the initial surge of 10-year yields above 2.78% to carry rates higher despite the lack of additional fundamental triggers. To be fair, Bullard commented that he wouldn't rule out a 75 bp move in May – although he added this "is not my base case at this point." His caveat begs the question what data or development between now and May 4 could change this perspective – particularly as we already have the CPI release in hand and won't have the benefit of the April BLS employment report until May 6.

We're certainly cognizant that this is largely a moot point given Bullard currently represents the hawkish extreme of Committee members' view. Nonetheless, he has been pressing the envelope in terms of advocating for higher policy rates sooner and the FOMC is unquestionably leaning in the same direction; even if more moderately. Our expectations for next month remain biased toward a 50 bp hike accompanied by the official announcement of the balance sheet runoff schedule as outlined in the March minutes. All else being equal, this will be followed up by another half-point in June and it's at that juncture the forward path of policy rates becomes less certain. The Fed will continue to hike; however, the cadence is likely to slow to 25 bp a meeting during the second half.
More moderate hikes (i.e. 25 bp) are not a foregone conclusion and the Committee's ability to downshift will be contingent on

confirmation that peak inflation has already been achieved for the cycle. Setting aside the well-worn base effects observation in Q2, there is evidence that downward pressure on core inflation is emerging on a monthly basis. March's -3.8% decline in used auto prices speaks to moderation in this pillar of rising consumer prices that has defined much of the pandemic. While the current CPI read showed service inflation on the rise, goods prices declined -0.09% for the largest monthly drop since April 2020. It's far too soon to anticipate the core-CPI pace will moderate to the pre-pandemic pace; although it's unlikely we'll see a repeat of the +0.7%-0.9% prints posted in Q2 2021. Note the divergence between headline and core-CPI will define the next stage of the great inflation debate in the coming months which will offer support to both the bond bears as well as the bond bulls – a dynamic that we expect will resolve in the resumption of the curve flattening trend.

In the near term, we struggle to find any compelling reason to fade the market's insistence on testing 3-handle territory in 10s and 30s. Beyond 3.0% 10s there is very little of technical relevance until last cycle's peak of 3.26%. The degree to which the Treasury market is oversold and positions remain decidedly short gives us pause – the pain trade is toward lower yields at the moment and we're cautious of this reality even as the Fed readies another hike and confirming SOMA will soon be shrinking. We've been reluctant to fade the selloff and while we might have ample reason to view 3% as a buying opportunity, the momentum behind the move and the lack of any decidedly bond friendly developments on the macro horizon leaves us in fence-sitting mode. This perspective will change in early May as the details of the balance sheet rundown are revealed, the Fed offers another 50 bp shot of normalization, and the market turns its focus to the May refunding. The looming refunding series will offer another litmus test for duration demand and we're increasingly of the mind that the auction of 10s and 30s next month will correspond with the establishment of the upper-bound for 10- and 30-year yields that will hold throughout the summer months. Whether that level is 2.91% 10s, or 3.00%-3.26% will remain a function of risk assets' ability to retain the present proximity to the peaks and offer only limited downside from here.

Tactical Bias: It was what didn't happen during the post long weekend quiet Monday session that offered the most relevant new information as the bearishness didn't meaningfully extend, but nor did a wave of dip buying interest come in to bring yields lower. Last week's steepening also pressed further as 2s/10s crossed 40 bp and that will leave the staying power of this cheaper and steeper landscape top of mind as the market awaits incoming data and Fed speak. On Tuesday, that is limited to March's housing starts and building permits data, and Chicago Fed President Evans's (non-voter) remarks that will do little to inform the macro backdrop as 10s trade at levels not seen since December 2018.

For all the focus on the price action in the long-end of the curve and a new high yield print in 10s at 2.88%, the steepening in the front-end has also caught our attention as 2s/5s reached its steepest level since February 2022 as 2s have outperformed in the latest rally and subsequent pullback from the local outright low of 2.272%. The shape of 2s/5s highlights the uncertainty surrounding terminal, and where it will ultimately be that Powell brings policy rates this cycle. There is a bit more nuance around this conversation than simply where the final hike leaves the target band, as there is still the emerging debate on both how long the Fed will be able to keep rates on hold, and if the rate cuts from that level will be 'fine tuning' akin to 2019, or a full fledged cutting cycle back to the effective lower bound. The fact that the more hawkish cohort of the Committee has advocated for pushing policy into restrictive territory and the median SEP forecast showing fed funds at 2.75% to end both 2023 and 2024 being above the longer term estimate at 2.375% implies that at a minimum the Fed will attempt to get rates beyond neutral.

We suspect there will be another period when the market calls into question the durability of this assumption, and as for what that means for the shape of 2s/5s, we struggle to see a significant extension of the steepening bounce. From a more near-term tactical perspective the opening gap from 33.7 bp to 34.6 bp is resistance that held on the initial challenge and overhead is also the 74-day moving average of 35.4 bp. As with much of the broader market, momentum is at the extremes and the fast stochastics is now overbought (steep), although we would wait for a full cross before advocating joining a flattening given the impressive conviction behind the long-end's underperformance.

There was another milestone achieved during Monday's session as 10-year real yields reached -5 bp for the first time since the pandemic and definitively within striking distance of positive territory. (See FT story on reals below) The selloff in TIPS from -111 bp as recently as March 8 means that on a MoM basis, the trough to peak increase in 10-year reals reached a pace not seen since 2013, and we remain on board with FOMC's commitment to push real yields closer to neutral. Admittedly we would have expected a greater reversal in 10-year breakevens than the latest low at 2.793%, and it's exactly that dynamic is a crucial pillar of our waning bearishness and increasingly constructive take on the long end as we approach the summer months. Moderating growth optimism will likely limit how far above zero 10-year real yields will be able to increase, and instead we expect a downtrade in inflation expectations will be the driver of a move toward lower 10-year nominal yields. There is also the feedback with risk assets to consider as corporate earnings season picks up, and domestic equities' performance is put to the test with all that means for financial conditions.- Ian Lyngen and Ben Jeffery

Hot Economy, Rising Inflation: The Fed Has Never Successfully Fixed a Problem Like This (WSJ) Central bank says it is possible, but many factors are out of its control; 'they are strikingly behind'

FT - Fed tightening sends US 'real yields' to brink of positive territory (attached, Ling Yu) Surge in inflation-adjusted Treasury yields marks latest 'headwind' for risky assets



Apollo Global Considers Participating in a Bid for Twitter (WSJ) Elon Musk's \$43 billion pitch has put the social-media company in play

Law360 - Tesla Investors Want Musk Muzzled Over SEC Comments (attached, Ling Yu)

Are Markets Better Understood Without Equality?: John Authers (Bloomberg, attached) It might seem heresy, but let's ask a few questions of one of the most fundamental assumptions used to analyze the economy.

- What if it's equities that have it right, not bonds?
- What if bonds are no longer a hedge for anything?
- What if it would be better for everyone if stocks went down?
- What if the Fed doesn't matter anymore?
- What if commodity prices don't safely rise from here?

Bank Stocks Have to Reckon With the Downside of Higher Rates (WSJ) Rising interest rates have many benefits for banks, but some of the burdens are front and center now

Billions Are Being Wagered on Breakthrough Ethereum Revamping (Bloomberg, attached)

- Over \$10 billion in Ether staked to Lido Finance application
- Stakers can maximize rewards after leveraging holdings

Crypto Stocks Perform Worse Than Cryptocurrencies (WSJ) Coinbase is off 42% so far this year as trading volume sinks; Silvergate Capital, Marathon Digital and Riot Blockchain are down sharply as well.

Law360 - SEC Proposals May Harm Digital Asset Space, GOP Reps. Say (attached, Ling Yu) The two congressmen, Patrick McHenry and Bill Huizenga, said in the joint letter they are concerned that the proposed rules for alternative trading systems could potentially expand the SEC's jurisdiction beyond its existing authority to regulate players in the digital asset space, including in decentralized finance.

TREPP - Corporate CLO Exchanged Traded Funds (ETFs): Looking Ahead at Continued Interest (attached, Ling Yu) The most prominent CLO ETF, Janus Henderson AAA (JAAA), reported that it hit a record \$1.2 billion of assets recently, after launching in late 2020.

Oil May Hit \$185 if EU Speedily Bans Russian Oil, JPMorgan Says (Bloomberg, attached)

- Full and speedy ban would affect more than 4 million b/d
- Slower phase-out like coal ban may leave prices unaffected

China's Promises to Support Covid-Hit Economy Fail to Impress (Bloomberg, attached) China reported the biggest contraction in retail sales and the highest unemployment since the early months of the pandemic on Monday. Hours later, the central bank announced 23 measures to cushion the economy, including more loan support to help businesses struggling to cope with damaging lockdowns.

What will it cost to rebuild Ukraine? (Economist, attached) And all sorts of infrastructure will need rebuilding

Law360- Banks Challenge FDIC's \$624M Sale Calculation In RMBS Suit (attached, Ling Yu)

CREDIT DAYBOOK AMERICAS: Risk Gauge Rises; Apollo Eyes Twitter (Bloomberg) -- Broader markets traded weaker Tuesday as investors digest the prospect of aggressive policy action to curb inflation following Federal Reserve Bank of St. Louis President James Bullard's comments that policy makers shouldn't rule out a 75 basis-point hike. Moscow, meanwhile, has launched a new campaign focused on conquering the Donbas region. Apollo is considering backing a potential deal for Twitter.

- The spread on the Markit CDX North American Investment Grade Index, which rises with increased credit risk, opened 5bps wider at 74.32 as of 7:24am in New York

- Bullard said the central bank needs to move quickly to raise interest rates to around 3.5% this year with multiple half-point hikes and that an increase of 75 basis points shouldn't be off the table
- Apollo Global Management is interested in helping finance a bid for Twitter following Elon Musk's \$43 billion unsolicited offer to take the company private, according to people familiar with the matter
- Taiwan Semiconductor Manufacturing is selling an imminent four-part dollar bond and planning to issue local-currency green notes in May, according to people familiar with the deals, facing a test of investor confidence at a challenging time for the chip industry
- U.S. borrowers that issued leveraged loans tied to the London interbank offered rate prior to the start of the year could switch to the Secured Overnight Financing Rate sooner than expected should the gap between the two benchmarks continue to widen
- At least three lender meetings are on tap for Tuesday in the U.S. leveraged loan market, including one for case management company Paradigm's two-part, distribution-backing loan that will also go toward debt repayment
 - There are currently no deals marketing in the U.S. high-yield bond market
- Issuers including Johnson & Johnson, Halliburton and Lockheed Martin, report earnings Tuesday with Netflix reporting after the close. J&J reported adjusted earnings per share for the first quarter that beat average analyst estimates. The company also cut its annual profit forecast because of unclear demand and global supply surplus. Oilfield-services company Halliburton's adjusted earning per share and sales both beat average analyst estimates over its first quarter
- Chinese junk dollar bonds dropped 1-2 cents on the dollar Tuesday morning, according to credit traders, after property agency operator E-House (China) Enterprise Holdings became the latest defaulter in the country's indebted real-estate sector
- Liangshan Development priced \$204m 3Y Euro-Dollar bonds at par to yield 6.5%. The proceeds will go toward the repayment of existing offshore indebtedness
- Zendesk, a software company that became a takeover target during a failed purchase of SurveyMonkey's parent, is exploring a potential sale, according to people familiar with the matter
 - The company has brought on a new adviser, Qatalyst Partners, and has reached out to potential buyers including software companies and private equity firms
- The U.S. steelmaker owned by Sanjeev Gupta's GFG Alliance lined up \$125 million of debt financing from a private lender, refinancing an earlier loan as the steel and mining conglomerate shores up finances following last year's collapse of lender Greensill Capital

U.S. HY OPEN: Junk Primary Frozen; Yields Near Two-Year High (Bloomberg) -- U.S. junk bonds extended the decline as yields edged higher and the broader index posted losses for the second straight session with the markets continuing to focus on the prospect of faster policy tightening by the Federal Reserve amid forecasts of the likelihood of a recession. Yields rose to close at 6.57%, a near 21-month high, after investors pulled cash from the sector. Lipper reported an outflow of more than \$4 billion last week.

- Investors and borrowers remained on the sidelines amid continuing macro risks emerging from rising commodity prices, the war in Ukraine and an aggressive Federal Reserve, which has signaled interest rate hikes of 50bps and a rapid reduction in the debt holdings of the central bank
- The high-yield primary market has almost ground to a halt as bond sales for April stood at a mere \$5.5b versus more than \$28b same time last year
 - The calendar may remain thin as most borrowers have refinanced in the last two years and have enough liquidity, with no large maturities in the near term
 - Also, most leveraged buyouts and acquisitions are increasingly being financed in the leveraged loans markets as loan funds have reported cash inflows in nine of the last 10 weeks
 - And the private credit market, also referred to as direct lending, is also becoming an alternative source of financing with no regulatory constraints
- While the losses in the junk bond market were across ratings, the asset class was still the best in the U.S. corporate debt market, with month-to-date losses of a little more than 2%
 - CCCs, the riskiest of junk bonds, were the top performing assets with month-to-date loss of 1.75%
- The high yield market may continue to stay on the sidelines as U.S. equity futures declined along with stocks in Europe as investors reassess tightening expectations after St. Louis Fed President James Bullard said that hikes of as much as 75 basis points shouldn't be ruled out
 - Oil prices, meanwhile, erased earlier gains as traders weighed hawkish comments from U.S. Federal Reserve officials and China's promise to repair the economic damage caused by a spate of lockdowns

U.S. LEVLOANS DAILY: Market Still Bustles With Refinancing Deals (Bloomberg) -- The U.S. leveraged loan market is off to an active start with six borrowers announcing light offerings Monday as refinancing and debt-repayment deals emerged alongside issuers funding acquisitions. That's in line with the moves made last week as companies sought to address liabilities as the asset class continued to rebound, and as they looked to lock in prices before rates rise by as much as a half point in May. Issuers are expected to keep moving forward on such deals in the coming weeks, with more than half the loans in general syndication

- Paradigm, borrowing via Outcome Group Holdings Inc., has marked proceeds from \$110 million and \$60 million incremental term loans to pay shareholder dividends, as well as repay and extend a revolving credit facility. The company, which provides case management for the workers' comp industry, is the first borrower to come to the primary market for dividend distributions in about a month, according to Bloomberg-compiled data. A lender call for the CS-led offering is scheduled for Tuesday

INDEX LEVELS

- The S&P/LSTA Leveraged Loan Price Index slipped to close Monday at 97.94 from 97.96 in the previous session
- Year-to-date returns for loans stand at +0.44%, according to the S&P/LSTA Leveraged Loan Total Return Index

STRUCTURED PIPELINE: CarMax, Ford, OneMain, Bluegreen Added (Bloomberg) -- Ford is premarketing its first prime auto lease ABS of the year while CarMax is out with its second prime trade. **OneMain Financial, meanwhile, announced its first consumer loan deal of 2022, which is also the company's first ABS aligned with the 2021 Social Bond Principles administered by the International Capital Market Association**, according to a presale report from Kroll Bond Ratings. A timeshare transaction from Bluegreen Vacations is also expected to price this week.

- Goldman Sachs may price a new issue CLO for Bain on Wednesday
- Goldman may also announce a prime jumbo RMBS Tuesday
- Woodward Capital Management has started marketing its third prime jumbo RMBS of the year. Pricing is expected this week. Starwood is also expected to price a non-QM transaction
- Morgan Stanley, Wells Fargo and BofA Securities are expected to price the BANK 2022-BNK41 CMBS conduit later in the week
- Placement agent GreensLedge and co-placement agent Raymond James & Associates priced a new middle-market CLO for Deerpath

DISTRESSED DAILY: Juice Plus+ Faces Strains As Pandemic Eases (Bloomberg) -- Supplement maker Juice Plus+ Co.'s revenue and earnings are sinking as the multi-level marketing company struggles to attract and retain distributors to sell its products. The company's revenue dropped around 20% in the nine months through January compared with a year earlier, while a measure of earnings fell 40%, according to S&P Global Ratings. Analysts Dinushanth Ramanathan and Gerald Phelan expect the company's performance to continue to decline this year as pandemic restrictions ease and more traditional employment opportunities become available. Juice Plus+'s financial metrics are likely to be at "levels we deem unsustainable for its capital structure" in the 2023 fiscal year, and could breach a financial covenant, the analysts wrote. The Collierville, Tennessee-based company had only drawn \$7.5 million on its revolver due November 2023, though its ability to draw more is restricted by covenants and the fact that the credit line becomes current later this year. Juice Plus+ should be able to extend the revolver, but may not be able to do so on favorable terms, the analysts wrote. Like many of its competitors, Juice Plus+ saw its distributor ranks reach new highs in the pandemic as people sought work-from-home opportunities. As it loses sellers, the company is now trimming costs it added during the pandemic S&P downgraded Juice Plus+'s credit rating to CCC from B-last week. The company's first-lien term loan due November 2025 is quoted around 86 cents on the dollar, according to data compiled by Bloomberg.

- DATA POINTS

Read more: Junk Bonds Decline, Xinhua Warns on Risks: Evergrande Update

- QUOTABLE
 - "None of Mr. Jones's ridiculous tricks have worked in the past, and this one will fare no better."
 - Mark Bankston, lead counsel for the Sandy Hook parents in Texas lawsuits, on the bankruptcy of some of Alex Jones's businesses
- DEADLINES AND DOCKETS
 - All times are U.S. Eastern unless specified and are subject to late revision or cancellation.
- Tuesday, April 19
 - Gulf Coast Health Care, confirmation hearing, 10 a.m.
 - Hertz Global Holdings, bankruptcy hearing, 11:30 a.m.
 - Nordic Aviation Capital, confirmation hearing, 12 p.m.
- READING LIST
 - News, research and insight relevant to distressed investing
- Infowars Bankruptcy Tactic Tips Scale Against Sandy Hook Victims
- Creditors of Vale- BHP Brazil Venture Reject Restructuring Plan
- Exela Surges on Plan to Swap Common Shares for Convertibles
- Shuttered Texas Prison May Struggle to Repay Bonds: Filing

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From: Nigro, Daniel
Sent: 2022-04-12T13:04:33Z
Subject: Markets Daily: Despite 8.5% Inflation Print, Markets Breathe Sigh of Relief & Rally Sharply as Traders Focus on Core CPI - Increase Moderates;
Received: 2022-04-12T13:04:34Z

- [Why the Fed's Shrinking Balance Sheet Matters.pdf](#)
- [U.S. Auto Loan ABS Tracker February 2022 S&P Global Ratings.pdf](#)
- [D.E. Shaw Tops Multistrategy Funds With 11% Quarterly Gain .pdf](#)
- [China's Li Issues Third Growth Warning as Covid Takes Toll .pdf](#)
- [Highlights From the 4-8-22 Issues of Asset & Commercial Backed Alerts.docx](#)
- [There's a Bull Market in Forecasting Macro Doom.pdf](#)
- [U.S. Natural Gas Closes at 13-Year High With Inventories Falling.pdf](#)
- [Ethereum Undergoes Another Stress Test Ahead of Software Change.pdf](#)
- [TINA Is Alive and Other Reasons Dip Buyers Persist.pdf](#)
- [Ignites - Swing Pricing Has to Go, Industry Warns SEC - 04-12-2022.pdf](#)
- [FT - The private market "supercycle" - 04-12-2022.pdf](#)
- [Surge in Crypto Seizures Has Cops Hunting for USBs, Passwords.pdf](#)

Wall St. Breakfast Summary: Futures were wavering ahead of consumer-price figures that are expected to show that **inflation accelerated** to a new multi-decade high last month. (They subsequently rallied, see below) The inflation data will factor heavily into the Federal Reserve's rate-rise decision at its May meeting, and many anticipate the central bank could increase rates by a half-percentage point. Economists estimate the consumer-price index **climbed by an 8.4% annual rate last month** as Ukraine-related disruptions, supply-chain constraints and high demand drove up prices. [Read our full market wrap here.](#)

Inflation watchers this morning will be eyeing the Labor Department's Consumer Price Index, which will be released at 8:30 a.m. ET. The CPI is expected to come in at a whopping 8.4% Y/Y for March and the White House has already warned that the headline figure (which includes volatile food and energy) will be "extraordinarily elevated." America hasn't witnessed inflation levels above 8% since 1981, and the number would mark the thirteenth month it has hit above the Fed's longstanding targeted range of 2%.

Commentary: "It's going to be ugly," said Mark Zandi, chief economist at Moody's Analytics. "It's a perfect storm - Russian invasion, surging oil prices, China locking down, further disruptions to supply chains, wage growth accelerating, unfilled positions. Just a kind of scrambled mess leading to painfully high inflation." **Signs of a top?** There is another cohort of the investing community that sees inflation moving down from here, with oil pulling back from near records and used vehicle prices starting to drop off. "The swing from tight supply to a goods glut could be rapid and dramatic, essentially because the lagged response from the supply chain to the COVID-driven surge in demand is coming on-stream just as consumers want fewer goods," wrote Ian Shepherdson, chief economist at Pantheon Macroeconomics. "This will be the peak, because the anniversary of a sequence of big increases in the spring and early summer of last year creates a hugely favorable base effect."

Consumer prices rose 8.5% in March, slightly hotter than expected and the highest since 1981 (CNBC, Ling Yu) But markets seem to be expressing a sigh of relief that the number was in line with expectations **Core-CPI +0.3% MoM; smallest monthly gain since Sept 2021: U.S. Yield Curve Bull Steepens as Short End Rallies (Bloomberg)** -- The bond yield curve, which had been flatter on the day, has bull steepened after the data. The yield on two-year Treasuries is down 8 bps on the day **S&P 500 Futures Spike to Session Highs With In-Line CPI** S&P 500 futures climbed on relief after March inflation data.

Futures at 9:00, Dow +.6%. S&P +.1.0%. Nasdaq +1.8%. Crude +4.2% to \$97.95. Gold +1.1% to \$1971.50. Bitcoin +1.9% to \$40,591
Ten-year Treasury Yield -8 bps to 2.70%

BMO Commentary: Today is arguably the most relevant session of this holiday shortened trading week as the market prepares for the March CPI report as well as this afternoon's \$34 bn 10-year reopening. To be fair, Thursday's retail sales data will also offer a welcome update on the state of nominal spending as the first quarter came to a close, but at this stage in the cycle it is the trajectory of consumer prices that holds the most sway for both monetary policymakers and market participants. The extension of the selloff in Treasuries overnight that brought 10-year yields as high as 2.832% and 30s to 2.856% is at least partially a reflection of what is expected to be the highest YoY read on core consumer prices since August 1982 as well as a setup for today's 10-year offering and tomorrow's long-bond supply. **It remains to be seen whether the passage of the event risks will mark the near-term yield highs as investors look to the take advantage of 10s at levels not seen since late 2018, or if there is greater bearish conviction to stage a challenge of 3%. We're biased toward the former given the scale of the repricing but continue to prefer taking advantage of the steepening we've seen to reenter flattener positions.**

Considering that even a significant disappointment on the consumer prices front would do little to derail the Fed's ambitions to deliver a 50 bp hike in May and announce the start of balance sheet normalization, we are still in the camp of utilizing the steepening that pushed 2s/10s as high as 29 bp. If we have learned anything from Fed communication over the past month, it is that the flatness of the curve is not sufficiently troubling to inspire any hesitation from Powell in bringing policy rates swiftly higher and into restrictive territory. After all, the Committee has been clear that while there are headwinds facing the recovery, in terms of recession-predicting power, it is neither 2s/10s nor 5s/30s that holds the greatest weight. Rather, the 3-month/10s spread –

currently >200 bp – is most indicative of a pending slowdown. There will certainly come a time when the Fed's hiking campaign presses this measure below zero, although at present there is still ample flattening to be realized before the shape of the curve would derail the tightening campaign.

This brings us to a conversation with a particularly astute client and the question of what it would take for this trend to reverse and a sustainably steeper curve to reassert itself. In short, such a dynamic would need to be a function of inflation and inflation expectations that persist and accelerate in such a manner that either 1) goes unaddressed by the FOMC or 2) does not respond to tighter monetary policy over the medium to long term. Said differently, unanchored inflation expectations that press 10-year breakevens well beyond their all-time highs seen on March 24. We are certainly sympathetic to the argument that the war in Ukraine and persistent supply chain disruptions derived from renewed lockdowns in China presents precisely the supply-side type of cost pressures that the Fed cannot combat. However, we will offer the observation that the Committee will do what it can on the demand side – even if that means dragging real growth precariously close to negative territory later in 2022 or 2023.

An especially topical thought exercise as CPI looms and the divergence between headline and core prices highlights the unique drivers of food and energy costs in contrast to subcategories such as OER and autos. The market has not yet reached the point at which the base-effects from Q2 2021's reads will be relevant, but as the war in Ukraine drags on, and the pandemic enters its next stage, further noise in the data (and thus choppiness in Treasuries) over the coming months is the path of least resistance. After the kneejerk response to the data this morning, we'll be mindful of any steepening setup for the 10-year offering and advocate taking advantage of any relative concession as an opportunity to add flatteners.

Tactical Bias: Higher outright 10-year rates contrasted with 2-year yields that spent the bulk of the domestic session on Monday net lower – a reaction we will credit at least in part to upcoming Treasury supply as well as a heavy day of corporate issuance and selling pressure in USTs to help accommodate primary market dynamics on the corporate side. This leaves CPI to add staying power to the latest leg of the bear steepening, although we're cautious that the March read on consumer prices may ultimately prove a sell the rumor, buy the fact event. Despite what is almost certain to be another multi-decade high data release, 5-year forward breakevens are holding at ~2.50%, and 10-year breakevens are still contained off their record highs in a vote of confidence in the Fed's inflation fighting credibility.

We'll credit some of the 2s/10s steepening with the looming auction of \$34 bn 10-year notes and the accompanying concession that has added to the already impressive selloff that pushed to fresh cycle highs (again). At current valuations the 10-year auction would be the highest yielding primary market event since December 2018, and versus last month's stop at 1.92% we have already seen a solid concession. We're nearing the stage at which the height of the bearish seasonal factors tend to run their course in Treasuries – a notion that resonates with the idea that the selloff is approaching the point at which previously sidelined cash will look to take advantage of the liquidity point provided by supply. Not solely on an outright basis, but a relative one as well; a quick glance at the 5s/10s/30s cash butterfly reveals 10s back to levels not seen since November 2021. This, coupled with the calendar leave us constructive on the auction takedown, and rather than our typical long bias, we favor either 2s/10s flatteners or long the aforementioned butterfly coming out of supply.

Supply will not be Tuesday's main event however, that designation falls to March's CPI print and the final look at consumer prices before the May FOMC. Even a substantial disappointment on the inflation front would not hold the necessary weight to derail Powell's normalization ambitions, or significantly alter the probability of a 50 bp hike in just over three weeks. Nonetheless, **within the details will be especially focused on two subcomponents that have emerged as the pandemic pillars of inflation in OER and used auto prices. On the latter, we've already heard anecdotal evidence and seen an inflection in some alternate indicators that car prices have reached their peak. While that does not ensure autos will be a net drag on inflation, it does imply that further gains will be more challenging to achieve.** Then there is how rising home borrowing costs will begin to flow through to the housing market and begin to stem further appreciation that pushed OER +4.3% YoY in February. By no means something that will materialize in the March data, but something of which to be mindful in the coming months. - Ben Jeffery and Ian Lyngen

[New York Fed: Public Expectations for March 2023 Inflation Hit 6.6% Record \(WSJ\)](#) **but...Expectations for inflation three years from now, in March 2025, moderate to 3.7%** [Survey Summary](#) (Ling Yu):



Inflation Expectations Reach New High for the Short Term, Ease for the Medium Term

Median one-year-ahead inflation expectations increased again in March, climbing from 6.0 percent in February to a new series high of 6.6 percent. At the three-year horizon, median inflation expectations ticked down to 3.7 percent from 3.8 percent, a decrease driven by respondents with no college education and with annual household incomes under \$50,000. The median expected twelve-month change in home prices increased to 6.0 percent from 5.7 percent in February, remaining well above its pre-pandemic reading of 3.0 percent in February 2020. Median year-ahead household spending growth expectations jumped by 1.3 percentage points to 7.7 percent, marking a both new high and the largest month-to-month increase for the series.

Forget the Data, Earnings Season Is the Place to Look for Inflation Clues (Barron's) A hot U.S. inflation data reading for March should be filed under "unsurprising," particularly given the sky-high oil prices last month driven by Russia's invasion of Ukraine. The core CPI, which excludes food and energy prices, may be of more use to those trying to figure out what is going on with inflation. The White House is anticipating another big number, and President Joe Biden is going to Iowa, where he will **take further steps Tuesday** to lower the prices people are facing at the pump by announcing plans to allow E15 gasoline to be sold this summer. E15 gas is 15% ethanol and could save families 10 cents a gallon on average, the White House said. That follows Biden's move to release one million barrels a day of U.S. oil reserves announced last month. Those moves will help alleviate, as opposed to solve, the problem for now. The key question everyone, particularly Federal Reserve officials, wants the answer to is when **inflation will peak**. The CPI, as hot as it may be, is unlikely to provide the answer on this occasion, not least because it is backward looking. But earnings season, which begins this week, may offer more clues. A wave of companies raising wages, as well as prices, would likely concern the Fed ahead of its May meeting and suggest the peak hasn't been reached yet. **Some companies**, including **Chipotle**, **McDonald's**, and **Starbucks**, have already raised prices. Any indication they won't implement further increases or that rising costs are abating will point to inflation peaking.

Why the Fed's Shrinking Balance Sheet Matters: Mohamed El-Erian (Bloomberg, attached) The reduction will have significant implications for the economy and financial markets. Here are some key issues to watch.

China's Li Issues Third Growth Warning as Covid Takes Toll (Bloomberg, attached)

- Premier says 'sense of urgency' needed on implementing policy
- Nomura sees risk of GDP contraction in 2Q amid lockdowns

There's a Bull Market in Forecasting Macro Doom (Bloomberg, attached) Bearish arguments are compelling because they sound smart. That's what makes them seductive to novice investors. "There have only been four major bear markets in the last 100 years. We know perfectly well why the market crashes, but we have no idea why it doesn't."

TINA Is Alive and Other Reasons Dip Buyers Persist: After an initial selloff at the beginning of the year, the S&P 500 Index is close to flat since Jan. 28, but with some significant swings in between. When the market has sold off, investors have found reasons to buy the dip. Here are five reasons often cited.

Home Builders Bypassing Individual Home Buyers for Deep-Pocketed Investors (WSJ) More than one in every four houses purchased by a professional rental investor in the fourth quarter last year was a new-construction house

Surge in Crypto Seizures Has Cops Hunting for USBs, Passwords (Bloomberg, attached) Some criminals see digital assets as easier to hide and transfer. Law enforcement is learning fast.

Nasdaq: Majority Of Advisors Want Spot Crypto ETFs (ETF.com, Ling Yu) Approximately 72% of financial advisors polled by Nasdaq said they would allocate more to cryptocurrency exposure if there was an ETF option

Ethereum Undergoes Another Stress Test Ahead of Software Change (Bloomberg, attached)

- The shadow fork is designed to find more bugs ahead of launch
- The test detected one bug, and has been deemed a success

Metaverse in the making (Seeking Alpha) The development of the metaverse, or the online worlds where avatars interact, play and transact, is heating up among the world's biggest entertainment giants. The latest news from the sector has seen Epic Games, the developer of popular title *Fortnite*, secure \$2B in new funding from Sony (SONY) and Kirkbi, the family-owned group behind the Lego franchise. Until now, Epic's "metaverse" has largely taken place within *Fortnite*, where third parties have collaborated on items like themed skins or staged virtual events. **Flashback:** It was only a week ago that Epic and Lego announced a partnership to co-develop a "family-friendly" metaverse for kids, empowering them to become "confident creators" while delivering amazing play opportunities in a "safe and positive space." In January, Microsoft (MSFT) also agreed to acquire Activision Blizzard (ATVI) for \$75B, with CEO Satya Nadella saying the deal would allow it to get a foothold in the "metaverse." Facebook kicked off the trend by renaming itself Meta Platforms (FB) last November, with Google (GOOG, GOOGL), Nvidia (NVDA) and Qualcomm (QCOM) also

investing in the technology. "As we reimagine the future of entertainment and play we need partners who share our vision. We have found this in our partnership with Sony and Kirkbi," said Epic founder and CEO Tim Sweeney. "This investment will accelerate our work to build the metaverse and create spaces where players can have fun with friends, brands can build creative and immersive experiences and creators can build a community and thrive."

Crypto.com Hires Financial Crimes Expert From Western Union (WSJ) Duncan DeVille, a former regulator and federal prosecutor, will become the cryptocurrency company's global head of financial crimes compliance

Law 360: NY Regulator Gets Assessment Fee Authority For Crypto Cos. (Ling Yu) Legislation that Hochul signed Saturday to enact New York's 2023 fiscal year budget requires the state's Department of Financial Services to charge its licensed cryptocurrency businesses for the costs associated with their oversight, much as the agency already does with banks and insurers that it regulates.

FT Alphaville - The private market "supercycle" (attached, Ling Yu) Goldman Sachs reckons that the boom in private capital has much, much further to run.

S&P: U.S. Auto Loan ABS Tracker: February 2022 (attached)

Key Takeaways

- ☐ In February 2022, prime losses declined month over month and year over year. Subprime losses also dipped month over month, and while they rose relative to last year, they remained 39% lower than in February 2020.
- ☐ Recoveries were especially strong, increasing to approximately 74% and 50% in prime and subprime, respectively.
- ☐ Delinquencies declined for the month, but are inching back to pre-COVID-19 levels. In addition, subprime extensions, while lower than in January, were higher than February 2020, a month before the pandemic started.
- ☐ In March, we reviewed 17 transactions and reduced our expected cumulative net losses on all of them. These reviews resulted in 46 upgrades and 28 affirmations.

U.S. Natural Gas Closes at 13-Year High With Inventories Falling (Bloomberg, attached)

- ☐ Traders fear cold weather could divert fuel from storage
- ☐ Settlement price highest since before shale revolution

Highlights From the 4-8-22 Issues of Asset & Commercial Backed Alerts (attached, Ling Yu)

D.E. Shaw Tops Multistrategy Funds With 11% Quarterly Gain (Bloomberg, attached)

- ☐ Citadel's Wellington fund up 4.7% this year after March slump
- ☐ Multistrats thrived amid volatility fueled by inflation, war

FT/Ignites - Swing Pricing Has to Go, Industry Warns SEC (attached, Ling Yu) The comment period for the proposed new money market rules closed on Monday. **Investment Company Institute** associate general counsel **Jane Heinrichs** said the rule "would kill the product," Reuters reports, with funds deciding it's not worth the effort to put out a product that no longer meets investors' needs.

CREDIT DAYBOOK AMERICAS: All Eyes on CPI; Risk Gauge Widens (Bloomberg) -- Credit investors will tune into the consumer price index print, key inflation data scheduled to be released at 8:30 a.m. New York time, in an effort to better navigate the Federal Reserve's monetary tightening campaign to fight the highest inflation in 40 years. A credit risk gauge opened slightly wider ahead of today's release.

- Although Amazon sparked some excitement in credit markets on Monday with a \$12.75 billion jumbo bond sale and another big deal might be on the way from Oracle, Wall Street says don't get your hopes up for corporate issuance
- There are three borrowers scheduled to hold lender calls Tuesday in the leveraged loan market, while commitments are due on testing company Element Materials' dual-tranche, buyout-backing loan
- StoneX Group has hired William Wilson from Imperial Capital to serve as head of debt capital markets amid a broader fixed-income push
- Treasuries stabilized on Tuesday after the 10-year yield jumped to the highest since 2018 on Monday
- Investors including UBS and AllianceBernstein are betting that some companies issuing high-yield bonds have done enough to bolster their balance sheets and that such notes should better weather volatile fixed-income markets ahead
- A "fast and furious" Fed has sent global growth optimism to an all-time low and keeps Wall Street stability risks high, according to Bank of America's April global fund manager survey
- Exiled Chinese businessman Guo Wengui is offering to repay the more than \$100 million he owes creditors in part by offering up the yacht that drove him to bankruptcy, court papers show

U.S. HY OPEN: Junk Yields Climb as Wary Investors Pull Cash (Bloomberg) -- U.S. junk bonds extended their decline to a fifth straight session amid a broader risk-off sentiment caused by a hawkish Federal Reserve and rising 5-year and 10-year Treasury yields. U.S. inflation data on Tuesday is likely to add to concern of higher rates. Junk bond yields rose to a 21-month high of 6.58% and a benchmark index posted its fifth consecutive daily loss, the longest losing streak in three months.

- Two big high-yield exchange-traded funds - HYG and JNK - saw an outflow of \$1.3b just in the last two sessions
 - U.S. high yield funds estimate an outflow of \$2.18b through Friday's close, JPMorgan wrote on Monday, citing Refinitiv Lipper

- CCC yields, the riskiest of junk bonds, climbed to a new 17-month high of 9.81% and the index posted a loss of 0.58% on Monday pushing the year-to-date losses to 5.6%
- New borrowers stayed on the sidelines on Monday amid a weak equities market
 - U.S. borrowers sold \$5b last week after the slowest first quarter since 2016, with just \$43 billion, a decline of 71% from the first quarter of 2021
 - Issuance is expected to stay light as most borrowers have refinanced in the last two years and have enough liquidity, with no large maturities in the near term
 - Oldcastle BuildingEnvelope, a building products company, was the lone new deal in the pipeline. The marketing for the \$985 million, two-part transaction begins Tuesday. The proceeds will fund the buyout of the company by KPS Capital Partners. The financing package also includes a term loan
 - Initial price talk for the secured tranche is mid-high 6% and mid-high ?? for the unsecured
 - Also, leveraged buyouts are funding through the leveraged loans market and are even exploring the new alternative financing option of the private credit market
 - Lack of cumbersome paperwork, absence of serious regulatory constraints and the possibility of aggressive covenants make the private credit option attractive for funding LBOs
- While concerns about the rising cost of borrowing fueled by rate hikes grow, Bank of America's Oleg Melentyev wrote that the U.S. high-yield market should be able to withstand the probable margin squeeze, since 82% of the market cap is in sectors with sufficient cushion to withstand the initial impact of a rate increase
 - Fundamentals should hold strong in the next three to six months of price pressures, Melentyev wrote on Friday
- U.S. junk bond investors may wait and watch as U.S. equity futures waver ahead of an inflation print that's set to bolster the case for aggressive Federal Reserve policy tightening
- In other news, JPMorgan revised its total returns forecast for junk bonds in 2022 to a mere 0.5%, down from the earlier projection of 2.25%
 - Citigroup lowered its annual issuance forecast for U.S. junk bonds by 37.5% to \$250 billion, according to a note published Monday

STRUCTURED PIPELINE: Lendbuzz Auto Set To Price; Dryrock Returns (Bloomberg) -- Barclays is in the market with the first credit card deal off its DROCK shelf since September 2021, according to data compiled by Bloomberg. Synchrony Bank upsized and priced its first credit card deal off the SYNIT shelf since June 2019. Lendbuzz is expected to price a non-prime auto later today. Autos from Exeter and Harley Davidson are also expected to price this week along with a solar trade from GoodLeap and timeshare from Hilton Grand Vacations.

- Freddie Mac priced the STACR 2022-DNA3 credit risk transfer RMBS
- Freddie Mac announced the K-142, K-J39 and WI-K145 CMBS deals
- Citigroup priced a new issue CLO for Carlyle

DISTRESSED DAILY: Phone Recycler Reconext Facing Cash Crunch (Bloomberg) -- Two years after leaving bankruptcy, electronics recycler Reconext has a shrinking pool of cash and high leverage that will make it harder for the company to refinance debt coming due next year, S&P Global Ratings said in a report in which it downgraded the company's prospects. Parent 4L Topco Corp. reported weaker-than-expected results for the third quarter last year and likely ended 2021 with \$12 million to \$15 million in unrestricted cash, down about a third from the previous year, credit analysts Dieynaba Kane and Andy Sookram said in a report. The company could probably only borrow \$6 million at the end of last year under its revolving credit line before it tapped out the facility, they wrote. "These characteristics lead us to believe that the company could pursue a restructuring or debt exchange that we view as tantamount to a default," the report says. Reconext did not respond to requests for comment. The company manages returns, trade-ins and buybacks for wireless carriers and other consumer electronics retailers. Reconext refurbishes consumer phones and laptops as well as networking and other equipment used by data centers, according to its website. The company divested several units, leaving it with a smaller scale, and it faces additional challenges stemming from inflation, the tight labor market and growing business competition, the analysts wrote. When the Grapevine, Texas-based company -- formerly known as Clover Technologies -- reorganized in bankruptcy in 2020, it borrowed \$80 million to fund its exit, which is due in 2024. It also has an asset-based revolving credit facility due next year.

- DATA POINTS
- QUOTABLE
 - "Kmart was part of America. Everybody went to Kmart, whether you liked it or not."
 - Michael Lisicky, an author who has written several books on U.S. retail history, commenting to the Associated Press on the closure of a New Jersey Kmart that left the chain with just three remaining locations
- DEADLINES AND DOCKETS
 - All times are U.S. Eastern unless specified and are subject to late revision or cancellation.
- Tuesday, April 12

- Ion Geophysical, forbearance expiration
- Sungard AS New Holdings, first-day hearing, 9 a.m.
- LTL Management, bankruptcy hearing, 10 a.m.
- READING LIST
 - News, research and insight relevant to distressed investing
- Derivatives Panel Asked to Review Russia 'Failure to Pay' Event
- Luckin Coffee Completes Restructuring, Emerges from Chapter 15
- Medline Bonds Fall as CCC Rated Debt Struggles to Perform
- Sungard Back in Bankruptcy Court After Less Than Three Years

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From: Nigro, Daniel
Sent: 2022-06-14T12:52:35Z
Subject: Markets Daily: Bear Market Blues: US Rates Have Biggest Two Days Since 1987; Crypto Sinks to \$22K; S&P in Bear Market; Junk Bonds See Biggest Decline in 2 Years; Loan Prices Drop Most Since 3/20
Received: 2022-06-14T12:52:35Z

[Crypto Staking Brawl Breaks Out in Middle of Ethereum Upgrade.pdf](#)
[Year-Ahead Inflation Outlook Matches Record in NY Fed Survey.pdf](#)
[Crypto Investors Who Bought the Hype Get Hammered by the Selloff.pdf](#)
[US Rates Have Biggest Two Days Since 1987, Jolting Global Assets.pdf](#)
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[Law360 - Tales From The Crypto Bill 2 From Fees To State Licensees - 06-13-2022.pdf](#)
[Law360 - What Stablecoins Are And Aren't Lessons For Crypto Industry - 06-13-2022.pdf](#)
[Law360 - Schwab To Pay \\$187M In SEC Deal Over Robo-Adviser Conflict - 06-13-2022.pdf](#)
[CreditFlux - NAIC suggests going beyond ratings by taking CLO evaluations in-house.docx](#)

Wall St. Breakfast Summary: Futures are up this morning after a rout Monday sent the S&P 500 into a bear market ([live coverage](#)). Another inflation measure, the producer-price index, is due before the opening bell and comes on the heels of last week's consumer-price data that set off the market's current tailspin. The Federal Reserve begins its two-day policy meeting today, and a 0.75-percentage-point increase [could be in the cards](#) when it makes its decision Wednesday. [Read our full market wrap here.](#)

Bear Market Blues: An intense selloff hit Wall Street on Monday as traders got rattled by worries of entrenched inflation and a possible recession. The S&P 500 slumped nearly 4% to enter a bear market, now off more than 21% from its record high in January. The rout even hit the energy industry (a rare segment that has performed well in 2022), while cooling valuations rocked the risky crypto sector (Bitcoin tumbled below \$21,000) and Treasury yields spiked to levels not seen in a decade (10-year jumped 28 bps to 3.44%). **Bigger picture:** While the S&P 500 hit the bear threshold in May, the benchmark index quickly rebounded within the same day and has avoided closing in bear territory over the past month. Some similar price action could be seen overnight, with S&P 500 futures rallying 1%, though many analysts caution that things could be different this time around. "We're definitely seeing a risk-off atmosphere, a flight to quality," noted Charlie Ripley, senior investment strategist at Allianz Investment Management. "In that environment, people need to raise cash." The selloff came just in time for the latest Fed meeting, which will see FOMC officials meet over the next two days and announce policy changes and economic forecasts on Wednesday. Expectations over the past month priced in a half a percentage point rate hike, but an upshift transpired following the elevated CPI reading seen on Friday. Traders now see a 99.8% chance of a 75-basis-point move, according to the CME Group's FedWatch tool that measures pricing in the fed funds futures markets. **Behind the curve:** "What we need to see is clear and convincing evidence that inflation pressures are abating and inflation is coming down. And if we don't see that, then we'll have to consider moving more aggressively," Fed Chair Jerome Powell said at a recent *Wall Street Journal* conference. The central bank raised rates by a half percentage point at its meeting in May - marking the first such increase since 2000 - to a range between 0.75% and 1%. The last time the Fed raised rates by 0.75 percentage points was at a meeting in 1994, when the central bank rapidly raised rates to stave off a potential rise in inflation.

PPI in May came in at 0.8% MoM in line with estimates and from April's downwardly revised 0.4% MoM gain. This brings the YoY pace to 10.8% vs. 10.9% expected and prior. The ex-food, energy and trade measure also matched forecasts at 0.5% MoM which left YoY unchanged at 6.8%; below the 6.9% consensus. On net it was a modestly lower-than-expected print, but given the proximity to the Fed and the post-CPI timing of the release, the new information has been met with little reaction in US rates. **Futures at 8:50,** Dow +0.4%. S&P +.6%. Nasdaq +.9%. Crude +1.3% to \$122.46. Gold -0.6% to \$1821.10. Bitcoin -4.4% to \$22,205. **Ten-year Treasury Yield** -4 bps to 3.33%

BMO Commentary: *To characterize the overnight price action in Treasuries as stabilizing is only with the backdrop of Monday's 28 bp peak to trough selloff in 10s as the overnight bid has already left a 12 bp intraday trading range in the benchmark of all benchmarks.* The bearish level to beat in the form of an isolated yield high from April 2011 at 3.451% held on the first challenge, and we'll be eager to see the durability of that technical line in the sand over the balance of the trading week. After reaching new cycle flats at -17.9 bp, the modest steepening in 5s/30s has left that curve firmly in inverted territory, and given the uncertainty surrounding tomorrow's policy rate decision, we remain firmly in the flattening camp. *To put yesterday's increase in 10-year real yields in context, the only time we have seen larger one day selloffs were during the height of the pandemic's volatility in March 2020 and in October 2008 – eclipsing even the taper tantrum in terms of the surge in inflation-adjusted borrowing costs. It followed intuitively that the S&P 500 entered official bear market territory, and it is this feedback loop that promises to define trading as tomorrow's rate hike is absorbed and summer more materially sets in.*

Implied in the aggressiveness with which the Fed is preparing to act is a comfort with some moderation in what has been an unequivocally strong labor market. As we've been on about, the real economy has yet to feel the impact of the Fed's tightening, and while financial markets (and conditions) have recalibrated to this new monetary policy paradigm, the lagged nature of

employment data means that just three months with rates off zero, has had a negligible influence on hiring thus far. The type of inflation the Fed is endeavoring to head off is of the wage/price spiral variety, and while real wages are still firmly in negative territory, cooling a too-hot labor market will bring nominal compensation lower. Normalizing the imbalances in labor supply and demand will leave our focus on the unemployment estimates within the SEP and any upward revision to forecasts for UNR that will reflect a dramatically less accommodative policy backdrop. Indeed, by most estimates of NAIRU there is room for the unemployment rate to rise while not necessarily running counter to the dual mandate. Especially with last week's initial jobless claims figures reaching the highest level since early February on a 4-week moving average basis, this promises to be a space to watch in the coming months.

More immediately germane to trading ahead of Wednesday's Fed meeting will be May's PPI data that holds the potential to add to the already poignant inflationary angst that is defining the macro backdrop. While not as directly influential for Powell as the prices on the consumer side, production costs serve as a reminder of the current point in the cycle and the degree to which input prices are being passed onto the end user or eating into profits. Recall, just a few weeks ago it was several of the benchmark retailers that cited struggles in increasing prices to keep up with costs as the magnitude of the increase was simply proving too severe for consumers. In practical terms this means that balance sheets will begin to feel the pressure of not only production prices, but also higher borrowing costs as this new, higher, interest rate paradigm is established. With headline PPI seen at 10.9% YoY from 11.0% YoY, this morning's figures could certainly add to the chatter surrounding a 75 bp hike.

The news that the Bank of Japan purchased a record amount of JGBs overnight to defend its tolerance band serves as a reminder that not all monetary policy backdrops are created equal. Governor Kuroda reiterated that it is still too soon for Japan to exit the ultra-low rates regime even as questions on future changes to the YCC program begin to mount given the yen continues to make fresh lows versus the USD. As for what this means for the current state of US rates, we will credit currency hedging considerations for some of the reason why 10-year yields were able to reach 3.44% as Japanese buyers remain absent from a long end bid for USTs. This will not persist indefinitely, although as we monitor the Ministry of Finance data, we are skeptical that the largest foreign holder of Treasuries is ready to begin buying US rates just yet.

Tactical Bias: 10-year yields are back to levels last seen in 2011 as the selling conviction in Treasuries remains intact. In terms of the next threshold to monitor – support is sparse until a yield high from April 2011 at 3.451% and given the speed of the move to start the week, we are certainly sympathetic to a preference for the sidelines in the current environment. The next potential inflection point comes on Wednesday and a Fed meeting that will be looked to for some more clarity on the path of monetary policy and how the Fed is viewing the next leg on the economic cycle. We would be remiss not to acknowledge the selloff in stocks and while a bear market marked the strike price of the Powell put in 2018, with inflation running at 8.6%, that inflection point in the current environment is much lower in domestic equities.

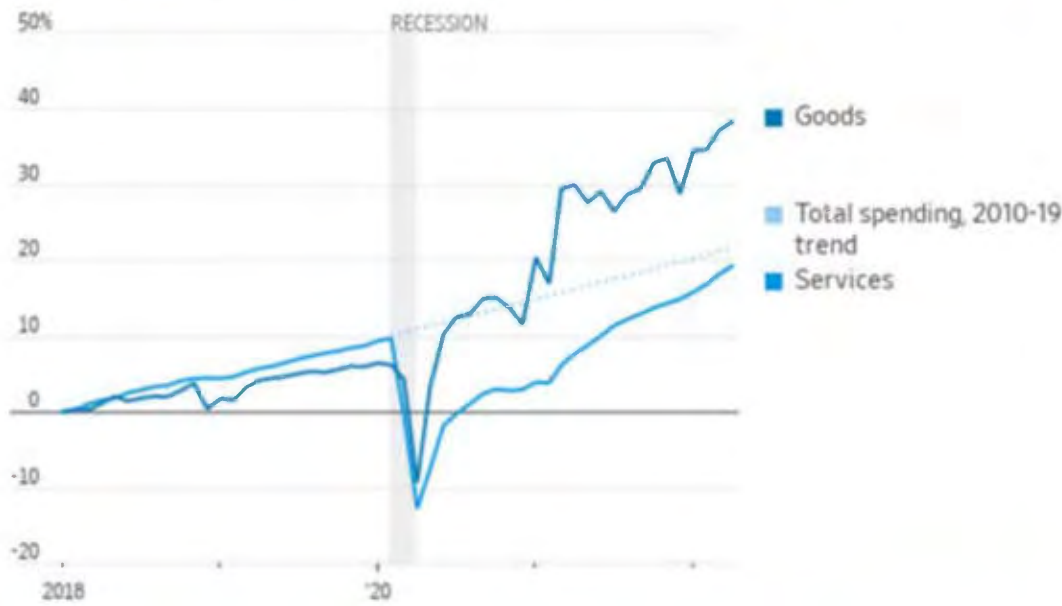
Following the speed and severity of the curve flattening, in addition to the uncertainty on the size of Wednesday's hike – we are still looking for a 50 bp move – we fielded several questions on why Powell is not simply raising rates by 100 bp and expediting the normalization process. There are a few reasons why we expect the Committee favors adding more hikes rather than larger ones. Firstly, credibility and the messaging delivered by the Chair only four weeks ago revealed that a 50 bp hike was on the table with no acknowledgment of anything more aggressive being considered. As such, changing that stance after a single CPI print would add monetary policy uncertainty in an already-volatile backdrop and undermine the market's confidence in the FOMC's follow through on their communicated opinions.

Secondly, as we have seen historically, in the event of a 75 bp or 100 bp hike, the market would press that pricing and incorporate multiple moves of the same magnitude. With financial conditions already reaching new tights even before accounting for Monday's price action, at this point there has been a lot of heavy lifting done for the Fed, which leaves the onus on Powell to follow through rather than shock investors with even more hawkishness. This certainly does not preclude opening the door to 75 bp at some point, but we expect such a reality would be communicated well ahead of time in an effort to drive an even larger FCI tightening; as the S&P 500 fell below 3800, we are apprehensive now is the time to look for this from the Fed. Thirdly, and of greatest relevance from a macro perspective is the lagged influence of monetary policy to consider. Three months ago, policy rates were still at the effective lower bound and the Fed had only just conducted its last QE pass. As such, none of the tightening conducted thus far has had a material impact on the realized economic data – it will not be until the end of Q3/Q4 that we expect higher policy rates will truly begin to show up within the inflation, jobs and growth numbers. As another reason why we think a 75 bp hike on Wednesday is unlikely, the Fed will want to give the economy an opportunity to show the influence of higher rates before deciding to act even more aggressively.

Within the breakdown of Wednesday's repricing the response in the TIPS market was especially informative as the nearly 20 bp increase in nominal 10-year yields was entirely a function of higher real rates as breakevens narrowed. 10-year reals back to +59 bp almost eclipsed the volatility of the pandemic and on a sustainable basis are back to mid-2019 levels before the first of the fine-tuning rate cuts that took place before the pandemic. While the outright level of rates is not necessarily troubling in their own right, the speed of the move is more volatile than would be ideal through the eyes of the FOMC. In fact, on a net change basis, aside from the swings associated with the pandemic in March 2020, we have not seen 10-year reals increase by this much over a single session since the taper tantrum in 2013. **Directionally, we are very much on board with the move even if the size of the selloff continues to strike us as a bit oversized in response to a single CPI read.** - Ben Jeffery and Ian Lyngen

FT - Recession, inflation or both? - And the crypto system starts to creak (attached, Ling Yu)

Percentage change in consumer spending from 2018



Source: Commerce Department

Higher Unemployment Rate Looms as the Fed Fights Inflation (WSJ) Central-bank officials shift views from last year, when they sought a fast labor-market recovery

The crypto industry just had one of its worst days ever — Here's what happened (CNBC, Ling Yu) The market cap of crypto has fallen below \$1 trillion, down from \$3 trillion at its peak in Nov. 2021.

Year-Ahead Inflation Outlook Matches Record in NY Fed Survey (Bloomberg, attached)

- Household spending seen rising a record 9%, regional Fed says
- Three-year ahead inflation expectations hold steady at 3.9%

US Rates Have Biggest Two Days Since 1987, Jolting Global Assets (Bloomberg, attached)

- Almost all major currencies weakened versus soaring greenback
- Money managers ramped up Fed interest-rate hiking wagers

Self-Everything Markets Are Serving Up Healthier Doses of Panic (Bloomberg, attached)

- Stocks to have hard time rebounding without VIX at 40: Emanuel
- S&P 500 sinks almost 9% in three days, enters bear market

Charles Schwab Paying More Than \$186 Million in Settlement Over Robo-Adviser Business (WSJ) SEC faulted company for not disclosing enough about a practice of keeping some client assets parked in cash

Law360 - Schwab To Pay \$187M In SEC Deal Over Robo-Adviser Conflict (attached, Ling Yu)

Some European Factories, Long Dependent on Cheap Russian Energy, Are Shutting Down (WSJ) Industrial energy costs are soaring in the wake of Russia's war on Ukraine, hobbling European manufacturers' ability to compete globally

Crypto Staking Brawl Breaks Out in Middle of Ethereum Upgrade (Bloomberg, attached)

- Lido seen raising centralization risk by some observers
- Protocol maintains it improves decentralization of staking

Crypto Investors Who Bought the Hype Get Hammered by the Selloff (Bloomberg, attached) Most cryptocurrency traders bought in the past year, surveys show. Bitcoin is now trading at its lowest level in 18 months.

The Oil Price Shock Will Reverberate Into Next Year: Javier Blas (Bloomberg, attached) There's no end in sight for the price spike as supply struggles to keep up with demand.

These 40 'overvalued' housing markets could see 15% to 20% home price declines if a recession hits (Mark Zandi, Moody's Analytics In Fortune)

FT - The return of the workers' economy (attached, Ling Yu) Rise in wages is structural with labour set to take an increasing share of corporate income - The writer is chief US economist at Morgan Stanley

Law360 - Tales From The Crypto Bill 2: From Fees To State Licensees (attached, Ling Yu)

Law360 - What Stablecoins Are And Aren't: Lessons For Crypto Industry (attached, Ling Yu)

CreditFlux - NAIC suggests going beyond ratings by taking CLO evaluations in-house (attached, Ling Yu)

Bond Hits of Note:

tumble in hotel and lodging REITs. The company is facing substantial debt payments in the months ahead; analysts have expressed confidence the company will meet those obligations.

- The price is the lowest since April 7, 2020, pushing the yield to 10.8%
- About \$400 million of the notes are outstanding, with the next coupon payment due in two months; about \$500 million of senior unsecured notes are due in August
- S&P says in an April report the company previously extended the maturity of its fully drawn revolver by six months to January 2023, with another six-month extension possible
 - Co. approached lending groups for covenant relief, expects to “sort of exit those covenant issues by the third quarter,” per SVC’s June 8 investor presentation
- The 2030 notes are rated B+ by S&P, which said that the amended revolver, together with hotel sales, helped alleviate near-term liquidity concerns
 - “Refinancing risk remains if operating performance within the hotel segment does not recover as expected,” S&P wrote. “Additionally, the company has material debt maturities in each year through 2030 and would likely need access to capital markets, which is currently restricted due to non-compliance of its debt service incurrence covenant”

[Heart’s 2027 Notes Top 12% Yield Amid Caution on Ad Outlook](#) (Bloomberg) – Iheart Communications 8.375% senior unsecured bonds maturing in 2027 fall as much as 4 cents on the dollar to 86 cents amid a broad market selloff and comments last week from Morgan Stanley about the risk of recession and decelerating ad growth.

- The price is the lowest since May 8, 2020, pushing the yield above 12%
- The notes are rated B- by S&P and Caa1 by Moody’s

[Carvana Notes Break Below 60 as Used Car Prices Crimp Demand](#) (Bloomberg) -- Carvana 4.875% senior unsecured bonds maturing in 2029 fall as much as 3.5 cents on the dollar to 58.25 cents, per Trace data. Analysts have said the company is under pressure because used car prices have been rising, which cuts into demand from potential customers of the online vehicle sales platform.

- **The price set a new intraday record low, pushing the yield above 14%**
- **The notes have lost about a third of their value so far this year**
- Previously:
 - Carvana Price Target Slashed at Stephens on Demand Pressures
 - Used Cars Become Expensive Problem for Dealers Carvana, CarMax
 - Co. publishes turnaround plan that included major cuts to its advertising and capital expenses

[CREDIT DAYBOOK AMERICAS: Credit Risk Gauge Tops 100 Basis Points](#) (Bloomberg) -- **A measure of fear in US credit markets, CDX IG, opened above 100 basis points Tuesday, the first time hitting that level since the early days of the pandemic in April 2020.**

The move comes after corporate bond indexes were crushed amid a broad selloff as attention turns to whether the Federal Reserve will surprise the market with a larger rate hike than previously communicated.

- US junk bonds saw another brutal selloff as yields jumped to a two-year high of 8.43% on Monday, in the biggest one-day increase since March 2020
- Meanwhile loan prices extended declines, dropping the most on a percentage basis since March 2020, according to Bloomberg-compiled data
- “The beatings will continue until morale improves,” said Bill Zox, a high yield portfolio manager at Brandywine Global Investment Management. “But this treacherous near term setup is what creates the long-term opportunity for credit. This is when you should be legging in new commitments to credit”
- **The spread on the Bloomberg US Investment Grade Index has widened 9 basis points since Thursday, to +141**
 - “Where spreads go from here remains highly uncertain and will largely depend on what and how the Fed communicates tomorrow both via the dot-plot and the press conference,” JPMorgan strategists led by Eric Beinstein wrote Tuesday
- **New US company bond sales are likely to remain on hold until at least after Wednesday’s Federal Reserve meeting**
 - The Fed will probably consider a 75 basis-point rate hike, the largest since 1994, when it meets this week
- **In high yield, a bond sale by Intertape Polymer Group remains the only deal in the market.** It’s expected to price Tuesday, but timing is not clear after Friday’s CPI data rattled markets
- JPMorgan and Goldman Sachs are withdrawing from handling trades of Russian debt after the Biden administration’s surprise announcement last week it’s banning US investors from scooping up such assets
- Wynn Macau says Wynn Resorts agreed to make available a USD revolving loan facility of as much as \$500 million

US HY OPEN: Junk Yields at Two-Year High Amid Brutal Selloff (Bloomberg) -- US junk bonds saw another brutal selloff as yields jumped to a two-year high of 8.43% on Monday, in the biggest one-day increase since March 2020, as equities plummeted amid a broad risk-off move. The 5- and 10-year Treasury yields surged ahead of the Federal Open Market Committee decision Wednesday.

- Junk bond losses mounted as the index saw the biggest decline in more than two years, with negative returns of 2.6%, after seven days of losses, the longest losing streak in five months
- Yields have been under pressure, with spreads widening 42bps, the most in almost two years, to +480bps
- "Elevated volatility and gappy moves are likely to continue" as the market looks for the right balance of weaker growth, a regime shift in funding yields and tighter liquidity conditions, Morgan Stanley strategists including Taylor Twamley, Srikanth Sankaran and Joyce Jiang wrote on Monday
- As softer earnings growth and continued withdrawal of liquidity gets priced in, default and illiquidity premiums are bound to rise, Morgan Stanley wrote
- A shocking rise in consumer price data released on Friday triggered the selloff amid concern that the Federal Reserve will have to ramp up policy tightening to quell inflation, while also causing an economic recession
- Losses spanned across ratings in the junk bond market
 - BBs were the worst performers with a loss of 2.64%, the biggest one-day loss since March 2020, after steadily losing for 10 straight sessions, the longest losing streak since 2014. Yields rose 60bps to 7%, the highest since April 2020 and the biggest one-day increase in more than two years
 - CCC yields rose 74bps on Monday to 12%, the highest since May 2020, after rising for seven straight sessions. The index posted a loss of 2.58%, also the biggest one-day loss since March 2020
- The primary market has ground to a halt as borrowers stay on the sidelines. It is expected to stay quiet until some clarity emerges from the Fed decision
 - The highly leveraged packaging company Intertape Polymer, the lone borrower, has been marketing \$400m of 6.5-year notes since last week to fund its buyout by Clearlake Capital
 - It is not clear if the bonds will price this week amid the selloff. Intertape's bonds are rated CCC, the riskiest tier of the junk market
 - Early discussions had indicated the bonds could price to yield in the 11%-12% range
- US junk bonds may pause for clarity on market mood as US equity futures pared gains and a rebound in European stocks was short-lived ahead of the Fed meeting. Oil, meanwhile, rose toward \$122 a barrel as investors weighed a tight supply outlook and the impact of China's eventual return from virus curbs

STRUCTURED PIPELINE: Trio of Auto ABS, CRT Kick Off Week (Bloomberg) -- New issue activity was light across the board on Monday. Auto ABS deals from AmeriCredit, Enterprise and Exeter were announced and Freddie Mac priced its latest credit risk transfer transaction. In the CMBS sector, Freddie Mac may announce its SB-99 transaction later today.

- BNP Paribas plans to price a new issue Dryden CLO for PGIM later in the week

Structured Highlights This Week:

- CLO Senior Part Of Capital Stack Is Most Attractive, BNP Says
- Commercial Mortgage Backs Can't Find a Bottom: Support Snaps

DISTRESSED DAILY: Rite Aid Plans \$150 Million Debt Repurchase (Bloomberg) -- Rite Aid Corp. is seeking to buy back up to \$150 million of certain bonds at below-par prices in its latest efforts to trim its debt load. The Camp Hill, Pennsylvania-based company is willing to repurchase up to \$100 million of its 7.5% notes. Bondholders who submit their notes due in 2025 by June 27 are eligible to receive 87 cents on the dollar for their holdings. The securities last traded at 81.25 cents on the dollar, according to TRACE. The company is also seeking to buy back bonds due between 2026 and 2028 at prices between 85 and 57 cents on the dollar. It's funding the repurchase with cash on hand and borrowings under its revolving credit line. Rite Aid faces dimming growth prospects and declining market share as demand for Covid vaccines wanes and the company faces increased competition. Bloomberg Intelligence credit analyst Mike Holland called the tender offer a move that would give Rite Aid "some runway with liquidity support from its credit facility, receivable sales and sale-leaseback transactions."

- DATA POINTS
- QUOTABLE
 - "It's ugly out there."
 - Travis King, head of US investment-grade corporates at Voya Investment Management, on Monday's market selloff
- DEADLINES AND DOCKETS
 - All times are U.S. Eastern unless specified and are subject to late revision or cancellation.
- Tuesday, June 14
 - Cyprus Mines Corp., bankruptcy hearing, 10:30 a.m.
- READING LIST

- News, research and insight relevant to distressed investing
- Surging Credit Risk to Make Junk's Bad Year Even Worse
- IHeart's 2027 Notes Top 12% Yield Amid Caution on Ad Outlook
- Carvana Notes Break Below 60 as Used Car Prices Crimp Demand

Service Properties Notes Fall to Pandemic Lows Along With Hotels

Daniel J. Nigro

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yields rise. Real 10-year yields remain near 90 bp and effectively at the highs. This is surely a positive development for the Fed as it not only indicates investors have renewed faith in the FOMC's strategy to contain inflation but higher reals also create an environment in which a restrictive policy stance will have a more direct/immediate impact on the economy. 10-year breakevens are at 242 bp this morning; holding the lowest range since late-July and poised to breakout lower in the event of disappointing data this morning. We continue to target 10-year breakevens below 230 bp as investors look beyond the near-term impact of the looming energy crisis in Europe and begin to consider the more enduring demand destruction that will certainly follow.

For context, the NY Fed's survey of consumer expectations showed a marked decline of inflation expectations -- results that are surely welcome at the Fed and contribute to the case for further compression of market-based measures of inflation expectations -- i.e. breakevens. As the medium term (3-year) outlook for consumer prices has retraced to levels last seen in November 2020 at 2.8%, it's difficult to envision a near-term spike given the backdrop of restrictive monetary policy from most of the major central banks. The dimmer global growth outlook will be accompanied by demand concerns for a variety of sectors -- a dynamic that will be complicated by the sanctions against Russian energy exports and the implied upward pressure on prices. If nothing else, this winter will be accompanied by heightened uncertainty as the Fed pushes policy solidly into restrictive territory and signals the intention to retain such a stance for an extended period of time.

In addition to the passage of the event risk represented by this morning's inflation update, the release will also clear the path to fully pricing in a 75 bp hike next week and, presumably, accelerate the discussion regarding the magnitude of November's move. A downshift to 50 bp appears to be the path of least resistance, although the updated SEP will offer better context for the Committee's terminal target and allow a clearer understanding of where the Fed views the endpoint for the cycle.

Tactical Bias: Tuesday holds the greatest breakout potential during the pre-Fed window as the combination of CPI and any subsequent 'guidance' from the financial media will set the agenda for the Committee's next move. A weak headline print might initially be interpreted as lessening the urgency for 75 bp and ostensibly offer a check in the column for a half-point move; however, caution is warranted. In the event this scenario occurs, we'd fade any attempt to take 75 bp off the table and look for 'clarity' from the press given that the Fed's communications moratorium once again occurs during a particularly inconvenient time for policymakers and investors alike. To the Fed's credit, the 'totality' language allowed last week's official commentary to effectively communicate the base case scenario should be a three quarter-point hike on September 21; the uncertainty is, of course, the degree of Fed conviction to such a move if faced with a lower-than-expected inflation read. After all, not even the Fed had August's CPI data last week when the coordinated messaging occurred.

75 bp is extremely consensus at this point, and we expect the bulk of those calls will survive the August CPI print regardless of the degree of moderation revealed. As a result, the 3.055% implied rate on the October fed funds futures contract should be biased toward the upside following the initial reaction to the update on consumer prices. ***Within the details of CPI, the market will be focused on shelter costs as the pillar of consumer inflation; this is a well-traveled narrative but one that remains relevant given the fact OER/Rents will continue to create sufficient justification for the Fed to retain the current pace of hikes. The wild cards are auto prices and travel-related costs; although the forward momentum will continue to be defined by housing. Eventually, this will shift as the moderation in home prices offers a reprieve in OER and as the labor market outlook becomes less robust, the trajectory of rent increases will ease. We're reminded that the Fed doesn't need to see prices drop to claim victory over inflation; just a slowing in the rate of gains.***

It's certainly not wasted on us that 10-year real yields remain at the highest levels in four years. At ~90 bp, it's prudent to consider how risk assets might respond to a move in this benchmark of inflation-protected rates beyond the 100 bp level. The last time 10-year real yields traded >100 bp the Fed had brought policy rates to 2.50% (Q4 2018); a level not dissimilar from today. The key difference, however, is that Powell isn't done and the market anticipates another 150 bp of hikes are in the offing. Real policy rates are unquestionably on the rise and as inflation expectations moderate further, a spike in real rates across the curve will serve to enhance the impact of the prior Fed tightening on the economy. ***A disappointing headline CPI print will accelerate the compression of breakevens, as well as increase reals.*** The NY Fed's inflation expectations survey is surely a welcome update for the FOMC as 1-year dropped to 5.75%, a 10-month low, and 3-year slipped to 2.8% from 3.2% prior. Looking beyond Tuesday's data, we'll be watching Friday's University of Michigan survey for September's read on inflation expectations -- a far more market-moving series.

Tuesday's long bond auction's market moving potential is lessened due to its proximity to CPI, but the \$18 bn 30-year auction is nevertheless informative of primary market sentiment toward duration after the price action this summer. The highest yielding 30s offering since late-2018 could inspire dip buying interest despite the curve's persistent flatness as 5s/30s consolidates around 0 bp. While at higher yields versus August's refunding, we have seen stop-throughs at three of the last four long bond auctions and at eight of the last thirteen September 30-year reopenings. Within the breakdown of last month's investor class data, we were encouraged by foreign sponsorship at its highest level since February alongside a continuation of the theme of domestic funds being the primary drivers of auction strength. However, the takedown of 10s and 30s does not bode particularly well for an aggressive bid at Tuesday's auction and thus biases us for a modest tail.- Ian Lyngen and Ben Jeffery

US Futures Plunge, Dollar Rises on Inflation Shock (Bloomberg, attached) US equity-index futures dropped after inflation in the world's biggest economy slowed less than economists' expectations. Treasury yields rose and the dollar gained. The consumer price index increased at an annual pace of 8.3%, more than economists' median estimate of 8.1%, underscoring speculation that the Federal Reserve will maintain an aggressive policy stance that will weigh on economic growth and riskier assets

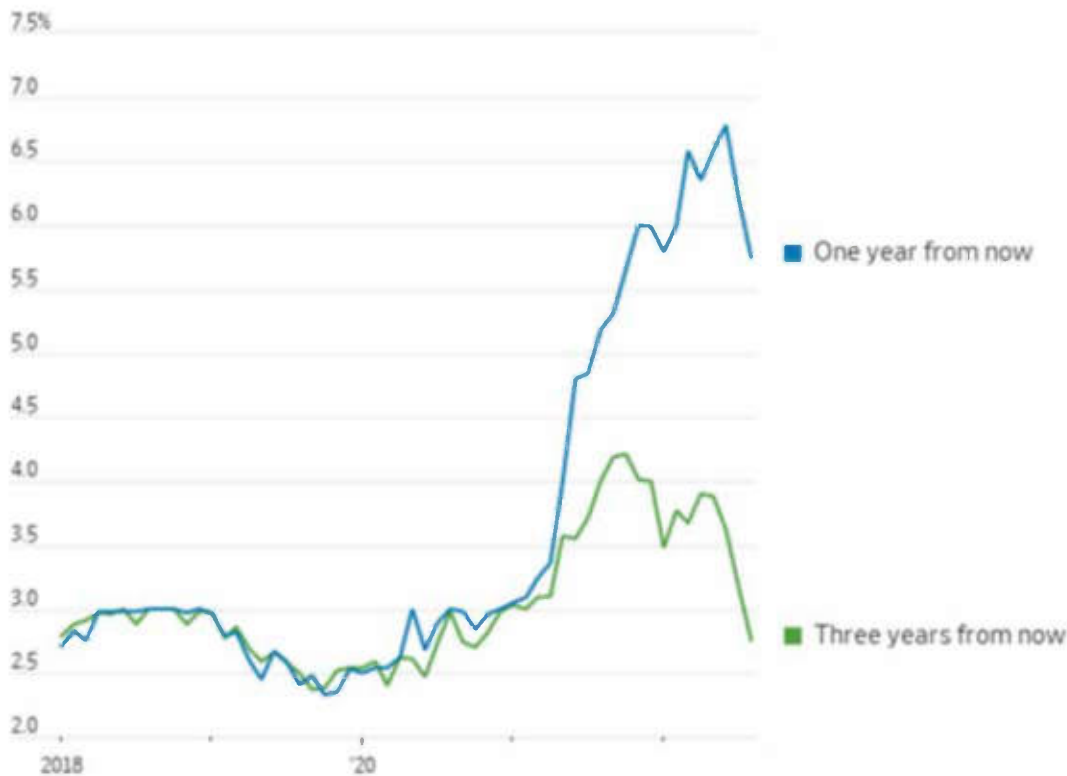
Soft Landing More Likely Than Recession, JPMorgan Says (Barron's) (Agrees with Goldman's Jan Hatzius) A soft landing is becoming a more likely scenario for the global economy than a recession, which should help boost risky assets, according to strategists at JPMorgan Chase.

- The avoidance of a global recession, along with moderating inflation and wage pressures among other factors, should continue to provide **tailwinds for risky assets**, the bank's global strategy team added in a note Monday.
- Within equities, the firm **favours cyclical stocks**, which it said should benefit from the gradual easing of inflation. They also like small-cap stocks and remain bullish on China and emerging-market stocks.
- The bank's strategists said economic data and investor positioning were more important factors for the performance of risk assets than hawkish central bank rhetoric. "The data appear to be increasingly **supportive of a soft landing** (rather than global recession), given moderating inflation and wage pressures, rebounding growth indicators, and stabilizing consumer confidence," they said.
- The U.S. consumer-price index is due to be released Tuesday and **economists expect** it to show that annual inflation **cooled to 8%** in August, from 8.5% in July. That would be the second consecutive month of decelerating price growth, and the lowest rate since February.

What's Next: JPMorgan sees inflation resolving itself before a likely pivot by the Federal Reserve. When, or even if, that happens is a key question facing markets, with Fed Chairman Jerome Powell suggesting it **won't be anytime** soon.

NY Fed Says Consumers Saw in August Steep Declines in Future Inflation (WSJ) Ebbing inflation expectations could point to moderating inflation over time

Consumer inflation expectations



Source: New York Fed

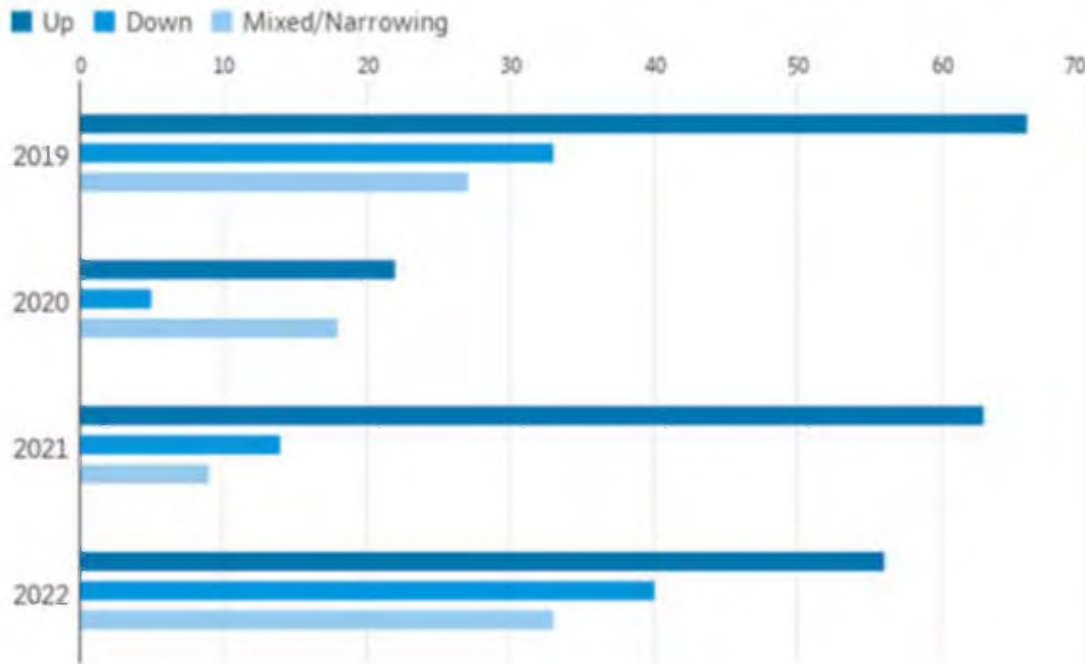
Markets Need a Less Rosy View of Inflation News: John Authers (Bloomberg, attached) There's no sign of a Fed pivot, or reason for Powell to make one until it's clear how to get back to 2%.

Liquidity Fated to Scupper Smooth-Running of Fed's QT (Bloomberg, attached) Liquidity constraints and uncertainty around investor preferences mean that QT is unlikely to operate as smoothly as optimists predict.

Earnings Could Survive This Recession Much Better Than You Think (Bloomberg Intelligence, attached)

Finance Chiefs Struggle to Set Guidance as Economy Flashes Mixed Signals (WSJ) Dozens of large U.S. companies have revised their annual forecasts recently, citing rising inflation, the possibility of recession and international factors like the energy crisis in Europe

Number of companies in the S&P 500 that revised their annual revenue or EPS guidance.



Note: The data covers the second quarter of each year. In 2020, many companies didn't provide guidance due to the Covid-19 pandemic.

Source: Calcibench Inc.

US Small-Business Optimism Improves by Most Since June 2021 (Bloomberg, attached)

- NFIB index rose to 91.8 in August as inflation pressures eased
- High costs are still a top issue factoring into weaker profits

The Ethereum Merge Ups the Stakes—and Reshapes Crypto's Universe (Bloomberg, attached) Ether will pay interest and more closely resemble normal financial instruments.

Movie Producer Gets 6 Years for Scamming BlackRock Trust (Bloomberg, attached)

- William Sadleir was sentenced Friday in federal court in N.Y.
- He diverted more than \$30 million of a BlackRock investment

Property Faces a Slow Reckoning as Interest Rates Rise (WSJ) Real estate companies are carrying as much debt as they were during the last financial crisis, but they now have more time to refinance it

Houston, We Have an Oil Problem: Elements by Javier Blas (Bloomberg, attached) A decline in drilling across the Permian Basin suggests US production forecasts are way too high.

FT Alphaville - How to save the Treasury market - Pimco comes out in favour of all-to-all trading (Attached, Ling Yu)

FT UK - Grocery Prices up 12.4%; Unemployment Declines (attached, Ling Yu)

Law360 - SEC Fines VC Advisers Over Undisclosed Interfund Loans (attached, Ling Yu) The [U.S. Securities and Exchange Commission](#) struck a deal Monday with a pair of investment advisers accused of transferring \$4.4 million in loans between the venture capital funds they advised on unfavorable terms and without investors' knowledge.

Junk Rebound Is Built on Riskier Bonds in Vulnerable Sectors (Bloomberg, attached)

CREDIT DAYBOOK AMERICAS: Primary to Slow as Eyes Turn to CPI (Bloomberg) -- A calmer day in the investment-grade primary market is expected as companies wait out potential volatility surrounding Tuesday's CPI data. A measure of credit risk, the CDX IG spread, opened 0.9 basis points tighter ahead of the 8:30 a.m. report in New York.

- Traders will be closely watching the inflation figures for clues about how aggressively the Federal Reserve will continue hiking rates
 - Bloomberg Economics is calling for a 0.1% decline in monthly headline terms, and a year-over-year rate of 8.1%, from 8.5% prior
- Investor demand for new high-grade bonds was strong on Monday, with the eight borrowers that came to market tightening pricing on their deals more than the year's average, and paying about half of the year's average new issue concession
- A group of lenders led by Credit Suisse will hold an investor call for a \$4 billion secured bond offering to help fund the buyout of Citrix Systems at 10:30 a.m. New York time on Tuesday
 - The deal is slated to price on Sept. 19, the same day as commitments are due on a loan offering of around the same size
- No new leveraged loan offerings came Monday as market participants focus on the debt package for the Citrix buyout

- Commitments are due next week on the three loan deals that have launched so far this month
- A soft landing is becoming the more likely scenario for the global economy, which will continue to provide tailwinds for risky assets, according to strategists at JPMorgan
- Goldman Sachs is set to close its latest mezzanine debt fund with roughly \$15 billion of firepower

US HY OPEN: Citrix Rolls Out \$4 Bln Bond Sale Amid Junk Rally (Bloomberg) -- The wait was finally over for junk bond investors as Citrix Systems Inc. kicked off its \$4b secured bonds sale on Monday, part of a \$15b debt package to fund its buyout by Vista Equity Partners and Elliott Management. The junk bond market is closely watching the sale as a barometer of investor demand for risky debt.

- The bond offering size was boosted from the \$3.5b contemplated at the time of pre-marketing, suggesting bankers led by Credit Suisse are persuaded that there is robust demand after watching Citrix's \$4.5b leveraged loan sale
 - The loan is expected to price at a discount of \$92.00. Investor commitments are due by Sept. 19
 - The bonds are also scheduled to price Sept. 19, in coordination the loan pricing

Read more Credit Suisse Kicks Off \$4 Billion Bond Sale for Citrix Buyout

- Citrix debt sale, the biggest in recent years to finance a leveraged buyout, comes as junk bonds rebound sharply from August losses
 - The market posted returns of 0.28% on Monday, the fourth consecutive session of gains. Junk bonds gained in five of the last seven sessions in September driving up the month-to-date gains to 1.42%
 - Yields have dropped to a more than two-week low of 8.16%
- The gains extended across all high yield ratings, with CCCs yields falling to a more than three-week low of 13.07% and spreads at +932, also a three-week low and far below the distressed levels
 - Both BB and single B yields dropped to a more than two-week low of 6.59% and 8.42%, respectively
- The primary market is expected to soon see a slew of new issues, including from Nielsen Holdings and Tenneco
 - Tenneco also announced its intention to redeem outstanding notes ahead of the debt sale to finance its acquisition by Apollo
 - The redemption of the outstanding notes was conditional on the completion of the acquisition of Tenneco by Apollo
- Borrowers have been encouraged after CNX Resources, an independent natural gas company, sold \$500m 8.3-year notes at 7.375%, a lot lower than price talk
 - Price talk was in the 7.5%-7.75% range. The bonds drew orders of more than \$1.8b
 - The cyber security firm NortonLifeLock was the first speculative-grade borrower to test demand for junk bonds after the US Labor Day holiday
 - The proceeds of the two-part bond offering was intended to fund the acquisition of the security software company Avast plc
 - The bonds priced tighter than talk: 5-year sold at 6.75% and the 8-year at 7.125%
 - The size of the bond sale was boosted by \$300m to \$1.5b after the credit drew orders of more than \$3b
- US junk bonds are poised to extend the rally as investors return to the asset class after pulling cash for three straight weeks. US high yield funds estimate an inflow of \$1.49b at Friday's close, JPMorgan wrote, citing Refinitiv
- There seems to be a broader risk-on move ahead of the inflation data today as US equity futures edge higher extending Monday's rally amid expectations that headline CPI will slow for the second month in a row, igniting a debate that the Fed could end the tightening cycle sooner.

STRUCTURED PIPELINE: Five ABS Price Ahead of Tuesday CPI Print (Bloomberg) -- ABS deals were priced on Monday by Bankers Healthcare Group, Continental Finance, Hyundai, Marlette Funding and Santander as the market looked to get ahead of this morning's CPI number. YTD volume is around \$211.8 billion, according to data compiled by Bloomberg News. Amur Equipment Finance also began premarketing its next small-/mid- ticket equipment transaction. Kroll Bond Ratings issued a presale report for National Funding, which is planning its second small business transaction.

- Freddie Mac remains busy across asset classes as it priced its latest credit risk transfer RMBS on Monday, and is currently marketing the K-109 and K-SG4 multifamily CMBS deals. It also plans to price the SB-102 small balance CMBS this week
- Bank of America priced a new issue CLO for Western Asset Management Company

Structured Highlights:

- Waterfall Names Two Partners From Loan Strategies, ABS Trading
- The following issuers recently filed ABS-15Gs:
 - National Funding, Inc: ABS-15G 2022/09/12
 - New Hampshire Higher Education Loan Corp: ABS-15G 2022/09/09

- Case 1:24-cv-01858-ACR Document 34-5 Filed 06/20/25 Page 335 of 672
- o Nissan Auto Receivables Co Lj Llc: ABS-15G 2022/09/09
 - o Jgw-s Holdco, Llc: ABS-15G 2022/09/09
 - o Progress Residential Depositor 7, Llc: ABS-15G 2022/09/07
 - o Bp Pace Iii Llc: ABS-15G 2022/08/11
 - o Fip Master Funding Iv, Llc: ABS-15G 2022/08/01

DISTRESSED DAILY: Scotts' Gets Reality Check After Housing Boom (Bloomberg) -- The Scotts Miracle-Gro Co. is experiencing a harsh comedown this year following the company's housing boom-induced high of 2020 and 2021. The branded lawn-and-garden care company now finds itself grappling with elevated leverage and declining free operating cash flow after its home improvement and mass merchant retail partners pulled back on ordering this summer -- a reflection of retailers' wariness surrounding inflated store inventories and cutbacks on consumer discretionary spending. S&P Global Ratings estimates that Scotts will enter fiscal 2023 with adjusted debt near \$3.3 billion -- roughly \$1.4 billion above its three-year pre-pandemic average. And the credit rating company forecasts a 5.7x adjusted leverage to debt ratio for fiscal 2022. Still, Scotts should have adequate liquidity to manage its debt burden, especially considering that it doesn't have any significant maturities due until 2026, according to S&P. Lockdown restrictions stimulated interest in outdoor gardening activities during the height of the pandemic, artificially boosting Scotts' sales, profitability and credit metrics. However, the company's performance deteriorated significantly this year because of inclement weather this spring, high inflation, and oversupply in the company's Hawthorne division that caters to the struggling US cannabis industry, according to the credit grader. S&P lowered Scotts' corporate credit rating to BB- from BB and concurrently lowered its ratings on the company's senior unsecured notes to B from B+.

- DATA POINTS
- QUOTABLE
- "Our view is directionally that spreads are headed wider into year end and we do worry more about downgrades in part of the leveraged credit complex and so on."
 - o Srikanth Sankaran, head of US & European credit strategy at Morgan Stanley & Co., expressing his belief that the credit markets are currently underpricing recession risk, during an interview with Bloomberg TV.
- DEADLINES AND DOCKETS
 - o All times are U.S. Eastern unless specified and are subject to late revision or cancellation.
- Tuesday Sept. 13
 - o Unifin Financiera SAB: Holders meeting scheduled according to filing
 - o Bausch Health: Early tender date for exchange offer
 - o Voyager Digital, bankruptcy hearing, 2 p.m.
 - o InfoW LLC, bankruptcy hearing, 2 p.m.
- READING LIST
 - o News, research and insight relevant to distressed investing
- Creditors Lose Some Rights as ESG Bond Market Allows Legal Tweak
- 'Edge of Our Seats': Voyager's Frozen-Out Users Await Auction
- Credito Real Has Reached Deals With Banks, Faces Probes
- Olympia Sports, Citing Poor Sales, to Liquidate in Bankruptcy

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(O) (b)(6) (M) (b)(6)

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From: IOSCOSEC
Sent: 2023-04-04T18:12:40Z
Subject: FW: IARC-COSRA Virtual Meeting - 9 March 2023 - PPT slide decks
Received: 2023-04-04T18:12:40Z

- [Ag item 3 - FTF work - Tuang Lee Lim - IARC-COSRA meeting 9 March 2023.pdf](#)
- [Ag item 4 - Sustainable Finance - Lee White - IFRS - IARC-COSRA meeting 9 March 2023.pdf](#)
- [Ag item 5 - NASAA's Update - IARC-COSRA meeting 9 March 2023.pdf](#)

Dear (b)(6)

Forgive me if I'm not following protocol, but I'm requesting to add Stephen Benham, Senior Special Counsel, (b)(6)@sec.gov to the intcom@iosco.org email distribution.

Please do not hesitate to contact me if I can provide additional information or if I need to forward my request in another way.

Thank you in advance and best regards,

Alethea
Alethea A. Bard
Management and Program Analyst
U.S. Securities and Exchange Commission
Office of International Affairs

(b)(6) Office
(b)(6) Phone
(b)(6)@sec.gov

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From: intcom@iosco.org <intcom@iosco.org>
Sent: Friday, March 10, 2023 3:50 AM
To: IOSCOSEC <IOSCOSEC@SEC.GOV>
Subject: IARC-COSRA Virtual Meeting - 9 March 2023 - PPT slide decks

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Official Posting: IOSCO Inter-American Regional Committee

Email sent by: IOSCO General Secretariat

Dear IARC Members,

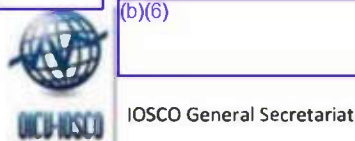
We would like to thank you for your participation in the IARC-COSRA virtual meeting. On behalf of the IARC (b)(6) please find attached the PPT slide decks that were presented during the meeting. They correspond to the following agenda items:

- Agenda item 3 – Fintech and Crypto Assets
- Agenda item 4 – Sustainable Finance
- Agenda item 5 – NASAA's update

The PPT slide decks are also available on the IARC website, members-only section, at the following link: (b)(5)

Should you have any questions, please let us know at RC-Support@iosco.org

Best regards,
(b)(6)



Calle Oquendo 12 | 28006 Madrid

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(b)(6) iosco.org | www.iosco.org



From: intcom@iosco.org <intcom@iosco.org>

Sent: Friday, March 3, 2023 3:33 PM

Subject: IARC-COSRA Virtual Meeting - 9 March 2023 (8.00-10.00 CST / 15.00 - 17.00 CET) - final agenda and documents

Dear IARC Members,

On behalf of the IARC (b)(6) please find attached the **final agenda (IARC-2023-01)** and **related documents** for the IARC-COSRA virtual meeting on 9 March 2023 (8.00-10.00 CST / 15.00 - 17.00 CET).

These documents correspond to the following agenda items:

- Agenda item 1: Summary of the last IARC meeting on 17 October 2022 (IARC-2022-20)
- Agenda item 3: Fintech and Crypto Assets (IARC-2023-02)
- Agenda item 4: Sustainable Finance (IARC-2023-03)

As customary, these documents have also been posted on the IOSCO website under the [IARC members-only section](#).

Should you have any comments regarding the summary of the IARC discussions on 17 October 2022 (IARC-2022-20), please send those to me at RC-Support@iosco.org by 7 March 2023.

If you have any questions, please do not hesitate to reach out.

Best regards,

(b)(6)
(b)(6)



IOSCO General Secretariat

Calle Oquendo 12 | 28006 Madrid

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Phillip.Millman@infra.gov; Phillip.Millman@infra.gov
From: Nigro, Daniel
Sent: 2023-06-26T12:43:11Z
Subject: Markets Daily: Wagner Fallout Still Unknown; Why Economies Haven't Slowed More Since Central Banks Hit the Brakes; Junk-Rated Companies Accept Tougher Terms to Borrow
Received: 2023-06-26T12:43:11Z

- [Ether's Hazy Status at SEC Leaves Token Trailing Bitcoin's Surge.pdf](#)
- [FT - Investors still need to adjust to a world of higher interest rates - 06-26-2023.pdf](#)
- [FT - US shale oil and gas producers pull back after commodity price drop - 05-26-2023.pdf](#)
- [FT - Silicon Valley braces for the worst as funding dries up - 06-26-2023.pdf](#)
- [Far Too Late, Traders Are Heeding Powell's Message.pdf](#)
- [For Investors, the Russian Gun Hasn't Fired Yet.pdf](#)
- [Pricey Junk Bonds Are Seeing a Sudden Vibe Shift.pdf](#)

Markets Daily: Stock futures and bond yields are slightly lower as global investors largely brush off this weekend's events in Russia.

Oil prices are up a bit.. Investors are focusing on inflation, growth prospects and the path of interest rates ahead of a meeting of global central bankers this week in Portugal. Follow [live coverage](#) throughout the day for the latest news affecting markets.

Things are moving fast following a headline-provoking weekend in Russia, where an aborted mutiny by Yevgeny Prigozhin and the Wagner Group has shaken expectations about what might come next in the Kremlin's war in Ukraine. An armored Wagner convoy was only 120 miles from Moscow when a revolt was called off, with the paramilitary group shooting down six Russian helicopters and a command-center plane after seizing the military logistics hub of Rostov-on-Don. Under terms of an agreement to end the crisis, Wagner's 25,000 heavily armed troops won't face prosecution, while Prigozhin will be exiled to Belarus, though his days there could be numbered after threatening to storm the Russian capital in a "March of Justice."

"I don't think we've seen the final act," U.S. Secretary of State Antony Blinken declared. "We've seen more cracks emerge in the Russian facade. It is too soon to tell exactly where they go, and when they get there, but certainly, we have all sorts of new questions that Putin is going to have to address in the weeks and months ahead. Our focus is resolutely and relentlessly on Ukraine, making sure that it has what it needs to defend itself and to take back territory that Russia seized."

Markets are looking at the situation as a non-event for now, but traders are on edge should things morph into something bigger - like a full-out coup, uprising or even a civil war. Energy is likely the biggest sector that would be impacted, with Russia being the world's third-largest crude producer and a key supplier of natural gas to Western Europe. Even safe-haven gold barely caught a bid after the weekend's events, but based on past disruptions, shocks could roil everything from stocks to currencies pretty quickly if trouble ensues.

For Investors, the Russian Gun Hasn't Fired Yet: John Authers (attached, Ling Yu) Sorting out the uncertainties from the Wagner mutiny will take time, and there's no obvious market play to make.

Futures at 8:35: Dow, S&P & Nasdaq -flat Crude +0.4% at \$69.42. Gold +0.5% to \$1,940.10. Bitcoin -.5% to \$30,236 Ten-year Treasury Yield -6 bps to 3.68%.
Last Week: U.S. Indices Dow -1.7% to 33,727. S&P 500 -1.4% to 4,348. Nasdaq -1.4% to 13,493. Russell 2000 -2.9% to 1,822. CBOE Volatility Index -0.7% to 13.44.

BMO Commentary: It's a summer Monday to be sure (first of the year); albeit one with a decidedly bond bullish tone as the session gets underway. The combination of flagging German business confidence, geopolitical uncertainty linked to the Russian near-mutiny, and reports of lackluster holiday travel spending in China have combined to push 10-year yields as low as 3.68%. The belly has been driving the rally, although rates across the curve are lower as the final week of the second quarter gets underway. It's not much of a week in terms of fundamental inputs on offer - not until next week will the market have the benefit of the June payrolls report. For now, the last three coupon auctions of the month (2s, 5s, and 7s) will test investor appetite for Treasuries and month/quarter-end demand. Auction performance has been consistent with ongoing demand for on-the-run supply and minimal need for significant concessions - we see little reason to challenge this trend and anticipate a relatively smooth underwriting process.

The overnight bid for US rates has reinforced the shift in momentum that commenced in the 10-year sector when yields failed to reach 3.86% during the recent bear run. The stabilizing price action that has characterized the second half of June has been accompanied by an acceleration in daily stochastics in favor of lower rates. There has also been a bullish curl in weekly stochastics that speaks to a more durable tone shift in favor of duration. It's certainly not wasted on us that the long-end's consistent outperformance has pressed the curve inversion back to levels that put the cycle low of -111 bp within range as the market continues to recalibrate to the realities of a Fed committed to avoiding rate cuts in 2023 (and as far into 2024 as can be justified). Of course, this is all contingent on the real economy continuing to perform within an acceptable band of policymakers' expectations.

This observation isn't simply an acknowledgement of the obvious; instead, we'll suggest that a sense of what Powell is anticipating

from the US economy is essential to the Fed's commitment to retaining a restrictive policy stance. The SEP continues to reflect a slower (albeit still positive) trajectory of real growth, elevated core inflation, and a strong labor market. In the event that all three of these factors continue to hold, it is very difficult to envision a path to Fed cuts over the next 9-12 months. In fact, we'll argue that even a mild contraction of real growth won't be sufficient to derail the Fed; if for no other reason than Powell has been signaling policymakers' willingness to damage demand in pursuit of price stability throughout much of the hiking cycle. As for inflation, the realized data has illustrated an unexpected stickiness in the core series driven by shelter costs and autos. While a strong labor market has afforded the Fed a longer runway to orchestrate a soft-landing, stubbornly high consumer price pressures have necessitated the Committee push rates deeper into restrictive territory.

As a result, the Fed's hawkish game plan (as well as the curve flattening momentum) is the most vulnerable to a material shift in the trajectory of the labor market. It's with this backdrop that next week's employment report takes on elevated significance. The unemployment rate is 0.3 pp off the cycle low and initial jobless claims have reached a higher plateau; neither of which are sufficient to change the outlook. At least not until there is more tangible evidence of a shift in the employment landscape via the headline payrolls figures. As a theme, expectations for June's NFP print are in the +200k range – a pace that would do nothing to shift the bias for a July rate hike. In the absence of a downside surprise, the curve inversion trend will be difficult to fade; particularly in the event the incoming Fed rhetoric fails to lay the groundwork for another skipped meeting. In light of the Fed's efforts to characterize June's decision as a skip versus a pause; a hit to the jobs market would have a greater influence on the FOMC's decision than a benign inflation print – although a combination of the two would surely change the July meeting conversation.

HIGHLIGHTS FROM THE LYNGEN/JEFFERY US RATES WEEKLY: In the week ahead, we anticipate lamenting the unfortunate addition of a fifth workday as the final trading sessions of Q2 are sandwiched between two holiday shortened weeks. To be fair, the last five days of June are filled with potentially tradable events, including an early auction calendar that kicks off with Monday's 2-year supply. As the highest yielding on-the-run coupon on the Treasury curve, the front-end auction will provide a meaningful litmus test for demand as the Fed's path toward a July rate hike comes squarely into focus. For context, the futures market is currently suggesting 77% odds the Fed is able to execute on another quarter-point increase in the policy rate, bringing the corridor to 5.25-5.50%. Such pricing is consistent with Powell's observation that another hike is reasonable assuming the economy continues to perform as expected. With the backdrop of the Fed's updated SEP, this implies that wait-and-see is destined to clash with more-of-the-same in a war of the hyphens.

The onus is on the June updates to the employment landscape and the pace of consumer price inflation to define the Fed's agenda this summer. In keeping with the 'more-of-the-same' reasoning, even a 100k-200k NFP print combined with a stable UNR would be sufficiently strong to keep a July hike in play – regardless of how the AHE figures perform. After all, falling nominal wage growth would be a win for monetary policymakers in the current environment and reinforce the narrative that prior tightenings are finally beginning to impact the real economy. Any core-CPI move of +0.3% or higher would similarly reinforce the need for another Fed hike. The policy outlook would only be complicated by a marked deceleration in the pace of inflation to 0.2% or slower. The caveat in this context is that the market is anticipating a drag on core prices as a result of the recent trend in used auto costs; therefore, a downside surprise would presumably be a function of an outsized impact from this factor or further deceleration in shelter costs. In short, the 77% odds reflected in the market need to survive the looming fundamental updates before the Fed will be comfortable taking the opportunity to hike afforded by investors.

This isn't to suggest that's not the most likely outcome at the moment; the market is certainly trading as though it is. Rather, we're cognizant that Powell's more balanced tone suggests there is an inherent risk in taking the dotplot at face value. It isn't lost on us that throughout this cycle, the terminal dot revisions have only been one way – i.e. higher. As the end of hikes transitions to an extended period on hold, downward revisions to the dotplot shouldn't be dismissed out of hand. In fact, we'll argue that a key consideration in Powell's decision not to hedge the signaling from the SEP was that the dotplot was more successful in convincing the market to price out rate cuts in 2023 than any other prior Fed rhetoric. If it ain't broke. Powell speaks again on Wednesday with the heads of the ECB, BoE, and BoJ on a policy panel that is likely to outline the progress made globally in reestablishing price stability and the need to continue such efforts.

June has been a challenging month for the 2-year sector to be sure. However, 10s have managed to avoid a more durable shift toward higher yields; reinforcing an underlying bond bullishness that we continue to anticipate will come to define the summer. 3.84-3.86% will remain a key buying zone in the event of a backup in rates; although we're increasingly expecting that the next milestone of relevance will be retesting the 40-day moving-average of 3.627%. Month and quarter-end flows will be meaningful in such a move – keeping us cautious against going with any belly auction concession.

Tactical Bias: It is not likely to be a week defined by economic data – although May's core-PCE figures on Friday will round out the inflation picture for last month. Instead, the early front-end supply schedule holds the potential to extend the inversion of the 2s/10s curve that has now dropped back to within striking distance of fresh cycle flats. Beyond simply the ongoing debate on whether or not the Fed will hike in July, we'll characterize the depths of the current inversion as assuming that nothing occurs between now and the end of 2023 that calls into question Powell's ability to deliver what was forecasted in the June SEP. As jobless claims hold steady at their highest level since October 2021, global central banks continue to tighten, the risks facing the UK housing market solidify, and the uncertainty in the financial sector persists, we are apprehensive that all will go according to plan. While that doesn't preclude a shorter-term tactical flattening, over a lengthier time horizon, current levels present a good

opportunity to add a core steepener.

The 2s/5s/7s auction series in the week ahead will help frame the attractiveness of current front-end valuations with the Treasury curve's inversion back to extremes. Most notably, the 2-year auction holds the potential to clear at the highest yield since 2007 with 5s and 7s likely to stop at their highest in at least three months – solid outright discounts that will bring demand. The impressive stop throughs at the 5-year TIPS and 20-year auctions set a bullish Treasury backdrop heading into the offerings – on top of what has largely been strong primary market sponsorship for coupons since early May. All three of these auctions stopped through last month featuring an above-average allocation to indirect bidders, and we expect this buyer base will continue to support the headline results. With limited top-tier economic data and official communication with which to contend; the performance of the auctions will offer a relatively clean read on how accurately current front-end pricing reflects the most probable outlook for monetary policy. On net, we find it difficult to fade the prevailing primary market sentiment for coupons and expect to see another round of solid takedowns.

On the data front, Tuesday's Conference Board figures will be in focus as an update on how consumers are viewing current economic conditions and what may lie ahead. The spread between 'jobs plentiful' and 'jobs hard to get' will be closely monitored after the recent spike in jobless claims with the number of initial filers coming in higher-than-expected for the last three weeks. Recall a notably weak aspect of May's release was the labor differential narrowing to the least since April 2021 (jobs plentiful dropped to 25-month low). Much attention has been placed on the recent 0.3 pp gain in the unemployment rate and further indication of diminishing job availability on top of the jump in claims will contribute to the ambiguity around what could prove to be a pivotal June employment situation report. The Conference Board figures alone won't be enough to bring rate cut pricing back into 2023, but will certainly help frame expectations for NFP and CPI which remain primary determinants of another rate hike this year.

The impact of the debt ceiling has begun to fade in terms of attracting the market's attention and dictating the price action further out the curve. However, the ramp up in bill supply and Treasury Department's cash balance back to ~\$300 bn (expected to reach \$425 bn by the end of the month), has been digested with solid demand. As was expected, the source of the cash to purchase the recently upsized bill offerings has come from the Fed's reverse repo facility that dropped below \$2 trn for the first time since June 2022 earlier this week. A quick glance at the bill curve shows yields beyond the 2-month point offering cheaper levels than the 5.05% return at the RRP, and the reallocation away from the reverse repo program to the bill market demonstrates that even \$1 trn in bill issuance can be readily absorbed by the market. The related concern on a reserve drain within the banking sector that risks a repeat of the scarcity episode of 2019 remains a very low probability event given the buffer offered by the RRP, outright level of banking reserves at \$3.3 trn vs. \$1.4 trn in September 2019, and existence of the standing repo facility to act as a funding market backstop to any short term cash needs. Nonetheless, as summer plays out, the interplay between bills, the RRP, and bank reserves will continue to be a dynamic to monitor as issuance shifts and the Fed's balance sheet continues to be run down. - Ian Lyngen and Ben Jeffery

[Why Economies Haven't Slowed More Since Central Banks Hit the Brakes \(WSJ\)](#) Pandemic effects and government aid are blunting impact of higher rates, for now

[Russia's Revolt Has Made the Fed's Inflation Fight Even Harder. Here's Why.](#) (Barron's) Markets [appeared to shrug off](#) the dramatic events in Russia over the weekend, when a group of mercenaries headed for Moscow, only to call off a potential revolt in a last-minute deal. On the surface, the levers of power remain as they were before—President Vladimir Putin is still in office and in control of the military as he continues his assault on Ukraine. But his [grip now looks shaky](#), and it's only a matter of time before something or somebody else comes along to threaten his authority. It creates a lot of uncertainty, and markets tend not to like that. When Russia invaded Ukraine in February 2022 oil prices spiked on concerns that production would be hit, rising to almost \$140 the following month. The disruption never came—despite Western sanctions, Russia's oil continued to flow to Asia and global markets continued to function. Prices are now around \$70 a barrel. Russia has every incentive to keep the oil flowing, whoever's in charge. But bad things can happen amid disorderly change. Imagine what would happen to the price of crude if disruptions were more than a worry—if the global oil market really did suddenly face a drop in supply. The potential for another energy price spike would [upend the Federal Reserve's and other central banks' forecasts](#) that show inflation steadily marching back toward target. The [Bank for International Settlements](#) on Sunday warned that the battle to put the inflation toothpaste back in the tube is far from won, now that it has seeped into wage demands and companies' price setting. Much of the drop in inflation is, in fact, due to "supply chains easing and commodity prices falling," the BIS said. "The last leg of the journey to restore price stability will be the hardest." Indeed. The latest events in Russia could make it even harder.

[FT - Investors still need to adjust to a world of higher interest rates](#) (attached, Ling Yu) Markets may no longer be able to rely upon monetary policy as an inevitable shock absorber

[Junk-Rated Companies Accept Tougher Terms to Borrow \(WSJ\)](#) Investors are often getting greater protections in the form of collateral

[FT - Silicon Valley braces for the worst as funding dries up](#) (attached, Ling Yu) Painful adjustment looms for start-ups as they burn down cash reserves

[PacWest Sells \\$3.5 Billion Asset-Backed Loan Portfolio to Ares](#) (Bloomberg, attached) Troubled regional bank PacWest Bancorp sold a \$3.5 billion asset-backed loan portfolio to Ares Management Corp. as it continues to offload assets to boost its liquidity amid concerns about deposit outflows. The stock is up nearly 7% pre-market.

Crypto Custodian Prime Trust Teeters on the Brink of Collapse (WSJ) The company previously stored assets and provided banklike services to crypto firms Binance.US, FTX and Celsius

Ether's Hazy Status at SEC Leaves Token Trailing Bitcoin's Surge (Bloomberg, attached)

- Unclear if US agency would deem Ether an unregistered security
- Risk of such a designation seen sapping coin's performance

Bitcoin is up 12% this month — even though barely anybody is trading it (CNBC, Ling Yu) Bitcoin's price has risen more than 12% since the beginning of June. Investors attributed the jump to news that BlackRock had filed for a spot bitcoin ETF. The more likely thing moving bitcoin, though, is large purchases by so-called bitcoin "whales" as liquidity remains low. This, analysts say, is causing big moves in the price of the world's top digital currency.

Far Too Late, Traders Are Heading Powell's Message: Bloomberg Poll (attached) US yield curve may remain inverted for unprecedented duration, but stocks and bonds acting as hedges for each other tempers bleak outlook. Bitcoin to drop.

Pricey Junk Bonds Are Seeing a Sudden Vibe Shift: Credit Weekly (Bloomberg, attached)

- High yield takes first losses since May, eroding June gains
- Reality of higher for longer rates is changing market mood

Fitch: U.S. high yield (HY) trailing 12-month (TTM) default rate was 1.9% at the end of May based on par value, unchanged from April according to Fitch Ratings. The team expect HY defaults to trend slightly higher over the remainder of the year.

U.S. High Yield Default Rate Breakdown

(% of Par Value)	2020	2021	2022	May 2023 TTM	2023F
Regions					
U.S./Canada Issuers	5.2	0.5	1.3	1.9	4.5-5.0
Yankee Issuers	6.7	1.6	2.4	4.1	5.0-5.5
All Issuers(a)	5.4	0.7	1.5	2.4	4.5-5.0
Sector					
Broadcasting and Media	1.8	—	4.6	9.1	10
Energy	14	1.5	0.2	0.0	<0.5
Healthcare and Pharma	2.4	—	6.4	9.8	4.0(b)
Leisure and Entertainment	13.5	3.5	—	0.3	8.5
Retail	13.7	—	0.2	3.1	16
Technology	0.5	1.2	1.3	4.3	6.5
Telecom	14.5	0.7	0.1	0.0	10

(a) 83% of the \$1.6 trillion index is U.S./Canada. Note: Yankee issuers are domiciled in Latin America.

(b) If Bausch Health files, the rate would reach 15%.

Note: F - Forecast. TTM - Trailing 12-month.

Source: Fitch Ratings U.S. High Yield Default Index.

CREDIT DAYBOOK AMERICAS: Rite Aid Bond Holders Band Together (Bloomberg) -- A group of Rite Aid's secured bondholders is working with Evercore and law firm Paul Weiss ahead of potential talks with the company to rework its debt. Western Global Airlines, a cargo hauler, is evaluating its options as its cash pile dwindles.

- The spread on the Markit CDX North American Investment Grade Index, which declines as credit risk drops, widened 0.36 basis points to 73.08 as of 7:24 a.m. New York time

- Some of Brite Aid's investors are considering proposals to provide cash to the company as part of a so-called liability management deal to help manage what it owes
 - The retailer is grappling with \$2.9 billion of debt, some of which is due to be repaid in 2025 and 2026
- Western Global is weighing options including filing for bankruptcy as it faces dwindling liquidity
 - The cargo airline began confidential talks with some of its creditors related to its financing needs last month, though a final decision hasn't been made, and the situation could change
- A group of lenders led by Apollo Global Management is providing as much as \$2 billion to Wolfspeed to support the semiconductor maker's expansion in the US
 - The financing makes \$1.25 billion of cash immediately available to the company, while another \$750 million can be drawn later. It was structured as seven-year secured notes that carry a coupon of 9.875% and can be paid back after three years
- Ares Management said it purchased a \$3.5 billion specialty finance loan portfolio from PacWest Bancorp
 - The portfolio, which was originated by PacWest's Lender Finance unit, is backed by assets across a variety of industries and asset classes including consumer loans, small business loans
- Mallinckrodt said it is paying in full the \$17 million term loan interest payment to holders of its first-lien senior secured term loans on June 26, within the five business day grace period
- Investors are turning back to safer investment-grade notes, saying the debt of junk-rated companies has gotten too expensive after a recent rally — especially as earnings are likely to deteriorate in an economic slowdown
- Dealers anticipate \$15 billion in new high-grade debt sales this week, with issuance spread out Monday through Thursday
- Federal Reserve Governor Michelle Bowman said US banks need better supervision rather than higher capital requirements because they could stunt lending and competition, and she repeated her calls for an independent review of recent bank failures
- Brazil's state-controlled oil producer, Petroleo Brasileiro, is readying to return to global debt markets with a benchmark sale of as much as \$1.5 billion in 10-year notes as soon as Monday
- India's company regulator is gathering information about education-technology firm Byju's after the resignation of its auditor and three board members
 - The Ministry of Corporate Affairs has sought more information about the embattled startup and a final decision about whether to open a formal probe is expected soon

US HY OPEN: Junk Rally Lost Momentum on Recession Concerns (Bloomberg) -- US junk bond yields soared to a three-month high, driving losses across the US high yield market after Chair Jerome Powell reiterated again that the central bank expects to raise interest rates further despite the pause at the most recent meeting. Powell said the Federal Reserve was focused on returning US inflation to 2%, and clarified that a pivot to cutting rates was at least a couple of years away, ending market expectations that tightening cycle was coming to an end and rate cuts may begin in the first half of 2024.

- Junk bond yields crossed the 9% mark to close at a three-month high of 9.03% and spreads widened 25 basis points, the most for a week since mid-March, to close at +426. Spreads rose for the first time in five weeks
- While yields soared and returns turned negative for week ended Friday, junk bond markets overall were resilient in June, with positive returns in three of the last four weeks. The sudden reversal came last week after Powell's testimony to Congress
- Despite sticky inflation, the US economy remains resilient, and the current backdrop could support a further grind tighter in spreads, Brad Rogoff at Barclays on Friday. But more medium-term risks remain, Rogoff cautioned
 - Junk-rated borrowers rushed to market after the Fed paused its rate-hike campaign to assess the lagged effect of the 500 basis points hike in the last 15 months, and also raised 2023 economic growth forecast to 1%, easing concern for an imminent recession
 - The primary market was crowded as six companies lined up to sell more than \$5b last week to make it the busiest since May 19. New debt was mostly rated BB by Moody's and S&P or at least one of them
 - As the market turned a little weaker on Fed's renewed calls for at least two more rate hikes, bankers advanced the pricing of new bonds to get ahead of any reversal in sentiment
 - Oil and natural gas company Civitas led the primary market, with \$2.7b 2-part offering
 - Univar slashed the size of the bond offering from \$1.8b to \$800m on market weakness. Proceeds, together with cross border term loan, were to fund the company's buyout by Apollo
 - OneMain Finance Corp, Brinker International and GrafTech were among the other borrowers
- Junk bonds posted losses for the first time in four week. The losses for week ended Friday were at 0.75%, the biggest weekly loss since March 10
 - BB yields rose 20 basis points to close at a four-week high of 7.25%, the biggest weekly jump in more than three months. BB spreads rose 21 basis points to 284, first widening in six weeks
 - CCCs, the riskiest part of the high yield market, also ended the three-week gains to post a loss of 0.88%, the most weekly loss since March 17

o CCC yields rose 23bps to 13.09% after rising for five days in a row.

- The US junk bond market is expected to remain cautious ahead of a series of macro data this week. US equity futures as investors hedged the risk that economies would flag under central banks pushing their inflation-fighting zeal and rate-hiking campaigns too far

STRUCTURED PIPELINE: At Least 4 ABS, Three CMBS Names On Tap (Bloomberg) -- America's Car-Mart, Channel Partners Capital, TierPoint and Verizon are among the ABS names slated to sell new debt this week. 2023 US sales are approximately 6.5% lower year-over-year at \$144.8 billion, according to data compiled by Bloomberg News.

- Private-label CMBS sales are down by roughly 77% year-over-year at \$17 billion
 - o A single asset single borrower secured by two data centers in Elk Grove Village, Illinois is expected to price this week along with a pair of conduits
- New issue US CLO supply is ~23.4% lower year-over-year at approximately \$53.8 billion
- Private-label RMBS issuance is roughly \$34.9 billion compared to \$90.3 billion at this time last year, according to Bloomberg LEAG
- EUROPE ABS PIPELINE: Sales Pick Up Before Likely Summer Slowdown

Structured Highlights: Week of 6/19/23

- Bayview Mega Deals Supercharge Auto ABS Sales: Structured Weekly
- Mortgage Carry Costs Are Rising as Curve Inversion Deepens
- Distressed US Commercial Property Assets Swell to \$64 Billion
- 'Screaming Cheap' Mortgage Bonds Draw TCW, Pimco After Turmoil
- MUFG's Global Head of CLOs Asif Khan Departs Bank for Natixis
- Mortgage-Focused Manager Makes First Foray Into Auto Bonds
- MBA Mortgage Applications Rose 0.5% Last Week
- US Car Owners See Loan-to-Value Ratios Move in Wrong Direction

Daniel Nigro
 Sr. Specialized Examiner
 Enforcement Division – CFI
 100 Pearl Street, Suite 20-100
 New York, NY 10004-2616

OFFICE (b)(6)
 MOBILE (b)(6)
 (b)(6)@sec.gov



Confidentiality Notice: This e-mail message, including any attachments, from the U.S. Securities and Exchange Commission is for the exclusive use of the intended recipient(s) and may contain confidential and privileged information. If you are not the intended recipient, please do not read, distribute, or take action in reliance upon the message. If you have received this message in error, please notify the sender immediately by return e-mail and promptly delete this message and its attachments from your computer system. Be advised that no privileges are waived by the transmission of this message.

To: foia@foia.com[foia@foia.com]
From: Taylor, Felecia
Sent: 2023-08-21T11:49:56Z
Subject: FOIA Response - 23-01540-FOIA
Received: 2023-08-21T11:49:56Z
[FOIA Response.pdf](#)

Please see the attached response.



UNITED STATES
SECURITIES AND EXCHANGE COMMISSION

STATION PLACE
100 F STREET, NE
WASHINGTON, DC 20549-2465

Office of FOIA Services

August 21, 2023

Mr. Jeff Stachewicz
FOIA Group, Inc.
P.O. Box 368
Depew, NY 14043

Re: Freedom of Information Act (FOIA), 5 U.S.C. § 552
Request No. **23-01540-FOIA**

Dear Mr. Stachewicz:

This letter responds to your request, dated April 3, 2023, and received in this office on April 4, 2023, for "all records concerning Ethereum's shift to proof-of-stake consensus mechanism that have been created since January 1, 2018, including, but not limited to:

- a. all records reflecting any external communications involving the Commission, any Commissioner, and/or any Commission staff, including, but not limited to, meeting minutes, calendar invites, notes, e-mails, and letters, concerning Ethereum's shift to a proof-of-stake consensus mechanism;
- b. any factual or investigatory documents received by the Commission, any Commissioner, and/or any Commission Staff or otherwise in the Commission Staff's custody or control concerning Ethereum's shift to a proof-of-stake consensus mechanism; and
- c. any public communications by the Commission, any Commissioner, and/or any Commission Staff concerning Ethereum's shift to a proof-of-stake consensus mechanism."

We are withholding records that may be responsive to your request under 5 U.S.C. § 552(b)(7)(A). This exemption protects from disclosure records compiled for law enforcement purposes, the release of which could reasonably be expected to interfere with enforcement activities. Since Exemption 7(A) protects the

Mr. Jeff Stachewicz
August 21, 2023
Page 2

23-01540-FOIA

records from disclosure, we have not determined if other exemptions apply. Therefore, we reserve the right to assert other exemptions when Exemption 7(A) no longer applies.

It is the general policy of the Commission to conduct its investigations on a non-public basis. Thus, subject to the provisions of FOIA, the Commission does not disclose the existence or non-existence of an investigation or information gathered unless made a matter of public record in proceedings brought before the Commission or in the courts. Accordingly, the assertion of this exemption should not be construed as an indication by the Commission or its staff that any violations of law have occurred with respect to any person, entity, or security.

Please be advised that we have considered the foreseeable harm standard in preparing this response.

I am the deciding official with regard to this adverse determination. You have the right to appeal my decision to the SEC's General Counsel under 5 U.S.C. § 552(a)(6), 17 CFR § 200.80(f)(1). The appeal must be received within ninety (90) calendar days of the date of this adverse decision. Your appeal must be in writing, clearly marked "Freedom of Information Act Appeal," and should identify the requested records. The appeal may include facts and authorities you consider appropriate.

You may file your appeal by completing the online Appeal form located at https://www.sec.gov/forms/request_appeal, or mail your appeal to the Office of FOIA Services of the Securities and Exchange Commission located at Station Place, 100 F Street NE, Mail Stop 2465, Washington, D.C. 20549, or deliver it to Room 1120 at that address.

If you have any questions, please contact Ms. Felecia Taylor of my staff at taylorf@sec.gov or (202) 551-8349. You may also contact me at foiapa@sec.gov or (202) 551-7900. You

Mr. Jeff Stachewicz
August 21, 2023
Page 3

23-01540-FOIA

may also contact the SEC's FOIA Public Service Center at foiapa@sec.gov or (202) 551-7900. For more information about the FOIA Public Service Center and other options available to you please see the attached addendum.

Sincerely,

A handwritten signature in black ink, appearing to read "L. Katilius". The signature is written in a cursive, flowing style.

Lizzette Katilius
FOIA Branch Chief

Enclosure

ADDENDUM

For further assistance you can contact a SEC FOIA Public Liaison by calling (202) 551-7900 or visiting <https://www.sec.gov/oso/help/foia-contact.html>.

SEC FOIA Public Liaisons are supervisory staff within the Office of FOIA Services. They can assist FOIA requesters with general questions or concerns about the SEC's FOIA process or about the processing of their specific request.

In addition, you may also contact the Office of Government Information Services (OGIS) at the National Archives and Records Administration to inquire about the FOIA dispute resolution services it offers. OGIS can be reached at 1-877-684-6448 or via e-mail at ogis@nara.gov. Information concerning services offered by OGIS can be found at their website at [Archives.gov](https://www.archives.gov). Note that contacting the FOIA Public Liaison or OGIS does not stop the 90-day appeal clock and is not a substitute for filing an administrative appeal.

To: foia@foia.com[foia@foia.com]
From: Taylor, Felecia
Sent: 2023-08-23T13:12:17Z
Subject: RE: Acknowledgement Letter FOIA-PA - 23-01540-FOIA
Received: 2023-08-23T13:12:17Z
[FOIA Response 23-01540-FOIA.pdf](#)

Mr. Stachewicz,
Attached is a copy of our response concerning request no. 23-01540-FOIA.

Thanks,
Felecia Taylor

Felecia Taylor

Lead Research Specialist
Office of FOIA Services
OFFICE +1 202 5S1 8349
MOBILE (b)(6)
taylorf@sec.gov



**U.S. Securities and
Exchange Commission**

From: FOIA GROUP <foia@foia.com>
Sent: Tuesday, August 22, 2023 11:02 PM
To: Fulton, Charlotte (b)(6) <[SEC.GOV](mailto:(b)(6)@sec.gov)>
Subject: RE: Acknowledgement Letter FOIA-PA - 23-01540-FOIA

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hello, we need a status for this request please.

From: (b)(6) <[@sec.gov](mailto:(b)(6)@sec.gov)> (b)(6) <[@sec.gov](mailto:(b)(6)@sec.gov)>
Sent: Tuesday, April 4, 2023 8:31 AM
To: FOIA GROUP <foia@foia.com>
Subject: Acknowledgement Letter FOIA-PA - 23-01540-FOIA



UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
STATION PLACE
100 F STREET, NE
WASHINGTON, DC 20549-2465

Office of FOIA Services

August 21, 2023

Mr. Jeff Stachewicz
FOIA Group, Inc.
P.O. Box 368
Depew, NY 14043

Re: Freedom of Information Act (FOIA), 5 U.S.C. § 552
Request No. **23-01540-FOIA**

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- a. all records reflecting any external communications involving the Commission, any Commissioner, and/or any Commission staff, including, but not limited to, meeting minutes, calendar invites, notes, e-mails, and letters, concerning Ethereum's shift to a proof-of-stake consensus mechanism;
- b. any factual or investigatory documents received by the Commission, any Commissioner, and/or any Commission Staff or otherwise in the Commission Staff's custody or control concerning Ethereum's shift to a proof-of-stake consensus mechanism; and
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Mr. Jeff Stachewicz
August 21, 2023
Page 2

23-01540-FOIA

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Please be advised that we have considered the foreseeable harm standard in preparing this response.

I am the deciding official with regard to this adverse determination. You have the right to appeal my decision to the SEC's General Counsel under 5 U.S.C. § 552(a)(6), 17 CFR § 200.80(f)(1). The appeal must be received within ninety (90) calendar days of the date of this adverse decision. Your appeal must be in writing, clearly marked "Freedom of Information Act Appeal," and should identify the requested records. The appeal may include facts and authorities you consider appropriate.

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Mr. Jeff Stachewicz
August 21, 2023
Page 3

23-01540-FOIA

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Sincerely,

A handwritten signature in black ink, appearing to read "L. Katilius". The signature is written in a cursive style with a large initial "L".

Lizzette Katilius
FOIA Branch Chief

Enclosure

ADDENDUM

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To: (b)(6) [redacted] @pcaobus.org
From: Jacobs, Elizabeth
Sent: 2018-12-12T17:09:10Z
Subject: Greetings & you around next week?
Received: 2018-12-12T17:09:10Z
[federalregister121118.pdf](#)

(b)(6) [redacted]

In the meantime, attached FYI is a CFTC notice for input on better understanding Ethereum and there are some questions about how recorded for accounting purposes (#4) and independent audits of Ether deposits (#25)...

6351-01-P

COMMODITY FUTURES TRADING COMMISSION

Request for Input on Crypto-asset Mechanics and Markets

AGENCY: Commodity Futures Trading Commission.

ACTION: Request for input.

SUMMARY: The Commodity Futures Trading Commission (“Commission” or “CFTC”) in furtherance of the LabCFTC initiative is seeking public comment and feedback on this Request for Input (“RFI”) in order to better inform the Commission’s understanding of the technology, mechanics, and markets for virtual currencies beyond Bitcoin, namely here Ether and its use on the Ethereum Network. The Commodity Exchange Act (“CEA”) grants the Commission regulatory authority over the commodity futures markets. The Commission is seeking public feedback in furtherance of oversight of these markets and regulatory policy development. The input from this request will advance the CFTC’s mission of ensuring the integrity of the derivatives markets as well as monitoring and reducing systemic risk by enhancing legal certainty in the markets. The RFI seeks to understand similarities and distinctions between certain virtual currencies, including here Ether and Bitcoin, as well as Ether-specific opportunities, challenges, and risks. The Commission welcomes all public comments on these and related issues.

DATES: Comments must be received on or before [INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*].

ADDRESSES: You may submit comments, identified by the title, “Virtual Currency RFI,” by any of the following methods:

- CFTC website: <https://comments.cftc.gov>. Follow the instructions to Submit Comments through the website.
- Mail: Send to Christopher Kirkpatrick, Secretary of the Commission, Commodity Futures Trading Commission, Three Lafayette Centre, 1155 21st Street, NW, Washington, DC 20581.
- Hand Delivery/Courier: Same as Mail, above.

Please submit comments by only one of these methods.

All comments should be submitted in English or accompanied by an English translation. Comments will be posted as received to <https://www.cftc.gov>. You should submit only information that you wish to make available publicly. If you wish the Commission to consider information that may be exempt from disclosure under the Freedom of Information Act (“FOIA”), a petition for confidential treatment of the exempt information may be submitted according to the procedures established in the Commission’s regulations at 17 CFR 145.9.¹ The Commission reserves the right, but shall have no obligation, to review, prescreen, filter, redact, refuse, or remove any or all of your submission from <https://www.cftc.gov> that it may deem to be inappropriate for publication, such as obscene language. All submissions that have been redacted or removed that contain comments on the merits of the RFI will be retained in the public comment file and will be considered as required under the Administrative Procedure Act and other applicable laws, and may be accessible under the FOIA.

¹ 17 CFR 145.9. All Commission regulations cited herein are set forth in chapter I of Title 17 of the Code of Federal Regulations.

FOR FURTHER INFORMATION CONTACT: Daniel Gorfine, Director of LabCFTC and Chief Innovation Officer, (202) 418–5625; Bianca M. Gomez, Counsel on FinTech and Innovation, Office of General Counsel, (202) 418–5627; or LabCFTC@cftc.gov.

SUPPLEMENTARY INFORMATION:

I. Background

A. Introduction

The CEA grants the Commission regulatory authority over the commodity futures markets.² LabCFTC was launched by the Commission in order to further the CFTC’s goal of evolving as a 21st century regulator and keeping pace with technological innovation. LabCFTC is dedicated to facilitating market-enhancing financial technology (“FinTech”) innovation, informing policy, and ensuring that we have the regulatory and technological tools and understanding to keep pace with changing markets. LabCFTC is designed to make the CFTC more accessible to all innovators and to inform the Commission’s understanding of emerging technologies and their regulatory implications. One such area of emerging innovation involves virtual currencies.

In further advancing its mission, LabCFTC published a primer on the topic of virtual currencies in October 2017 (the “Primer”) in order to help educate the public on potential applications and use-cases, the CFTC’s role and jurisdictional oversight, and potential risks and challenges that investors and users may face involving virtual currencies.³

² *See, e.g.*, 7 U.S.C. 5(b).

³ “A CFTC Primer on Virtual Currencies,” (Oct. 17, 2017), https://www.cftc.gov/sites/default/files/idc/groups/public/documents/file/labctc_primercurrency100417.pdf.

In December 2017, the Chicago Mercantile Exchange Inc. (“CME”) and the CBOE Futures Exchange (“CFE”) self-certified and began offering new contracts for bitcoin futures products following discussions with Commission staff regarding compliance with the CEA and Commission rules and regulations. In line with Chairman Giancarlo’s repeated statements⁴ regarding the unique nature and risks of virtual currency-related products, the CFTC’s Division of Market Oversight (“DMO”) and Division of Clearing and Risk (“DCR”) issued on May 21, 2018 a joint staff advisory⁵ that gives exchanges and clearinghouses registered with the CFTC guidance on certain enhancements when listing a derivative contract based on virtual currency pursuant to Commission regulations. The input being sought here will better inform the Commission and its operating divisions as the market evolves and potentially seeks to list new virtual currency based futures and derivatives products.

B. Bitcoin as a Virtual Currency

In its October 2017 Primer, LabCFTC cited the IRS to define a virtual currency as “a digital representation of value that functions as a medium of exchange, a unit of account, and/or a store of value . . . [but that] does not have legal tender status.”⁶ The Primer further noted key characteristics of Bitcoin, including that it:

⁴ See, e.g., Testimony of Chairman J. Christopher Giancarlo before the Senate Committee On Appropriations Subcommittee on Financial Services and General Government (June 5, 2018), <https://www.cftc.gov/PressRoom/SpeechesTestimony/opagiancarlo47>.

⁵ CFTC Staff Advisory No. 18-14 (May 21, 2018), https://www.cftc.gov/sites/default/files/idc/groups/public/%40lrlettergeneral/documents/letter/2018-05/18-14_0.pdf.

⁶ See Primer, *supra* note 3, at 4 (citing IRS Notice 2014-21, available at <https://www.irs.gov/businesses/small-businesses-self-employed/virtual-currencies>). See also Proposed Interpretation on Virtual Currency “Actual Delivery” in Retail Transactions (Dec. 15, 2017), 82 FR 60335 (Dec. 20, 2017), <https://www.cftc.gov/sites/default/files/idc/groups/public/@lrfederalregister/documents/file/2017-27421a.pdf>.

- Is “pseudonymous” (or partially anonymous) in that an individual is identified by an alpha-numeric public key/address;
- Relies on cryptography (and unique digital signatures) for security based on public and private keys and complex mathematical algorithms;
- Runs on a decentralized peer-to-peer network of computers and “miners” that operate on open-source software and do “work” to validate and irrevocably log transactions on a permanent public distributed ledger visible to the entire network;
- Solves the lack of trust between participants who may be strangers to each other on a public ledger through the transaction validation work noted in the bullet above; and
- Enables the transfer of ownership without the need for a trusted, central intermediary.

The Primer noted potential applications or use cases of a virtual currency like Bitcoin, including that it may serve as a store of value, be used for trading, enable payments and value transfers, power applications built upon the virtual currency network, and facilitate money transfers or international remittances. The Primer further highlighted a range of potential risks around virtual currencies, including technology, operational, cybersecurity, speculative, and fraud and manipulation risks.

C. Ether as a Virtual Currency

In June 2018, the Director of the Securities and Exchange Commission’s (“SEC”) Division of Corporation Finance, Bill Hinman, delivered a speech which conveyed Mr. Hinman’s personal views. In the speech, he addressed the question of whether “a digital asset that was originally offered in a securities offering [could] ever be later sold in a

manner that does not constitute an offering of a security.” He explained among other factors that since the network on which Bitcoin operates appears to be decentralized and there is no central third party whose efforts are a key determining factor in the success of Bitcoin, “[a]pplying the disclosure regime of the federal securities laws to the offer and resale of Bitcoin would seem to add little value.” He further stated that, in addition to Bitcoin, “based on my understanding of the present state of Ether, the Ethereum network and its decentralized structure, current offers and sales of Ether are not securities transactions.” Finally, he stated that “[o]ver time, there may be other sufficiently decentralized networks and systems where regulating the tokens or coins that function on them as securities may not be required.”⁷

Ether is a virtual currency that was launched on the Ethereum Network in 2015. It is an open network that currently relies on a proof of work consensus mechanism, but developers, including through the Ethereum Foundation, have plans to shift the protocol to a proof of stake consensus model in order, at least in part, to reduce energy consumption required to validate the ledger.⁸ The Ethereum Network is often viewed as a platform that permits ready creation and use of smart contracts that can power decentralized applications or organizations. In this way, Ether is used as “fuel” to compensate miners for maintaining a public ledger for such networks.⁹ To date, Ether has typically been one of the top three virtual currencies by market capitalization.

⁷ “Digital Asset Transactions: When Howey Met Gary (Plastic),” Remarks of William Hinman, Director, Division of Corporation Finance, SEC at the Yahoo Finance All Markets Summit: Crypto (June 14, 2018), <https://www.sec.gov/news/speech/speech-hinman-061418>.

⁸ See Ethereum Foundation, Frequently Asked Questions, available at <https://www.ethereum.org/ether> (last visited Aug. 22, 2018).

⁹ See *id.*

II. Request for Input

The Commission is seeking public feedback namely on Ether and the Ethereum Network in order to better understand these technologies given Ether's size in the market and potentially unique attributes relative to Bitcoin. The Commission is issuing this RFI in order to gather public feedback on a range of questions related to the underlying technology, opportunities, risks, mechanics, use cases, and markets, related to Ether and the Ethereum Network. The requested information will inform the work of LabCFTC and the Commission as a whole. The Commission welcomes any relevant comments, including related topics that may not be specifically mentioned but which a commenter believes should be considered.

Specific Questions for Input

In addition to any general input, the Commission is interested in responses to the following questions:

Purpose and Functionality

1. What was the impetus for developing Ether and the Ethereum Network, especially relative to Bitcoin?
2. What are the current functionalities and capabilities of Ether and the Ethereum Network as compared to the functionalities and capabilities of Bitcoin?
3. How is the developer community currently utilizing the Ethereum Network? More specifically, what are prominent use cases or examples that demonstrate the functionalities and capabilities of the Ethereum Network?

4. Are there any existing or developing commercial enterprises that are using Ether to power economic transactions? If so, how is Ether recorded for accounting purposes in a comprehensive set of financial statements?

5. What data sources, analyses, calculations, variables, or other factors could be used to determine Ether's market size, liquidity, trade volume, types of traders, ownership concentration, and/or principal ways in which the Ethereum Network is currently being used by market participants?

6. How many confirmations on the Ethereum blockchain are sufficient to wait to ensure that the transaction will not end up on an invalid block?

Technology

7. How is the technology underlying Ethereum similar to and different from the technology underlying Bitcoin?

8. Does the Ethereum Network face scalability challenges? If so, please describe such challenges and any potential solutions. What analyses or data sources could be used to assess concerns regarding the scalability of the underlying Ethereum Network, and in particular, concerns about the network's ability to support the growth and adoption of additional smart contracts?

9. Has a proof of stake consensus mechanism been tested or validated at scale? If so, what lessons or insights can be learned from the experience?

10. Relative to a proof of work consensus mechanism does proof of stake have particular vulnerabilities, challenges, or features that make it prone to manipulation? In responding consider, for example, that under a proof of stake consensus mechanism, the chance of validating a block may be proportional to staked wealth.

11. There are reports of disagreements within the Ether community over the proposed transition to a proof of stake consensus model. Could this transition from a proof of work to a proof of stake verification process result in a fragmented or diminished Ether market if the disagreements are not resolved?

12. What capability does the Ethereum Network have to support the continued development and increasing use of smart contracts?

Governance

13. How is the governance of the Ethereum Network similar to and different from the governance of the Bitcoin network?

14. In light of Ether's origins as an outgrowth from the Ethereum Classic blockchain, are there potential issues that could make Ether's underlying blockchain vulnerable to future hard forks or splintering?

Markets, Oversight and Regulation

15. Are there protections or impediments that would prevent market participants or other actors from intentionally disrupting the normal function of the Ethereum Network in an attempt to distort or disrupt the Ether market?

16. What impediments or risks exist to the reliable conversion of Ether to legal tender? How do these impediments or risks impact regulatory considerations for Commission registrants with respect to participating in any transactions in Ether, including the ability to obtain or demonstrate possession or control or otherwise hold Ether as collateral or on behalf of customers?

17. How would the introduction of derivative contracts on Ether potentially change or modify the incentive structures that underlie a proof of stake consensus model?

18. Given the evolving nature of the Ether cash markets underlying potential Ether derivative contracts, what are the commercial risk management needs for a derivative contract on Ether?

19. Please list any potential impacts on Ether and the Ethereum Network that may arise from the listing or trading of derivative contracts on Ether.

20. Are there any types of trader or intermediary conduct that has occurred in the international Ether derivative markets that raise market risks or challenges and should be monitored closely by trading venues or regulators?

21. What other factors could impact the Commission's ability to properly oversee or monitor trading in derivative contracts on Ether as well as the underlying Ether cash markets?

22. Are there any emerging best practices for monitoring the Ethereum Network and public blockchains more broadly?

Cyber Security and Custody

23. Are there security issues peculiar to the Ethereum Network or Ethereum-supported smart contracts that need to be addressed?

24. Are there any best practices for the construction and security of Ethereum wallets, including, but not limited to, the number of keys required to sign a transaction and how access to the keys should be segregated?

25. Are there any best practices for conducting an independent audit of Ether deposits?

In providing your responses, please be as specific as possible, and offer concrete examples where appropriate. Please provide any relevant data to support your answers

where appropriate. The Commission encourages all relevant comments on related items or issues; commenters need not address every question.

III. Conclusion

The Commission appreciates your time and effort responding to this RFI on Crypto-asset Mechanics and Markets. The information provided by stakeholders will help us refine our understanding of this area of innovation and better inform the work of the Commission, including the evaluation of potential derivatives contracts. More broadly, the input from this request will further aid the Commission in identifying FinTech trends and related opportunities, challenges, and risks. In that respect, we look forward to continuing to engage proactively with the innovator community and market participants in order to help facilitate market-enhancing innovation and ensure market integrity.

Issued in Washington, DC, on December 11, 2018, by the Commission.

Christopher Kirkpatrick,

Secretary of the Commission.

Appendix to Request for Input on Crypto-asset Mechanics and Markets –

Commission Voting Summary

On this matter, Chairman Giancarlo and Commissioners Quintenz, Behnam, Stump, and Berkovitz voted in the affirmative. No Commissioner voted in the negative.

To: (b)(6)
From: Jacobs, Elizabeth
Sent: 2019-01-23T14:20:59Z
Subject: Fwd: #117: Japan is trying to replace cash with crypto
Received: 2019-01-23T14:20:59Z

Sent from my iPhone

Begin forwarded message:

From: Chain Letter from MIT Tech Review <newsletters@technologyreview.com>
Date: January 22, 2019 at 12:56:44 PM EST
To: (b)(6) @sec.gov
Subject: #117: Japan is trying to replace cash with crypto
Reply-To: newsletters@technologyreview.com

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Chain Letter

Blockchains,
cryptocurrencies, and
why they matter



01.22: Economy of scale

Bitcoin has “severe” economic limitations as a means of payment.

That’s according to a new [working paper](#) (PDF) from the Bank of International Settlements (BIS), the so-called central bank for central banks. Two limitations stem from the method, called proof-of-work, that Bitcoin and many other blockchain networks use [to secure their distributed ledgers](#).

First, as we saw recently in an [attack on Ethereum Classic](#), if someone is able to gain more than half of the mining capacity of a proof-of-work system, they can use it reverse transactions and effectively spend the same bitcoins twice. Called a double-spend attack, the attacker can pull this off by paying them in cryptocurrency before creating an alternative version of the blockchain in which the payment never happens. The deeper a transaction is in the blockchain, the more computing power is needed to create an alternative chain that doesn’t contain that transaction, and the lower the probability that a double spend attack will occur. That’s why merchants who accept Bitcoin as payment must wait for several additional sets of transactions, or blocks, to be added to the chain after the one containing the payment before they release the purchased goods.

But a transaction isn’t truly final, argues [Raphael Auer](#), a BIS economist, until it is so deep in the blockchain that it is in fact impossible for a double-spend attacker to profit. Achieving this, which he calls “economic payment finality,” is extremely expensive to the network.

The second economic limitation pertains to the way the network pays miners to keep it secure. In Bitcoin, a miner who adds a new block to the chain earns a set number of bitcoins, called the “block reward.” They can also earn transaction fees, which individual Bitcoin users propose when they submit new transactions. This income is incentive for miners to act in the interest of the whole network instead of selfishly attempting double-spend attacks. In Bitcoin, however, this will shrink over time, because the system is designed to phase out the block reward. Transaction fees alone won’t be enough to keep the security of the system from deteriorating once this happens, says Auer, meaning that achieving true payment finality will take longer and longer. When the reward reaches zero, it might even take months for a payment to become irreversible, he writes, concluding: “The only fundamental remedy would be to depart from proof-of-work.” (See also: [“Bitcoin’s inherent economics could keep it from every being very important”](#))

Auer notes that making such a substantial change to a cryptocurrency network’s software “would probably require some form of social

infighting and gridlock over technical decisions, however. Meanwhile, Ethereum is trying to switch from proof-of-work to an alternative method called proof-of-stake, and [its community is realizing how difficult this is from a social perspective.](#)

Will people ditch cash for cryptocurrency? Japan is about to find out.

Most payments in the world’s third largest economy are still made in cash, but with the 2020 Olympics approaching, the government is pressing for more cashless payment options. Several of Japan’s biggest banks are now betting that blockchain technology will be the key to getting people to ditch their banknotes. Sure, Japan’s retail investors already love crypto, and the government is very well versed in the technology thanks to the hard lessons of Mt. Gox, which collapsed in 2014 after losing half a billion dollars worth of its users’ cryptocurrency. But it will only work if Japan’s banks are able to do something that hasn’t yet been done: make cryptocurrency payments easy and useful. For the whole story, [check out my new feature.](#)

Featured EmTech Digital Speaker: Kent Walker

Every industry leader should be considering how to implement ethical AI. Google’s SVP of Global Affairs and Chief Legal Officer will join us on stage at EmTech Digital to discuss both policy and implementation and how to establish principles of responsible AI. [Secure your ticket today!](#)

Loose Change

Fill your pockets with these newsy tidbits.

- Ethereum’s core developers have proposed to activate the delayed Constantinople hard fork until late February. ([CoinDesk](#))
+Ethereum has a hard forking problem thanks to another delayed upgrade. ([TR](#))
- Daily Bitcoin payment transactions on darknet markets rose to an average of \$2 million by the end of 2018, double what it was at the beginning of the year. ([Reuters](#))
- Ripple’s executives don’t seem alarmed about a [recent report](#) that a nonprofit called Valor is planning to attempt “hostile takeover” of its cryptocurrency, XRP. ([Breaker](#))

- A startup called Spring Labs is working with 16 lenders and fintech firms to test a blockchain system that would remove the need for centralized credit bureaus like Equifax and Experian. ([Bloomberg](#))

The Money Quote

“We are on the cusp of something where if this doesn’t scale relatively soon, it may be relegated to ideas that were nice but didn’t work in practice: more like 3D printing than the internet.”

—Joey Krug, co-chief investment officer at Pantera Capital, explaining why the firm is backing Unit-e, a new cryptocurrency project led by professors from seven US colleges including MIT, Stanford, and Berkeley that is meant to process thousands of transactions per second. (Bitcoin averages between 4 and 7 per second, and Ethereum achieves 10 to 30.) ([Bloomberg](#))

We hope you enjoyed today's tour of what's new in the world of blockchains and cryptocurrencies. Send us some [feedback](#), or follow me [@mike_orcutt](#).

Was this forwarded to you, and you'd like to see more?

Blockchain—You've heard the term, now understand the impact.

Business of Blockchain

May 2, MIT Media Lab Cambridge, MA

[View this in a browser](#)

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MIT Technology Review
One Main Street
Cambridge, MA 02142



To: Jazmin Scott [Jazmin.Scott@Gesmer.com]; Michael Brier [Michael.Brier@Gesmer.com]
From: (b)(6); (b)(7)(C) Case 1:24-cv-01858-ACR Document 34-5 Filed 06/20/25 Page 371 of 672
Sent: 2024-04-12T19:57:53Z
Subject: RE: Correspondence Regarding Subpoena C-08950
Received: 2024-04-12T19:57:53Z

Thank you, Jazmin.

From: Jazmin Scott <Jazmin.Scott@Gesmer.com>
Sent: Friday, April 12, 2024 3:57 PM
To: (b)(6); (b)(7)(C) @sec.gov>; Michael Brier <Michael.Brier@Gesmer.com>
Subject: RE: Correspondence Regarding Subpoena C-08950

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Thank you, the documents have been uploaded using the secure link.

Regards,

Jazmin

From: (b)(6); (b)(7)(C) @sec.gov>
Sent: Friday, April 12, 2024 3:42 PM
To: Michael Brier <Michael.Brier@Gesmer.com>
Cc: Jazmin Scott <Jazmin.Scott@Gesmer.com>
Subject: RE: Correspondence Regarding Subpoena C-08950

Thank you for the update. Let me try sending a separate Accellion message to Jazmin—I believe the account creation may be tied to the specific email address, which could be why you're running into trouble.

From: Michael Brier <Michael.Brier@Gesmer.com>
Sent: Friday, April 12, 2024 3:37 PM
To: (b)(6); (b)(7)(C) @sec.gov>
Cc: Jazmin Scott <Jazmin.Scott@Gesmer.com>
Subject: RE: Correspondence Regarding Subpoena C-08950

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FYI, I understand that my assistant has been having some trouble logging into the account, which is now locked. It is possible we might not be able to figure out how to get the documents uploaded before the weekend.

Michael Brier
Partner
GesmerUpdegrove LLP
40 Broad Street
Boston, MA 02109
(617) 350-6800

www.gesmer.com

From: (b)(6); (b)(7)(C) @sec.gov>
Sent: Friday, April 12, 2024 11:50 AM
To: Michael Brier <Michael.Brier@Gesmer.com>
Subject: RE: Correspondence Regarding Subpoena C-08950

Please let me know if you run into any issues.

Thank you,

(b)(6);
(b)(7)(C)

From: Michael Brier <Michael.Brier@Gesmer.com>
Sent: Friday, April 12, 2024 11:47 AM
To: (b)(6); (b)(7)(C) <[@sec.gov](mailto:(b)(6); (b)(7)(C)@sec.gov)>
Subject: RE: Correspondence Regarding Subpoena C-08950

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Dear (b)(6); (b)(7)(C)

The Linux Foundation is nearly ready to make a production in response to the subpoena. I understand that you can provide us with an FTP link for uploading the documents. Please send one over when you have the chance.

Michael Brier
Partner
GesmerUpdegrove LLP
40 Broad Street
Boston, MA 02109
(617) 350-6800

www.gesmer.com

From: (b)(6); (b)(7)(C) <[@sec.gov](mailto:(b)(6); (b)(7)(C)@sec.gov)>
Sent: Thursday, March 28, 2024 5:38 PM
To: Michael Brier <Michael.Brier@Gesmer.com>
Subject: RE: Correspondence Regarding Subpoena C-08950

Dear Mr. Brier,

Thank you for your email and update on the subpoena response. With respect to the communications with the Ethereum Foundation, we are aware that the Foundation uses the "@ethereum.org" email domain.

I don't believe we have a standard procedure that we can recommend for collection of documents beyond our data delivery standards. However, if you are running into a specific issue, I can see if our technical support team is able to advise.

Please let me know if it would be helpful to have a call to discuss.

Best,

(b)(6);
(b)(7)(C)

From: Michael Brier <Michael.Brier@Gesmer.com>
Sent: Wednesday, March 27, 2024 1:44 PM
To: (b)(6); (b)(7)(C) <[@sec.gov](mailto:(b)(6); (b)(7)(C)@sec.gov)>
Subject: Correspondence Regarding Subpoena C-08950

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Dear (b)(6); (b)(7)(C)

I represent the Linux Foundation in connection with Subpoena C-08950. I understand that the subpoena was directed to my partner Andy Updegrove at the foundation's offices in San Francisco. However, Andy is outside counsel at my firm (Gesmer

In any event, Linux Foundation is now in the process of searching for documents responsive to the subpoena. One question we had pertains to Request No. 6, which seeks production of all communications with the Ethereum Foundation relating to the Merge or the Beacon Chain (as further defined in the subpoena). As the foundation is unaware of individuals who are affiliated with the Ethereum Foundation beyond the three listed on its website, we are wondering if there are communications with any other person that you are looking for here.

Also, apparently the Linux Foundation uses Gmail as its email service, which will complicate extracting the information you are looking for. If there is any procedure you typically use when dealing with Gmail communications, please feel free to share it with me and I will forward it to the foundation.

Thank you for your attention.

Michael Brier

Partner

GesmerUpdegrove LLP

40 Broad Street

Boston, MA 02109

Direct: (617) 531-8352

Web: www.gesmer.com

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To: Gottlieb, Jason [gottlieb@morrisoncohen.com]; Upadhyaya, Vani T. [vupadhyaya@morrisoncohen.com]; Isaacs, Daniel C. [disaacs@morrisoncohen.com]
From: (b)(6); (b)(7)(C)
Sent: 2024-04-29T19:59:59Z
Subject: RE: C-08950 - On behalf of (b)(6); (b)(7)(C)
Received: 2024-04-29T20:00:00Z
image001.jpg

Great—thank you, Jason.

From: Gottlieb, Jason <jgottlieb@morrisoncohen.com>
Sent: Monday, April 29, 2024 3:59 PM
To: (b)(6); (b)(7)(C) <(b)(6); (b)(7)(C)@sec.gov>; Upadhyaya, Vani T. <vupadhyaya@morrisoncohen.com>; Isaacs, Daniel C. <disaacs@morrisoncohen.com>
Subject: RE: C-08950 - On behalf of (b)(6); (b)(7)(C)

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(b)(6); (b)(7)(C) We anticipate making an additional production for (b)(6); (b)(7)(C) this week.

Jason



Jason Gottlieb
Partner & Chair, Digital Assets; Chair, White Collar and Regulatory Enforcement
D 212.735.8837
jgottlieb@morrisoncohen.com
vCard | Bio | LinkedIn

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909 Third Avenue, 27th Floor, New York, NY 10022-4784
212.735.8600 | morrisoncohen.com

From: (b)(6); (b)(7)(C) <(b)(6); (b)(7)(C)@sec.gov>
Sent: Monday, April 29, 2024 2:17 PM
To: Gottlieb, Jason <jgottlieb@morrisoncohen.com>; Upadhyaya, Vani T. <vupadhyaya@morrisoncohen.com>; Isaacs, Daniel C. <disaacs@morrisoncohen.com>
Subject: RE: C-08950 - On behalf of (b)(6); (b)(7)(C)

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Jason,

Following up on the below—could you provide an update on when you anticipate making additional document productions?

Thank you,

(b)(6); (b)(7)(C)

From: (b)(6); (b)(7)(C)
Sent: Monday, April 8, 2024 4:11 PM
To: Gottlieb, Jason <jgottlieb@morrisoncohen.com>; Upadhyaya, Vani T. <vupadhyaya@morrisoncohen.com>; Isaacs, Daniel C. <disaacs@morrisoncohen.com>
Subject: RE: C-08950 - On behalf of (b)(6); (b)(7)(C)

Jason,

Following up on our call today regarding the March 12, 2024 subpoena to (b)(6); (b)(7)(C) as we discussed we would like you to prioritize Requests 6 and 7, specifically related to the grant letter produced at (b)(6); (b)(7)(C) and Requests 3 and 8. For Request 8, we are happy to receive proposed search terms and to scope the "Ethereum Foundation" to mean officers, directors and employees of the Foundation for purposes of this Request. Also as discussed, we would be open to receiving a proffer regarding (b)(6); (b)(7)(C) role with respect to the Merge and EIPs listed in Request 2 as an initial response to see if we can narrow the scope of documents potentially responsive to this Request. Please let us know prospective dates for the proffer and when you anticipate making additional productions.

We appreciate your cooperation and are happy to have a call to discuss further after you've spoken with (b)(6); (b)(7)(C)

Thank you,

(b)(6); (b)(7)(C)

From: Gottlieb, Jason <jgottlieb@morrisoncohen.com>


Sent: Thursday, April 4, 2024 4:21 PM

To: (b)(6); (b)(7)(C) <(b)(6); (b)(7)(C)@sec.gov>; Upadhyaya, Vani T. <vupadhyaya@morrisoncohen.com>; Isaacs, Daniel C. <disaacs@morrisoncohen.com>

Subject: RE: C-08950 - On behalf of (b)(6); (b)(7)(C)

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(b)(6); (b)(7)(C) with apologies, I meant **Monday** at 11. Does that work? Thanks.

 **Jason Gottlieb**
Partner & Chair, Digital Assets; Chair, White Collar and Regulatory Enforcement
D 212.735.8837
jgottlieb@morrisoncohen.com
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From: Gottlieb, Jason

Sent: Thursday, April 4, 2024 4:20 PM

To: (b)(6); (b)(7)(C) <(b)(6); (b)(7)(C)@sec.gov>; Upadhyaya, Vani T. <vupadhyaya@morrisoncohen.com>; Isaacs, Daniel C. <disaacs@morrisoncohen.com>

Subject: RE: C-08950 - On behalf of (b)(6); (b)(7)(C)

(b)(6); (b)(7)(C) we're not available tomorrow, but, how about Tuesday at 11?

 **Jason Gottlieb**
Partner & Chair, Digital Assets; Chair, White Collar and Regulatory Enforcement
D 212.735.8837
jgottlieb@morrisoncohen.com
vCard | Bio | LinkedIn

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From: (b)(6); (b)(7)(C) @sec.gov>
Sent: Thursday, April 4, 2024 3:52 PM
To: Upadhyaya, Vani T. <vupadhyaya@morrisoncohen.com>; Isaacs, Daniel C. <disaacs@morrisoncohen.com>
Cc: Gottlieb, Jason <jgottlieb@morrisoncohen.com>
Subject: RE: C-08950 - On behalf of (b)(6); (b)(7)(C)

CAUTION: External sender. Verify before continuing.

Hi all,

I wanted to circle back on our discussion last week. Do you have some time tomorrow that would work for a call?

Thank you,

(b)(6); (b)(7)(C)

From: Upadhyaya, Vani T. <vupadhyaya@morrisoncohen.com>
Sent: Monday, March 25, 2024 10:00 AM
To: (b)(6); (b)(7)(C) @sec.gov>; Isaacs, Daniel C. <disaacs@morrisoncohen.com>
Cc: Gottlieb, Jason <jgottlieb@morrisoncohen.com>
Subject: RE: C-08950 - On behalf of (b)(6); (b)(7)(C)

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Thanks, I'll circulate an invite for 12pm today.

Best,



Vani T. Upadhyaya

Associate
she/her/hers

D 212.735.8827
vupadhyaya@morrisoncohen.com

[vCard](#) | [Bio](#) | [LinkedIn](#)

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909 Third Avenue, 27th Floor, New York, NY 10022-4784
212.735.8600 | morrisoncohen.com

From: (b)(6); (b)(7)(C) @sec.gov>
Sent: Monday, March 25, 2024 9:47 AM
To: Isaacs, Daniel C. <disaacs@morrisoncohen.com>
Cc: Gottlieb, Jason <jgottlieb@morrisoncohen.com>; Upadhyaya, Vani T. <vupadhyaya@morrisoncohen.com>
Subject: RE: C-08950 - On behalf of (b)(6); (b)(7)(C)

CAUTION: External sender. Verify before continuing.

Thanks, (b)(6), (b)(7)(C) Moving you to BCC.

Dan,

I'm free today at 12pm to discuss.

Thank you,

(b)(6), (b)(7)(C)

From: (b)(6); (b)(7)(C) <(b)(6); (b)(7)(C)@sec.gov>
Sent: Monday, March 25, 2024 9:43 AM
To: Isaacs, Daniel C. <disaacs@morrisoncohen.com>; (b)(6); (b)(7)(C) <(b)(6); (b)(7)(C)@sec.gov>
Cc: Gottlieb, Jason <jgottlieb@morrisoncohen.com>; Upadhyaya, Vani T. <vupadhyaya@morrisoncohen.com>
Subject: RE: C-08950 - On behalf of (b)(6); (b)(7)(C)

Hey Dan!

Hope you are all doing well too! I've copied my colleague (b)(6); (b)(7)(C) to take it forward from here.

(b)(6), (b)(7)(C)

From: Isaacs, Daniel C. <disaacs@morrisoncohen.com>
Sent: Friday, March 22, 2024 6:52 PM
To: (b)(6); (b)(7)(C) <(b)(6); (b)(7)(C)@sec.gov>
Cc: Gottlieb, Jason <jgottlieb@morrisoncohen.com>; Upadhyaya, Vani T. <vupadhyaya@morrisoncohen.com>
Subject: C-08950 - On behalf of (b)(6); (b)(7)(C)

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(b)(6), (b)(7)(C)

I hope all is well! We have been engaged as counsel for (b)(6); (b)(7)(C) in connection with the subpoena to (b)(6) in the above-referenced matter. We're getting up to speed, but were hoping to connect with you early next week to discuss (b)(6); (b)(7)(C) response.

Might Monday at 12pm ET work for you?

Have a great weekend.

Best,

Daniel C. Isaacs

Partner

D 212.735.8653
disaacs@morrisoncohen.com

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To: Jennifer Saunier [Jennifer.Saunier@Gesmer.com]
Cc: Michael Brier [Michael.Brier@Gesmer.com], Jazmin Scott [Jazmin.Scott@Gesmer.com]
From: (b)(6), (b)(7)(C)
Sent: 2024-04-30T18:50:07Z
Subject: RE: Correspondence Regarding Subpoena C-08950
Received: 2024-04-30T18:50:07Z

Thank you, Jenny.

From: Jennifer Saunier <Jennifer.Saunier@Gesmer.com>
Sent: Tuesday, April 30, 2024 2:48 PM
To: (b)(6), (b)(7)(C)@sec.gov>
Cc: Michael Brier <Michael.Brier@Gesmer.com>; Jazmin Scott <Jazmin.Scott@Gesmer.com>
Subject: RE: Correspondence Regarding Subpoena C-08950

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Hi (b)(6), (b)(7)(C)

I heard back from IT and they were able to convert the MBOX files to .eml files. I've asked Jazmin to upload the zipped file to Accellion tomorrow when (b)(6), (b)(7) back in the office.

Thank you,

Jenny

From: Jennifer Saunier
Sent: Monday, April 29, 2024 4:19 PM
To: (b)(6), (b)(7)(C)@sec.gov>
Cc: Michael Brier <Michael.Brier@Gesmer.com>; Jazmin Scott <Jazmin.Scott@gesmer.com>
Subject: RE: Correspondence Regarding Subpoena C-08950

Hi (b)(6), (b)(7)(C)

I'm checking with our IT department on your request. I'll get back to you as soon as I have an answer.

Thank you,

Jenny

From: (b)(6), (b)(7)(C)@sec.gov>
Sent: Monday, April 29, 2024 10:46 AM
To: Jennifer Saunier <Jennifer.Saunier@Gesmer.com>
Cc: Michael Brier <Michael.Brier@Gesmer.com>; Jazmin Scott <Jazmin.Scott@Gesmer.com>
Subject: RE: Correspondence Regarding Subpoena C-08950

Hi Jenny,

Thank you for resending the files, and apologies for the delayed response—I was out of the office last week. Our tech team has flagged that they're still running into an issue with these files. Are you able to provide these documents as PST files rather than MBOX?

Thank you,
(b)(6), (b)(7)(C)

From: Jennifer Saunier <Jennifer.Saunier@Gesmer.com>
Sent: Friday, April 19, 2024 4:42 PM

To: (b)(6); (b)(7)(C) Case 1:24-cv-01858-ACR Document 34-5 Filed 06/20/25 Page 380 of 672
Cc: Michael Brier <Michael.Brier@Gesmer.com>; Jazmin Scott <Jazmin.Scott@Gesmer.com>
Subject: FW: Correspondence Regarding Subpoena C-08950

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Good afternoon (b)(6); (b)(7)(C)

Attorney Brier asked me to look at the files you indicated below. I do not have the capability of opening MBOX files without IT, but I was able to open them as .txt files with no corruption indicated. They seem to be okay on our end. I've attached the text files and the original MBOX files here and I'll ask Jazmin Scott, cc'd here, to upload the MBOX files through Accellion on Monday.

Thank you,

Jenny

Jennifer (Carver) Saunier
Pronouns: she/her
Litigation Paralegal
GesmerUpdegrove LLP
40 Broad Street
Boston, MA 02109
(617) 350-6800

Web: www.gesmer.com

From: (b)(6); (b)(7)(C) <sec.gov>
Sent: Friday, April 19, 2024 3:00 PM
To: Michael Brier <Michael.Brier@Gesmer.com>
Cc: Jazmin Scott <Jazmin.Scott@Gesmer.com>
Subject: RE: Correspondence Regarding Subpoena C-08950

Mr. Brier,

Our CPU team has flagged a few files in the April 12 production that appear corrupted and we're unable to process. Are you able to reproduce the below files through Accellion to ENF-CPU copying me?

File Name	File Path
Ethereum Foundation To Non-Ethereum.org Emails--hyperledger-events@linuxfoundation.org-mtQTs-.mbox	\\TLF_Ethereum Foundation Subpoena Response\TLF_Ethn Subpoena Response\Google Email - Non-Ethereum.org addresses\To\Ethereum_Foundation__To_Non-Ethereum.c
Ethereum Foundation From nonethereum.org Emails--hyperledger-events@linuxfoundation.org-8DDySV.mbox	\\TLF_Ethereum Foundation Subpoena Response\TLF_Ethn Subpoena Response\Google Email - Non-Ethereum.org addresses\From\Ethereum_Foundation__From_nonethereu
To-From Ethereum.org--hyperledger-events@linuxfoundation.org-iH_yTK.mbox	\\TLF_Ethereum Foundation Subpoena Response\TLF_Ethn Subpoena Response\Google Email\To-From_Ethereum.org

Thank you,
(b)(6); (b)(7)(C)

From: Michael Brier <Michael.Brier@Gesmer.com>

To: (b)(6); (b)(7)(C) @sec.gov

Cc: Jazmin Scott <Jazmin.Scott@Gesmer.com>

Subject: RE: Correspondence Regarding Subpoena C-08950

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

FYI, I understand that my assistant has been having some trouble logging into the account, which is now locked. It is possible we might not be able to figure out how to get the documents uploaded before the weekend.

Michael Brier
Partner
GesmerUpdegrove LLP
40 Broad Street
Boston, MA 02109
(617) 350-6800

www.gesmer.com

From: (b)(6); (b)(7)(C) @sec.gov

Sent: Friday, April 12, 2024 11:50 AM

To: Michael Brier <Michael.Brier@Gesmer.com>

Subject: RE: Correspondence Regarding Subpoena C-08950

Thank you, Michael. I'll send you an email from Accellion, which is our secure file sharing platform. It will prompt you to create an account, which you can use to send the production.

Please let me know if you run into any issues.

Thank you,

(b)(6);
(b)(7)(C)

From: Michael Brier <Michael.Brier@Gesmer.com>

Sent: Friday, April 12, 2024 11:47 AM

To: (b)(6); (b)(7)(C) @sec.gov

Subject: RE: Correspondence Regarding Subpoena C-08950

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Dear (b)(6); (b)(7)(C)

The Linux Foundation is nearly ready to make a production in response to the subpoena. I understand that you can provide us with an FTP link for uploading the documents. Please send one over when you have the chance.

Michael Brier
Partner
GesmerUpdegrove LLP
40 Broad Street
Boston, MA 02109
(617) 350-6800

www.gesmer.com

From: (b)(6); (b)(7)(C) @sec.gov

Sent: Thursday, March 28, 2024 5:38 PM

To: Michael Brier <Michael.Brier@Gesmer.com>

Subject: RE: Correspondence Regarding Subpoena C-08950

Thank you for your email and update on the subpoena response. With respect to the communications with the Ethereum Foundation, we are aware that the Foundation uses the "@ethereum.org" email domain.

I don't believe we have a standard procedure that we can recommend for collection of documents beyond our data delivery standards. However, if you are running into a specific issue, I can see if our technical support team is able to advise.

Please let me know if it would be helpful to have a call to discuss.

Best,

(b)(6);
(b)(7)(C)

From: Michael Brier <Michael.Brier@Gesmer.com>

Sent: Wednesday, March 27, 2024 1:44 PM

To: (b)(6); (b)(7)(C) <[sec.gov](mailto:(b)(6);(b)(7)(C)@sec.gov)>

Subject: Correspondence Regarding Subpoena C-08950

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Dear (b)(6); (b)(7)(C)

I represent the Linux Foundation in connection with Subpoena C-08950. I understand that the subpoena was directed to my partner Andy Updegrave at the foundation's offices in San Francisco. However, Andy is outside counsel at my firm (Gesmer Updegrave) in Boston, which caused some confusion and the resulting delay in our getting in touch with you.

In any event, Linux Foundation is now in the process of searching for documents responsive to the subpoena. One question we had pertains to Request No. 6, which seeks production of all communications with the Ethereum Foundation relating to the Merge or the Beacon Chain (as further defined in the subpoena). As the foundation is unaware of individuals who are affiliated with the Ethereum Foundation beyond the three listed on its website, we are wondering if there are communications with any other person that you are looking for here.

Also, apparently the Linux Foundation uses Gmail as its email service, which will complicate extracting the information you are looking for. If there is any procedure you typically use when dealing with Gmail communications, please feel free to share it with me and I will forward it to the foundation.

Thank you for your attention.

Michael Brier

Partner

GesmerUpdegrave LLP

40 Broad Street

Boston, MA 02109

Direct: (617) 531-8352

Web: www.gesmer.com

Electronic mail from Gesmer Updegrave LLP, 40 Broad Street, Boston, MA 02109. Voice: (617) 350-6800, Fax: (617) 350-6878. This communication is intended only for the use of the individual or entity named as the addressee. It may contain information which is privileged and/or confidential under applicable law. If you are not the intended recipient or such recipient's employee or agent, you are hereby notified that any dissemination, copy or disclosure of this communication is strictly prohibited. If you have received this communication in error, please immediately notify Christopher O'Sullivan at (617) 350-6800 and notify the sender by electronic mail. Please expunge this communication without making any copies. Thank you for your cooperation.

To: lamele, Stacy [Stacy.lamele@cfraresearch.com]
From: Hartz, Dana M
Sent: 2022-07-28T19:29:27Z
Subject: RE: Crypto Webinar from David Holt
Received: 2022-07-28T19:29:27Z

~WRD000.jpg

Stacy,
Thanks for passing this on. Is that something that anyone interested can attend? Thanks, Dana

From: lamele, Stacy <Stacy.lamele@cfraresearch.com>
Sent: Thursday, July 28, 2022 2:45 PM
To: Hartz, Dana M (b)(6) SEC.GOV>
Subject: Crypto Webinar from David Holt

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Hi Dana,
Hello! I hope you are having a good summer. Please feel free to pass this invitation along to the group that David presented to on Crypto Mining. He is hosting an update in August with our new partners at Washington Analysis (policy research). Here is a quick overview of the Washington Analysis service:

Washington Analysis is a top-rated independent institutional research firm focused on anticipating and analysing changes in public policy that will impact the financial markets. WA specialize in identifying risks and opportunities (L/S) across asset-classes and sectors, emanating from Courts, Congress, and Regulators, at both the state and federal level. They have been at the forefront of analysis at the intersection of geopolitics, public policy and regulatory impact on investors and financial markets for over 40 years, and have been closely following the situation in Ukraine.

Best,
Stacy
From: CFRA <communications@cfraresearch.com>
Sent: Thursday, July 28, 2022 10:08 AM
To: lamele, Stacy <Stacy.lamele@cfraresearch.com>
Subject: CFRA Webinar: Crypto Market Outlook in Second Half 2022

www.cfraresearch.com Email not displaying correctly? [View it in your browser.](#)

Crypto Market Outlook in Second Half 2022

Please join CFRA for our upcoming complimentary webinar-
Date: Thursday, August 18, 2022
Time: 11:00 AM ET | 8:00 AM PT | 4:00 PM BST

[Crypto Market Outlook in Second Half 2022](#)

With some of the hot air now taken out of digital assets – is it time to take a closer look, or is the crypto winter here to stay?

Join **CFRA's Senior Analysts John Sonsalla** and **David Holt**, who will blend cryptocurrency views through a policy and fundamental lens to help investors cut through the noise, manage risk, and assist in their investment decision-making. During this

During this session, we will cover:

- Deciphering Washington – separating near-term headwinds from long-term tailwinds
- Prospects for meaningful policy changes (e.g., spot Bitcoin ETF, stablecoin regulation) that will reshape the investment landscape
- Policy implications for issuers, miners, exchanges, and the traditional financial sector
- The driving forces (i.e., macro and asset-specific factors) behind recent bouts of volatility
- Key events (i.e., Ethereum Merge) to monitor that potentially drive outperformance (or underperformance) in the coming months
- General market and fundamental backdrop of equities to gain exposure based on risk tolerance

Presented by:

Ken Leon, Moderator, Director of Equity Research

John Sonsalla, Head of Strategy and Senior Financial Services Analyst

David Holt, Senior Equity Analyst

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12300 Twinbrook Parkway

Suite 510

Rockville, MD 20852



To: lamele, Stacy [Stacy.lamele@cfraresearch.com]
From: Hartz, Dana M
Sent: 2022-07-29T15:03:37Z
Subject: RE: Crypto Webinar from David Holt
Received: 2022-07-29T15:03:37Z

Stacy,
If you could provide me the replay link after the session that would be wonderful and I'll share it with the team for those who could not attend the live event.
Thanks!
Dana

From: lamele, Stacy <Stacy.lamele@cfraresearch.com>
Sent: Friday, July 29, 2022 9:50 AM
To: Hartz, Dana M (b)(6) SEC.GOV>
Subject: RE: Crypto Webinar from David Holt

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To register, you do need to put in your personal information. If you would rather not have them do that, I can provide a link to the replay after the event.

From: Hartz, Dana M (b)(6) SEC.GOV>
Sent: Friday, July 29, 2022 9:22 AM
To: lamele, Stacy <Stacy.lamele@cfraresearch.com>
Subject: RE: Crypto Webinar from David Holt

Hi Stacy,
I did send the information on to the relevant staff. Must they register and share personal information to attend or is there a way to review it without providing personal information?
Thanks.

Dana
From: lamele, Stacy <Stacy.lamele@cfraresearch.com>
Sent: Thursday, July 28, 2022 3:43 PM
To: Hartz, Dana M (b)(6) SEC.GOV>
Subject: RE: Crypto Webinar from David Holt

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Yes, it is open to anyone. Thanks.
From: Hartz, Dana M (b)(6) SEC.GOV>
Sent: Thursday, July 28, 2022 3:29 PM
To: lamele, Stacy <Stacy.lamele@cfraresearch.com>
Subject: RE: Crypto Webinar from David Holt

Stacy,
Thanks for passing this on. Is that something that anyone interested can attend? Thanks, Dana

From: lamele, Stacy <Stacy.lamele@cfraresearch.com>
Sent: Thursday, July 28, 2022 2:45 PM
To: Hartz, Dana M (b)(6) SEC.GOV>
Subject: Crypto Webinar from David Holt

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Hi Dana,
Hello! I hope you are having a good summer. Please feel free to pass this invitation along to the group that David presented to on Crypto Mining. He is hosting an update in August with our new partners at Washington Analysis (policy research).
Here is a quick overview of the Washington Analysis service:
Washington Analysis is a top-rated independent institutional research firm focused on anticipating and analysing changes in public policy that will impact the financial markets. WA specialize in identifying risks and opportunities (L/S) across asset-classes and sectors, emanating from Courts, Congress, and Regulators, at both the state and federal level. They have been at the forefront of analysis at the intersection of geopolitics, public policy and regulatory impact on investors and financial markets for over 40 years, and have been closely following the situation in Ukraine.

Best,
Stacy

www.cfra.com

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Crypto Market Outlook in Second Half 2022

Please join CFRA for our upcoming complimentary webinar-

Date: Thursday, August 18, 2022

Time: 11:00 AM ET | 8:00 AM PT | 4:00 PM BST

[Crypto Market Outlook in Second Half 2022](#)

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- Deciphering Washington – separating near-term headwinds from long-term tailwinds
- Prospects for meaningful policy changes (e.g., spot Bitcoin ETF, stablecoin regulation) that will reshape the investment landscape
- Policy implications for issuers, miners, exchanges, and the traditional financial sector
- The driving forces (i.e., macro and asset-specific factors) behind recent bouts of volatility
- Key events (i.e., Ethereum Merge) to monitor that potentially drive outperformance (or underperformance) in the coming months
- General market and fundamental backdrop of equities to gain exposure based on risk tolerance

Presented by:

John Sonsalla, Head of Strategy and Senior Financial Services Analyst

David Holt, Senior Equity Analyst

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To: Barbon, Andrea (b)(6)@unisg.ch]
From: Kozhanov, Igor
Sent: 2022-08-20T18:58:11Z
Subject: Re: CEBRA 2022 - Latest version of our paper
Received: 2022-08-20T18:58:11Z

- [image001.png](#)
- [image002.png](#)
- [image003.png](#)
- [image004.png](#)
- [image005.png](#)
- [image006.png](#)
- [image007.png](#)
- [Barbon and Ranaldo 19-08-2022.pdf](#)

Thanks, Andrea!

Unfortunately, in the SEC, I need to clear my slides for any outside talks and I already prepared my slides and they are going through the clearance process. Apologies if my slides would be stale because they are based on the old version. However, I will review your new version next week and provide any additional feedback verbally at the conference.

Regards and see you in Barcelona,
Igor

On Aug 20, 2022, at 10:09 AM, Barbon, Andrea (b)(6)@unisg.ch> wrote:

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Dear Igor,
me and my co-author A. Ranaldo recently revised our paper on DEXs.
You can find the latest version attached to this email.
Looking forward to meeting you in Barcelona and to hear your discussion!

Andrea Barbon
Assistant Professor of Finance

School of Finance
University of St.Gallen (HSG) – Dufourstrasse 50 – 9000 St.Gallen

T (b)(6)
(b)(6)@unisg.ch – [unisg.ch](#) – [Campusplan](#)

To: Harrington, James (b)(6) [redacted]; Hansen, Philip (b)(6) [redacted]; Millman, Philip (b)(6) [redacted]; Bloch, David (b)(6) [redacted]; Nigro, Daniel
Lars (b)(6) [redacted]; Bloch, David (b)(6) [redacted]; Millman, Philip (b)(6) [redacted]; Millman, Philip (b)(6) [redacted]
From: Nigro, Daniel
Sent: 2022-08-23T12:38:31Z
Subject: Markets Daily: Wall St. Swings From Greed to Fear Before Jackson Hole; Saudis Make a Push for \$100 Oil; Nat Gas Trades at Equiv. of \$470/barrel Oil in Europe
Received: 2022-08-23T12:38:31Z
[Wall Street Bears Fight Back After \\$7 Trillion Rally - Bloomberg MLIV Pulse.pdf](#)
[Hedge Funds Build Up Big Short Betting on Hawkish Jackson Hole.pdf](#)
[Home Sellers Are Slashing Prices in Former Pandemic Boomtowns.pdf](#)
[Saudi Arabia Makes a Push for \\$100 Oil.docx](#)
[Law360 Expert Anaysis - Takeaways For Broker-Dealers After SEC's Reg BI Action - 08-22-2022.pdf](#)
[Eurozone Recession Fears Increase.docx](#)
[Ignites - SRI Robos Are Pricier – But Not Much More Sustainable - 08-23-2022.pdf](#)

Wall St Breakfast Summary: Futures are wavering after Wall Street suffered its worst selloff in months. Business activity in Europe and Japan fell in August, according to new surveys, pointing to a sharp slowdown in global economic growth. Oil prices are rising after Saudi Arabia's energy minister said that a recent bout of volatility may push the OPEC+ oil cartel to curb production. Manufacturing data and new-home sales figures will arrive later in the morning. [Read our live markets coverage here.](#)

Wall Street Swings From Greed to Fear as the Fed's Message Sinks in (Barron's) Investors who felt the pain of the worst trading day for months might feasibly ask what changed. The 1.9% retreat in the Dow Jones Industrial Average and 2.6% slide in the Nasdaq Composite can be explained by the realization that equities ran ahead of themselves in the hope that inflation had topped out and the Federal Reserve would soften its stance on interest rate rises. What has not changed is the insistence from Fed officials that there is more work to be done. Traders are betting this hawkish tone will color Fed chairman Jerome Powell's Jackson Hole speech on Friday, neutralizing the optimism divined from last week's Federal Open Market Committee minutes. The prospect of narrowing the disconnect sent the CBOE Volatility Index, Wall Street's fear gauge, to its highest level for a month while the 10-year Treasury yield closed above 3% for the first time since June. The 2-year yield is even higher, a sign of looming recession. Inflation is digging in around the world. As a net exporter of liquefied natural gas, the U.S. does not have the same pressure on energy prices that could send U.K. inflation as high as 19% early next year. But Saudi Arabia comments that oil output could be cut after recent price declines is bad news for U.S. motorists who have seen some respite at the pumps. Despite Monday's sell-off, the Dow is only back to where it stood on August 8, and the Nasdaq has reversed its climb by an extra week. As the strong dollar threatens to crimp corporate earnings, there is danger of further falls. Markets can only hope that what Powell says is not as bad as feared. At least now they are listening.

Saudi Oil Minister Prince Abdulaziz bin Salman thinks similar dynamics may be happening in the crude industry. "Thin liquidity and extreme volatility" in the futures market are moving prices in ways that do not conform to normal supply and demand factors, which may spark OPEC+ to take action. The Saudi-led group could tighten production when it meets next month, doing a U-turn after reversing all of the cuts made during the COVID-19 pandemic. **On the move:** Crude oil futures have slumped 27% since mid-June amid concerns about the global economy, surging shipments from Russia and the possibility of more Iranian oil coming back online in the event of a nuclear deal. The WTI benchmark even recently fell under \$90 per barrel, but pared losses following the Saudi prince's comments. "The paper and physical markets have become increasingly more disconnected," Abdulaziz bin Salman declared, adding that forces which "undermine the stability of oil markets will only strengthen our resolve." Efficient price discovery is absent without sufficient liquidity, making it challenging for physical users to handle the costs of hedging or deal with fundamental risk. "Soon we will start working on a new agreement beyond 2022," he continued, without giving further details. **At issue:** "This vicious circle is amplified by the flow of unsubstantiated stories about demand destruction, recurring news about the return of large volumes of supply, and ambiguity and uncertainty about the potential impacts of price caps, embargoes, and sanctions. In a way, the market is in a state of schizophrenia, and this is creating a type of a yo-yo market and sending erroneous signals at times when greater visibility and clarity and well-functioning markets are needed more than ever to allow market participants to efficiently hedge and manage the huge risks and uncertainties they face."

Futures at 8:35, Dow & S&P flat Nasdaq +0.1%. Crude +1.2% to \$91.47. Gold -0.2% to \$1745.40. Bitcoin +1.3% to \$21,451. **Ten-year Treasury Yield** +4 bps to 3.06%

BMO Commentary: The selloff in Treasuries has been maintained with 10-year yields slightly above the 3.0% mark while the front-end of the curve remains under significant pressure. The combination of supply and the looming hawkish commentary from Jackson Hole have provided the most compelling trigger for the bear flattening – neither are trends to fade until the events are realized. A solid concession for this afternoon's 2-year auction is already in place; although there is room for the cheapening to extend ahead of the \$44 bn sale at 1pm. The supply itself won't provide a sufficient impetus for a reversal of the weakness; even if pushing 2-year yields beyond 3.45% will become increasingly difficult until investors have the Chair's official commentary on Friday morning. While we're anticipating a version of 'sell the rumor buy the fact' as it relates to Powell's expected hawkishness – the buy signal won't be the Jackson Hole comments but rather any follow-on selloff they trigger. The underlying assumption being that the Fed needs to err on the side of signaling a more aggressive stance to keep 75 bp in play. Investors are cognizant that at some point the hiking cadence will slow; however, given the 64.5 bp of hikes currently priced in for

next month, the Committee may find it prudent to tighten as much as the market will allow. 65-70 bp of hikes priced in is more than sufficient cover for the Fed to execute on 75 bp. Of course, there remains the August NFP and CPI reads with which to contend; even if the latter is more relevant given July's strong jobs report. Payrolls will be a tradable event next week to be sure, although an uptick in the UNR would be welcomed by monetary policymakers as opposed to a traditionally troubling event. The 75 bp question ultimately comes down to how consumer prices behaved this month. RBOB is below 300, but not at the lows – a dynamic that suggests there will be less drag created by fuel costs and therefore a somewhat 'cleaner' read on the inflation landscape.

Our read ahead of Jackson Hole is that the bar is relatively low for the Fed to move 75 bp again in the event of a positive CPI print. That said, Powell may choose to update the market's understanding of the Committee's reaction function to realized inflation data on Friday; effectively signaling that the official read in July was the beginning of a trend rather than potentially just a one-off. We're not anticipating such a transition in guidance from Powell; although it should be on the radar as a risk – an eventuality that would trigger a bull steepening. A reprieve from the bear flattening currently underway is our baseline scenario for Friday; albeit one born of technically extended selling in the front-end of the curve as opposed to a fundamental shift in Fed messaging.

It certainly isn't lost on us that US monetary policy continues to tighten even as recession jitters abroad have intensified. Overnight the PMI series showed disappointment in the service sectors for Germany, France, and the overall Euro-zone – a sentiment that will make this morning's US PMIs incrementally more relevant. The dollar remains on a decidedly bullish trajectory with the DXY at the highest level since June 2002 and for the Euro to reach parity now requires it to rally. While the strength in the dollar will offset the risk the US is faced with imported inflation (good for Powell's agenda), the extremes are increasingly cause for concern for nations with dollar currency pegs – whether explicit or implied. As it becomes more expensive to defend currency valuations, the prospects for defaults increase. An isolated credit event won't deter the Fed, however any resulting contagion into credit markets more broadly would tighten financial conditions sharply and complicate Powell's objectives significantly. Admittedly, this has been a risk throughout the hiking cycle. Nonetheless, as dollar strength would only be exaggerated by a hawkish Jackson Hole showing, we're anticipating the foreign exchange market will remain topical as the week unfolds with a backdrop of uncertainty for the global economic outlook.

Tactical Bias: It was a milestone Monday in Treasuries as 10s returned to the land of the 3-handle for the first time since July 21st as the bear flattening setup for this week's auctions as well as Powell's Friday speech extended. While the psychological weight of the handle change was always going to be significant, the true level to beat is an isolated yield high from mid-July at 3.097%. We're content to look there as support ahead of Jackson Hole as the true dip buying test, and especially given the risk of lighter trading volumes in the run up to the event itself, we won't stand in the way of an extension of the selloff just yet. 5s/30s' flattening through 6 bp also came with a cross in daily stochastics and particularly if we see more pronounced positioning for a hawkish Fed symposium, a return to inversion is very much on the table over the balance of the week.

Supply kicks off on Tuesday with the \$44 bn 2-year auction that will serve as a gauge of primary market appetite for the front-end following the latest leg of the repricing and event risk posed by Jackson Hole. Our concern on Treasuries ahead of Powell's speech on Friday is most poignant in the front-end of the curve, if only given that Powell reiterating a commitment to rate hikes and an emphasis on data dependence will add to the pressure we have seen on yields early in the week. This need not necessarily take the form of an indication of a 75 bp hike vs. a 50 bp one in September, but rather any communication from Powell (or another Fed speaker) that once terminal is achieved, rates will be on hold in restrictive territory throughout the entirety of 2023. This, in contrast to the futures market that is pricing some probability of rate cuts in the middle of next year, holds negative implications for the 2-year sector even after the solid selloff that pushed 2s through 3.33% on Monday. The true bearish line in the sand to beat is 3.452%, which is the cycle-high, and while not necessarily a zone that will be traded through on Tuesday, this remains a level to target.

Five of the last seven 2-year auctions have stopped through, and the fact that the offering will likely be the highest yielding since 2007 bodes well for dip buying interest to emerge and take advantage of the liquidity point. Indeed, last month's auction stopped through 0.9 bp at yields ~35 bp lower than current valuations, and this surely reflects some Jackson Hole discount. Within the details of July's result we saw domestic investment funds took down 60.3% of the auction in a dynamic that has proved throughout 2022. On six-month moving average basis, we have seen domestic buyers' allocation climb to 61.5% -- the highest on record using data back to 2008 and a testament to the fact that even as overseas participants have moderated their interest in Treasuries, domestic buyers have stepped up to fill that gap in demand. Especially following the downtrade on Monday, we think the first auction of the week should see good demand.

Along with supply and the new home sales data, tomorrow's PMI releases will contribute to the debate between 50 bp and 75 bp at the September meeting. Following July's CPI and PPI reads, the peak inflation narrative has gained traction and especially ahead of August's ISM releases, we'll be eager to see how this may have buoyed sentiment as the month gets underway. In terms of the price action, following the selloff through 3% 10s, even after momentum has moved into oversold territory, we will be mindful of how any strength in the S&P PMIs could add to a bearish setup for Jackson Hole in the event market participants remain reluctant to step in front of the selloff. - Ian Lyngen and Ben Jeffery

Wall Street Bears Fight Back After \$7 Trillion Rally: MLIV Pulse (Bloomberg, attached) Fed is years away from meeting its inflation target, survey of market participants shows.

- Position set to benefit if Powell rules out dovish pivot
- Shorts triple in a month even as market sees rate cuts in 2023

America's Office Glut Started Decades Before Pandemic (WSJ) Federal tax breaks dating to the Reagan years, and low interest rates, spurred developers to build too many office towers

As Crypto Slumps, Goldman Sachs Aims for a Wall Street Built on Blockchain (WSJ) Goldman, JPMorgan are already processing some trades using the technology behind cryptocurrency markets

Endless Demand Spurs U.S. Natural-Gas Prices to Shale-Era Highs (WSJ) Heating-season gas futures double last winter's price; analysts see even higher prices ahead. Prices have broken \$10/MCF in the US. **Natural Gas traded yesterday at the equivalent of \$470/barrel of oil in Europe.**

Weekly U.S. natural-gas inventories versus rolling five-year average



Saudi Arabia Makes a Push for \$100 Oil: Elements by Javier Blas (Bloomberg, attached) Prince Abdulaziz bin Salman says 'cutting production at any time' is an option.

Home Sellers Are Slashing Prices in Former Pandemic Boomtowns (Bloomberg, attached) Redfin found that 70% of homes for sale in Boise, Idaho, had their price cut in July, the highest share of 97 metros.

Euro trades at two-decade low against the dollar. And some think it could slide much further (CNBC, Ling Yu) The euro fell to a two-decade low of 0.9903 against the U.S. dollar.

FT - Eurozone Recession Fears Increase as Business Activity Declines (attached, Ling Yu)

Shrinking Deficits Cushion Fed's Retreat From Markets (WSJ) Some analysts had wondered if stocks and bonds would be hammered by the reversal of stimulus. The opposite has happened, though it's early yet

What Ethereum's Big 'Merge' Means in Crypto Land (WSJ) The crypto platform is prepping for a major systems overhaul that could, among other things, make it more energy efficient

Law360 - Takeaways For Broker-Dealers After SEC's Reg BI Action (attached, Ling Yu)

FT/Ignites: SRI Robos Are Pricier – But Not Much More Sustainable (attached, Ling Yu) Socially responsible investing portfolios within robo-advisors cost an average of 22 basis points, or nearly four times as much as the average standard portfolio.

CREDIT DAYBOOK AMERICAS: Credit Fear Gauge Trades Tighter (Bloomberg) -- Risk appetite is improving with a gauge of credit risk opening slightly tighter on Tuesday as investors prepare for Federal Reserve Chair Jerome Powell's Jackson Hole speech Friday. Banks meanwhile are getting creative with how they carve up risky buyout debt.

- The spread on the Markit CDX North American Investment Grade Index, which rises with increased credit risk, tightened by about three quarters of a basis point to about 84.2 basis points at 7:24 a.m. in New York
 - The spread had jumped more than 7 basis points in the last two trading sessions
- Traders are bracing for hawkish talk at the Jackson Hole event after recent comments from Federal Reserve officials convinced many investors the central bank will continue to tighten aggressively into a slowing economy
- Global banks stuck with \$80 billion in unappealing M&A financing debt are trying new tactics to find buyers such as slicing the debt in the private-equity buyout of Citrix Systems into smaller pieces to attract a wider pool of investors
 - Euro debt is being added to some financing packages, as in the case of ETC Group's takeover
- Leveraged loan secondary prices fell following a deepening rout in stocks and other corners of credit. Average leveraged

- o The index had been trading above 95 cents for almost two weeks, having fallen to as low as 91.75 cents in July
- The Alternative Reference Rates Committee is calling on market participants to fill out a survey about plans to move to alternative rates, such as the Secured Overnight Financing Rate, or to update fallback language. Responses are due by Sept. 7
- Rogers Communications is seeking approval from investors holding \$9.35 billion of bonds to extend the deadline to complete its acquisition of Shaw Communications

[US HY OPEN: Junk Bonds Suffers Worst Losses in Two Months](#) (Bloomberg) -- The US junk bond market was pummeled after a six-week rally as yields jumped to near 8% Monday following the biggest one-day increase in more than two months as investors get ready for Federal Reserve officials to reiterate that the bank was determined to tame inflation even if it meant sacrificing economic growth at the Jackson Hole symposium this week. US junk bonds suffered the worst rout in two months, with a loss of 0.88%. The losses extended across the high-yield market, with CCCs suffering the most posting a loss of 0.97%.

- The market convulsions began last week after Federal Reserve minutes acknowledged the risks from the central bank tightening more than necessary. The losses accelerated this week ahead of the annual Jackson Hole retreat
- Cautious investors retreat and pull cash out of the US high-yield funds after flooding the asset class with cash for four straight weeks
 - o The two big junk bond ETFs, HYG and JNK, reported a combined outflow of more than one billion on Monday amid a broader risk-off move
 - o US high yield funds, including ETFs, estimate an outflow of nearly \$2b at Friday's close, JPM wrote, citing Refinitiv
- The primary market has wound down for the rest of August as summer lull comes to an end. The market will return after Labor Day
- The rally that began in July and extended into the first two weeks of August faded away around the middle of last week after a chorus of Federal Reserve officials reiterated their resolve to continue rate hikes and traders raised tightening wagers for other major central banks
 - o Kansas City Fed President Esther George said the US central bank had already "done a lot" on raising interest rates while her St. Louis colleague James Bullard backed another 75 basis-point move next month
- Single B yields rose the most in two months to close at 8.18% after steadily rising for five consecutive sessions. The index posted the biggest one-day loss in two months
 - o BBs posted a loss of 0.83%, also the most one-day loss in two months. Yields climbed 20 bps to 6.47% after rising for five successive sessions
- The risk-off mood may be on hold. US equity futures rose cautiously on Tuesday as markets remained on edge ahead of the Jackson Hole central bankers' symposium later this week

[STRUCTURED PIPELINE: Pair of ABS Price; Another Recovery Bond](#) (Bloomberg) -- Newtek and Research-Driven Pagaya Motor Asset Trust priced US ABS on Monday to bring YTD volume to approximately \$203.1 billion, according to data compiled by Bloomberg News. A recurring revenue ABS from Golub Capital Partners is on tap for later this week while Oklahoma Development Finance Authority may begin pre-marketing a recovery bond.

- A GCAT RMBS backed primarily by non-owner occupied properties and loans that were underwritten to agency guidelines was also priced on Monday

[DISTRESSED DAILY: Diamond Sports Bets Big on New Streaming App](#) (Bloomberg) -- Debt-laden Diamond Sports Group LLC is pinning its future on its direct-to-consumer streaming service, Bally Sports+. The unit of Sinclair Broadcast Group paid around \$140 million of interest to its bondholders on Aug. 15, and should have enough liquidity to ride out the launch of the service on Sept. 26, according to Bloomberg Intelligence analyst Philip Brendel. The company's next coupon payment, due in February, looks less clear, Brendel wrote in a note Monday. "Absent a profoundly robust launch of its DTC product in the fall, Diamond may pursue a comprehensive restructuring ahead of its next coupon in February," Brendel wrote, adding that the company also has "significant" rights obligations in early 2023. Diamond installed a new five-member board of directors earlier this year as a condition of closing a new \$635 million credit line to help fund the streaming launch. The board will likely "act quickly" to explore M&A or bankruptcy options if Bally Sports+ is "anything but a clear success," according to the note. The company, which owns and operates the rights to 45 US professional sports teams for roughly the next nine years, has some \$8.8 billion of debt and an annual interest expense of more than half a billion dollars, more than its operating cash flow. Diamond Sports notes trade at deeply distressed levels. Its 5.375% note due 2026 changed hands Monday at 20 cents on the dollar, according to Trace.

- DATA POINTS

Read more: [Bausch Bonds Hit Record Low After Company Reports Asset Transfer](#)

- QUOTABLE
- "Revlon stock trading has all the outward appearances of a so-called 'meme' stock."

- READING LIST
 - News, research and insight relevant to distressed investing
- Carestream Health Files Voluntary Chapter 11 Petitions in US
- Bausch Health Transfers About 38.6% of Shares to Subsidiary
- 3M Awaits Bankruptcy Ruling That Could Sink Litigation Tactic
- Cineworld Says It Considers Filing for Bankruptcy in the US

Daniel J. Nigro

Sr. Specialized Examiner/U.S. Securities and Exchange Commission

100 Pearl St., Suite 20-100, New York, NY 10004-2616

(O) (b)(6) (M) (b)(6)

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afford to be anything other than hawkish. There was once a time when payrolls held the potential to serve as an inflection point in the US rates market, but the current backdrop means even a sizable disappointment would be dismissed as "just one month", while another strong read would give the Fed more cover to deliver another 75 bp hike.

The October fed funds futures contract is trading with a 3-handle as the follow through to Jackson has left a three quarter point move nearly fully priced. Had this been the case in the wake of the September 13th release of August's CPI data, another 75 bp move would be all but a forgone conclusion. Said differently, we expect that the Committee will take the opportunity presented by the market in terms of delivering the largest hike possible. If we see 50-60 bp of tightening priced in the lead up to the meeting, a 50 bp realized hike would be the path of least resistance. Conversely, as was the case with June's 'surprise' upsized rate move, any market pricing that nears 75 bp would be viewed as permission for Powell to deliver. On the issue of a 100 bp hike, given the official commentary on the issue we anticipate a move of that scale is off the table, although given CPI falls within the Fed's pre-meeting communication moratorium, it would not be out of the question to see market pricing of some probability of an even more outsized move.

Returning to the price action this morning in outright yield terms, the scale of the bearishness has thus far been contained, although that does not preclude a move through the most recently set yield high of 3.126% in 10s. By no means does this ensure a break of that level will be elusive in what promises to be late-summer trading conditions with limited conviction and choppy price action ahead of NFP. In terms of levels beyond that freshly established yield high, there is little of note until 3.26% that was a local yield high in this cycle, and also the twice-challenged line in the sand that marked the twin peaks in 2018. Running counter to the potential for further bearishness is the still-overdone momentum backdrop as well as the proximity to month-end. The refunding month duration needs associated with the calendar turn will additionally help contain any larger selloff, and advocates for a short-term dip buying bias ahead of the unofficial conclusion to summer.

While NFP will always be the data highlight of the week, let us not forget the deluge of other fundamental updates that will inform the setup to payrolls. This morning's Dallas Fed read will contribute to the theme of sliding sentiment within regional manufacturing surveys, but more market moving will be Tuesday's look at Conference Board Consumer Confidence that takes on a heightened relevance. Recall Friday saw headline University of Michigan Confidence revised up while inflation expectations fell further from the peaks in a solid indicator of the Fed's goal to bring down the expectation of consumer prices. Admittedly, gas prices deserve some of the credit for this pullback, but we'll be eager to see how this materializes in Tuesday's Conference Board measure. Historically it has been the labor market that is most relevant for the Conference Board series, so even after July's slide in the headline outlook, we suspect August will see comparatively little downside in the outlook on the household level. Alas, on a summer Monday with little of top tier relevance on the data front, we'll look to cross asset correlations and the price action itself to offer the most topical guidance in the low conviction conditions.

HIGHLIGHTS FROM THE LYNGEN US RATES WEEKLY: In the week ahead, the Treasury market will consolidate further with a flattening bias into the payrolls report. As an astute client observed following this morning's headlines, 'Powell throws in the towel – at Jackson Hole'. In retaining the Fed's hawkish stance, the Chair implicitly acknowledged having mischaracterized inflation as a temporary influence resulting from pandemic specific distortions and is now playing catch-up to get policy rates higher in an effort to reestablish credibility as an inflation fighter. An alternative outcome would have been any sign of caution about the performance of the real economy – which was decidedly not on offer in Wyoming. Instead, the takeaway was that the Committee is on course to deliver rate hikes at each of the three remaining meetings in 2022. In keeping with expectations, the Fed commentary has emphasized the need to keep rates in restrictive territory for an extended period of time. Read: Terminal for longer than seen during prior cycles.

As a stable policy rate in 2023 is one of the 'surprise' potentials for the next 18 months, we're encouraged to see the Fed has formerly introduced that into the conversation with market participants. In part, by stressing the potential to hold terminal for an atypically long period, the Fed is pushing back against the market pricing in cuts in mid-2023; needless to say, Powell's efforts have been successful with July 2023 fed fund futures only slightly inverted versus April. Venturing further out the futures curve, January 2024 still indicates investors are looking for more than 25 bp of cuts next year – although the key is that the pivot continues to move further out on the macro horizon. We're content to assume that this will be the prevailing dynamic throughout the balance of 2022; although our confidence in a soft landing remains low. This stems largely from the fact the Fed is not only behind the curve, but also cognizant that there is much credibility rebuilding to be done. It's not a policy error if Powell knows a recession will be required to anchor inflation expectations.

The remaining questions are how bad and when? For now, investors are left to watch the incoming data for any indication the prior hikes are beginning to create significant headwinds to growth and, more importantly, the trajectory of hiring. It's this backdrop that enhances the relevance of Friday's employment report. The current consensus is for a 300k NFP print and an unchanged unemployment rate at 3.5% -- goldilocks by any other name. Anecdotal evidence that labor shortages have peaked and momentum in the jobs market has waned have yet to translate into the BLS data – at least outside of the household jobs numbers. Given the strong July NFP and the fact UNR is tied with February 2020 as the lowest since 1969, it's difficult to envision a print weak enough to impact the Fed's near-term tightening decision.

Despite, or perhaps based on, Powell's observation that the size of the September rate hike will be based on the 'totality' of the economic data, the decision between 50 bp or 75 bp will come down to the August CPI release. A moderate increase in headline and core will clear the path for the FOMC to deliver another 75 bp hike; certainly, an acceleration of inflation will accomplish the

same end. Only in the case of another benign read on consumer prices comparable to July's CPI/PCE would one expect the Fed to downshift to a half-point. The extent to which the market prices in 75 bp will also be influential. All else being equal, if investors give the Fed the green light on 75 bp, the Committee will follow-through as it would provide the opportunity to further catch up to the realized inflation prints already seen in 2022. The prospects for retesting -58 bp in 2s/10s remain high and Jackson Hole only served to galvanize this call.

The firstly monthly decline in headline PCE since April 2020 was overshadowed by the proximity to Powell's speech, but the update on the Fed's preferred inflation measure added to the peak inflation narrative as another data point that supports the thesis of moderating supply side issues and increasing influence of the Fed's tightening. The consistent theme of the latest round of Fed rhetoric is that along with realized inflation, containing inflation expectations is of paramount importance from monetary policymakers' perspective. In this context the drop in the U Mich inflation expectation measures is encouraging, as is the pullback in breakevens – a move we are on board with from both a fundamental and technical perspective. In terms of the charts, the rejection of the 100-day moving average on a closing basis combined with the cross in the stochastics adds a near term bear case for breaks with support not until the 74-day moving average at 2.531% with the more realistic level to beat being a volume bulge wrapped around 2.45%.

2022 has seen a breakdown of the traditional relationship between risk assets and Treasuries – it has been a bearish year for both stocks and bonds. As for what will change this behavior, we are of the opinion it will ultimately need to be the passage of time and some official commentary indicating the Fed is nearing terminal that will allow good news to once again be good for equity valuations. We expect we will first need to see greater progress into restrictive territory and Powell begin to entertain the notion of less hawkishness before we start to see bonds rally in response to the expectation for less aggressive tightening, or a shorter period on hold before policy easing needs to make its way into the discussion. This is especially salient ahead of next week's payrolls report as another strong read akin to the July figures would only entrench 75 bp (and higher terminal) expectations, while a single month of slower hiring from such a strong outright departure point would only cement the onus on the September 13 release of CPI to determine the size of the next rate raise. - Ben Jeffery and Ian Lyngen

Powell Says Fed Must Show Resolve in Fighting Inflation (WSJ) Fed chairman tells central bankers: 'We must keep at it until the job is done'

Powell Must Reinforce His Words With Actions: Bill Dudley (Bloomberg, attached) The Federal Reserve chair finally got his message across. Now comes the hard part.

Inflation Eased in July, According to the Fed's Preferred Measure (WSJ) Pace of consumer price gains slowed, though it stayed near a four-decade high

Fed's Tough Talk Could Be Transitory (WSJ) Fed chief Jerome Powell's hawkish tone at Jackson Hole sent stocks tumbling, but inflation could ease and the economy soften before rates rise aggressively

A Different Take on the U.S. Economy: Maybe It Isn't Really Shrinking (WSJ) Gross domestic income, an alternative to gross domestic product as a measure of output, points to a stall instead of a recession

Investors Ramp Up Bets Against Stock Market as Summer Rally Fizzles (WSJ) Net short positions against S&P 500 futures have recently grown, reaching levels not seen in two years

FT - Shell chief warns Europe's energy crisis will last more than one winter (attached, Ling Yu) Boss of oil and gas giant says region may have to prepare for several years of *rationing*

American Real Estate Was a Money Launderer's Dream. That's Changing (NYT, attached)

Bitcoin Back Down Below \$20,000 as Hawkish Fed Weighs on Crypto (Bloomberg, attached)

- Cryptocurrencies fall along with stocks, equity futures
- Strategists see June low of around \$17,600 as key defense area

FT - Companies attack Texas over 'politicised' ESG blacklist (attached, Ling Yu)

FT - Inside Missfresh's hunt for investor cash ahead of collapse (attached, Ling Yu) Fundraising deals struck right before the Chinese delivery start-up's NASDAQ IPO have become the focus of investor lawsuits

Share price (\$)

Source: S&P Capital IQ
© FT

SEC Commissioner Uyeda Calls for Less Secrecy in Whistleblower Awards (Bloomberg, attached)

- Caps on the largest awards are no longer available
- Changes also will help whistleblowers get rewarded for helping other agencies

Law360 - Whistleblower Attorneys Cheer SEC's Tipster Rule Reboot (attached, Ling Yu) One of the 2020 amendments would have given the SEC discretion to limit the size of large award payouts, and the other would have precluded the agency from making awards in certain so-called "related actions" brought by other law enforcement and regulatory authorities

Ryan Cohen's Bed Bath & Beyond Stock Sales Highlight Gray Area in Disclosure (WSJ) The investor might have run afoul of disclosure guidelines in his surprise stock sale, but securities lawyers said regulatory action against him appears unlikely

Law360 - Whistleblower Says Contractor Defamed Him Over SEC Award (attached, Ling Yu)

Credit Investors See Wider Spreads Coming After Powell Speech (Bloomberg, attached)

CREDIT DAYBOOK AMERICAS: Credit Risk Climbs; New Deals Stall (Bloomberg) -- A key measure of credit risk, the investment-grade CDX, opened wider Monday after Federal Reserve Chair Jerome Powell's hawkish remarks in Jackson Hole on Friday. New deals in both the high-grade and high-yield markets will be rare this week leading up to the Labor Day holiday.

- The spread on the Markit CDX North American Investment Grade Index, which declines as credit risk drops, widened 2.31 basis points to 88.3, the highest since July 26, as of 7:23 a.m. New York time
 - The Markit CDX North American High Yield Index price, which rises as credit risk declines, fell 0.6 points to 99.4
- Issuance in the high-grade market is expected to be light this week, when traditionally new deals are rare ahead of the US Labor Day holiday
 - New junk bond and leveraged loan deals are also expected to stay paused this week, with the chance of a few small deals
 - Activity in all markets is expected to be back full force after Labor Day
- Rogers Communications' request to extend a deadline, from Aug. 31 to December 2023, to buy back \$9.35 billion of bonds may succeed as a challenge from members of an investor group appears to lack the support needed to derail it
- 3M's plan to use controversial bankruptcy rules to shield itself from some 230,000 lawsuits over military earplugs has failed and now the company may be looking at a settlement process
- UBS has been dropped from the underwriting ranks of a municipal-bond deal that Laredo, Texas, plans to sell next week after state Comptroller Glenn Hegar included the bank on a list of firms he deems "boycott" the fossil-fuel industry
- Carvana aims to price a bond backed by prime auto-loan cash flows this week after saying it would rely more heavily on whole loan sales during the third quarter
- Option-adjusted spreads on US Investment-Grade bonds widened 1 basis point to 137 basis points over Treasuries in the past week, according to the Bloomberg US Corporate Investment Grade index
- US credit ratings deteriorated last week as the main ratings companies issued 30 downgrades and 17 upgrades

US HY OPEN: CCCs Defy Mood to Head Toward Best Credit Gains (Bloomberg) -- CCCs, the riskiest of junk bonds, so far are posting gains for the second consecutive month, bucking a trend of modest losses across the US high yield market. Their month-to-date return is at 1.65%. US junk bonds dipped as stocks plunged more than 4% last week, the biggest weekly drop in more than two months, after Federal Reserve Chair Powell's widely anticipated policy speech at the Jackson Hole symposium. He reiterated that the Fed will keep raising interest rates to stamp out inflation and rejected the idea the central bank may soon reverse course. Read more: Powell Talks Tough, Says Rates Likely to Stay High for Some Time

- US junk bond yields rose just 8bps on Friday to close at a four-week high of 8.01%. The weekly increase was 28bps, the smallest weekly surge in eight weeks

- Spreads rose 6bps to +452. They have tightened 17bps month-to-date as 5-year US Treasury yields jumped 52bps for the same period
- Junk bonds are showing resilience. Still, Bob Michele of JPMorgan Asset Management said on Bloomberg TV last week that credit spreads aren't adequately pricing in recession risk
 - Spreads could reach around 600bps again by year end, and widen to as much as 750bps next year, Michele said

Read more: Top Central Bankers Deliver Hawkish Message at Jackson Hole

- James Bullard of St. Louis Federal Reserve has said he likes the idea of front-loading to lift the benchmark to a 3.75%-4% range by year-end
- The primary market will remain closed for the rest of August. Meanwhile, Nielsen Holdings, began tendering for existing bonds ahead of an expected sale of leveraged loans and junk debt to help fund the acquisition of the US TV ratings business
- The US high yield market could see a sudden surge in risk premium as US equity futures tumble, with the selloff deepening as European Central Bank policy makers joined their Fed counterparts in signaling aggressive tightening

STRUCTURED PIPELINE: Carvana, OneMain May Sell Debt This Week (Bloomberg) -- The US ABS market will see debt sales this week even as new corporate-bond issuance is largely stalled until after the US Labor Day holiday on Sept 5. Carvana issued guidance for a \$367.3 million prime auto loan ABS that's expected to price this week. OneMain Financial, meanwhile, started pre-marketing a \$500 million consumer-loan ABS and is expected to formally kick off marketing for the deal early this week. The debt sales come as issuance in the US junk-bond market screeched to a halt and investment-grade corporate bonds saw two blank sessions to end last week.

- AB Private Credit Investors priced a \$397.9 million middle- market CLO via SocGen on Friday
- Capital Four US Inc. priced a \$396.9m static new issue CLO via JPMorgan late last week
- Park Capital Management filed an ABS-15G for a potential RMBS issuance

Structured Highlights:

- **STRUCTURED WEEKLY: CMBS Money Is Pouring Into Florida Offices**
- MBS Traders Relieved Powell Speech Omits Balance Sheet Talk: FHN

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To: Melissa Montanez [melissa@coindesk.com]
From: Dent, Denene
Sent: 2022-09-07T21:35:42Z
Subject: RE: CoinDesk TV Media Request X Hester Pierce X July 28th at 9:00 AM ET
Received: 2022-09-07T21:35:42Z

Hi Mel, the commissioner is not available to discuss this topic.

Thanks,

Denene I. Dent

Confidential Assistant

Office of Commissioner Hester M. Peirce (pronounced "purse")

(b)(6)@sec.gov

From: Melissa Montanez <melissa@coindesk.com>

Sent: Friday, September 2, 2022 11:41 AM

To: Dent, Denene (b)(6)@SEC.GOV>

Subject: Re: CoinDesk TV Media Request X Hester Pierce X July 28th at 9:00 AM ET

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Hi Denene,

I hope that all is well! The team and I would love to see if we could have Hester join us to discuss the Ethereum Merge. I can be reached at (b)(6) for additional details.

Thanks,

Mel

Mel Montanez

Senior Booking Producer CoinDesk

Mobile: (b)(6)

On Mon, Aug 1, 2022 at 1:25 PM Dent, Denene (b)(6)@sec.gov> wrote:

Dear Mel, I have been advised by commissioner's counsel that Commissioner Peirce cannot comment on this topic or talk about individual entities, rumors of ongoing enforcement actions, or related topics.

Respectfully,

Denene I. Dent

Confidential Assistant

Office of Commissioner Hester M. Peirce (pronounced "purse")

(b)(6)@sec.gov

From: Melissa Montanez <melissa@coindesk.com>

Sent: Wednesday, July 27, 2022 1:35 PM

To: Dent, Denene (b)(6)@SEC.GOV>

Subject: Re: CoinDesk TV Media Request X Hester Pierce X July 28th at 9:00 AM ET

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Could Aug 8th, 9th and 10th at 9:00 am et work?

Mel Montanez

Senior Booking Producer CoinDesk

Mobile: (b)(6)

On Wed, Jul 27, 2022 at 1:32 PM Dent, Denene (b)(6)@sec.gov> wrote:

Dear Melissa,

The commissioner is not available to participate July 28 and 29 due to prior engagements.

Denene I. Dent

Confidential Assistant

Office of Commissioner Hester M. Peirce (pronounced "purse")

(b)(6)@sec.gov

From: Melissa Montanez <melissa@coindesk.com>

Sent: Tuesday, July 26, 2022 8:27 AM

To: Dent, Denene (b)(6)@SEC.GOV>

Subject: CoinDesk TV Media Request X Hester Pierce X July 28th at 9:00 AM ET

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hi Denene,

I hope that all is well! The team and I would love to have you join us for a LIVE segment on July 28th at 9:00 AM ET to discuss the recent Coinbase news:

<https://blog.coinbase.com/coinbase-does-not-list-securities-end-of-story-e58dc873be79>

This would be a quick 5-10 minute segment with host Christine Lee, Lawrence Lewitinn and Emily Parker. I can be reached at (b)(6) for additional details.

Thanks,

Mel

Mel Montanez

Senior Booking Producer CoinDesk

Mobile: (b)(6)

To: Cynthia Baughman [cbaughman@proshares.com]
From: Rosenberg, Michael
Sent: 2022-09-13T13:21:11Z
Subject: RE: ProShares Ether Strategy ETF - Draft Prospectus
Received: 2022-09-13T13:21:11Z

Why don't you send it since you know who from your end can attend.

Thanks,
Michael

From: Cynthia Baughman <cbaughman@proshares.com>
Sent: Monday, September 12, 2022 6:15 PM
To: Rosenberg, Michael [REDACTED]@SEC.GOV>
Subject: Re: ProShares Ether Strategy ETF - Draft Prospectus

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does 10:30 Wednesday work? Would you send a link for Zoom / WebEX or should we do it in our end?

thanks

Cyndie.

Cynthia Baughman | Director, Counsel

ProShares | ProFunds
+12404976580 DIRECT | ProShares.com | ProFunds.com
Proshare Advisors LLC | 7272 Wisconsin Avenue | 21st Floor | Bethesda, MD 20814-6527

From: Rosenberg, Michael [REDACTED]@SEC.GOV>
Sent: Monday, September 12, 2022 5:36 PM
To: Cynthia Baughman <cbaughman@proshares.com>
Subject: RE: ProShares Ether Strategy ETF - Draft Prospectus

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Hi Cyndie,

Let me know what time works for you. On our side it will be me and Jennifer McHugh. Right now we have time tomorrow from 11-1 or on Wednesday 10-11 or 1-2:30.

Michael

From: Cynthia Baughman <cbaughman@proshares.com>
Sent: Monday, September 12, 2022 1:03 PM
To: Rosenberg, Michael [REDACTED]@SEC.GOV>
Cc: Richard Morris <rmorris@proshares.com>; Kristen Freeman <kfreeman@proshares.com>; McHugh, Jennifer B. [REDACTED]@SEC.GOV>; Spratt, Michael J. [REDACTED]@SEC.GOV>
Subject: ProShares Ether Strategy ETF - Draft Prospectus

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Michael,

I'm forwarding the below message along on behalf of Kristen. If you have any questions, please reach out to me so I may coordinate a meeting to discuss.

Thank you,

Cyndie.

As a follow up to our discussion earlier this year, I am reaching out to you about the Ether Strategy ETF registration statement that ProShares withdrew at your request back in August 2022. As you may be aware, the Ethereum Merge is anticipated to occur next week. Once the Merge is complete, we would like to re-file the Ether Strategy ETF and begin the formal process of registering the Fund.

We have updated the registration statement to reflect the impact of the Merge on Ethereum and to incorporate the Staff's comments on the ProShares Bitcoin Strategy ETF, including to align the Fund's investment strategy with the Staff's view that "clean" futures exposure provides greater investor protection. As noted previously, an ether futures ETF will operate in the same manner as a bitcoin futures ETF and raises substantially similar issues. Given the successful launch and subsequent successful operation of the ProShares Bitcoin Strategy ETF, we would like to re-file with this revised strategy and move forward with this product. With this in mind, we have attached a draft Prospectus for your consideration.

We would like to file on September 16th promptly following the planned Merge.

Additionally, we believe we can successfully address the questions and concerns the Staff may raise in connection with launching an Ether Strategy ETF. In particular, during the review process for the ProShares Bitcoin Strategy ETF, the Staff raised several questions about market capacity and price impact, liquidity, fund investment capacity, fund operations during distressed market conditions, and the arbitrage mechanism. We believe the attached data supports the proposition that an Ether Strategy ETF should

Cynthia Baughman | Director, Counsel

ProShares | ProFunds

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Proshare Advisors LLC | 7272 Wisconsin Avenue | 21st Floor | Bethesda, MD 20814-4802

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From: Wells, Michael D.
Location: Microsoft Teams Meeting
Importance: Normal
Subject: Accepted: FW: Today at 11 - Session re the Ethereum Merge
Start Date/Time: 2022-09-15T16:00:00Z
End Date/Time: 2022-09-15T17:00:00Z

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From: Nigro, Daniel
Sent: 2022-09-28T12:57:38Z
Subject: Markets Daily: BOE Warns of "Material Risk to Financial Stability" - Steps Into Gilt Market to Avoid Cash Crash; UST Market Rallies, Futures Rise - Will Global Turmoil Slow Demand Enough to Reduce Fed Actions?
Received: 2022-09-28T12:57:38Z
[The Unease You Feel Is the Fed Pushing a Recession.pdf](#)
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[Stock Bear Market Will Get Whole Lot Worse When Credit Cracks.pdf](#)
[FT -Why the strength of the dollar matters - 09-27-2022.pdf](#)
[Bullard Leads Fed Speakers Pushing Hikes, Defending Credibility.pdf](#)
[FT -Bank of England warns of 'material risk' to financial stability as it intervenes in gilt market - 09-28-2022.pdf](#)
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[FT - IMF urges UK to 're-evaluate' tax cuts in biting attack on fiscal plan - 09-27-2022.pdf](#)

Wall St. Breakfast Summary: Futures are wavering after Treasury yields climbed above 4% for the first time in more than a decade. U.S. government-bond yields have been rising at their [fastest pace in four decades](#) on expectations that persistent inflation will push the Federal Reserve to [lift interest rates](#) higher for longer. The rising yields have lifted borrowing costs for everyone—and made a mess of the stock market this year. But Wednesday's climb above 4% reversed somewhat after the Bank of England said it would [postpone the beginning of planned bond sales](#) and begin buying long-dated government debt in a bid to ease market dysfunction. The British pound is slipping after the IMF [took a swipe](#) at the new Conservative government's economic plans.. [Read our live markets coverage here.](#)

FT - Bank of England warns of 'material risk' to financial stability as it intervenes in gilt market (attached, Ling Yu) Emergency action follows sell-off in UK government bonds. Thousands of pension funds have faced urgent demands for additional cash from investment managers in recent days to meet margin calls, after the collapse in UK government bond prices blew a hole in strategies to protect them against inflation and interest-rate risks.

BOE Acted Amid Concern Cash Calls Today Would Trigger Gilt Crash (Bloomberg) The Bank of England's decision to announce unlimited and immediate purchases of long-dated bonds was prompted by fears that collateral calls as soon as Wednesday afternoon could trigger a further crash in gilts, according to a person familiar with policy makers' decision making. The Bank had been warned by investment banks and fund managers in recent days that the collateral requirements could create a situation in which forced selling drove up the yield on UK debt, the person said, asking not to be named discussing the central bank's deliberations.

Bank of England to Buy Bonds in Bid to Stop Spread of Crisis (WSJ) U.K. central bank is launching an effort to restore order to the market for gilts

Backdrop: Gilt yields were on track for their sharpest monthly rise since at least 1957 after Prime Minister Liz Truss unveiled her so-called "mini-budget." The plan included sweeping tax cuts for individuals, businesses and house purchases, while subsidizing soaring energy costs. The Treasury even forecast that it would wipe £45B off government revenues over the next five years, sending shock waves through financial markets. "Were dysfunction in this market to continue or worsen, there would be a material risk to U.K. financial stability. This would lead to an unwarranted tightening of financing conditions and a reduction of the flow of credit to the real economy," the Bank of England said in a statement. "In line with its financial stability objective, the BoE stands ready to restore market functioning and reduce any risks from contagion to credit conditions for U.K. households and businesses."

Go deeper: In a rare rebuke of a G7 country, the IMF is urging Truss to "re-evaluate" the tax cuts, warning that the new measures are likely to fuel a cost-of-living crisis. "Given elevated inflation pressures in many countries, including the U.K., we do not recommend large and untargeted fiscal packages at this juncture, as it is important that fiscal policy does not work at cross purposes to monetary policy. Furthermore, the nature of the UK measures will likely increase inequality." In case investors didn't get the message yet, the "Fed put" has officially been retired. As Jerome Powell looks set on vanquishing soaring inflation and entrenched expectations, economic growth and hopes of a soft landing have been thrown into the back seat, with some arguing - maybe a bit too strongly. The crew at the central bank has even promised more rate hikes in November and December, after accelerating the unwinding of its balance sheet this month, and there are fears that the real effects could soon start rippling through the economy.

The latest: The 10-year Treasury climbed 4 basis points overnight to breach the key 4% level. The last time that happened was in 2008, at the height of the global financial crisis. It's even more astonishing when considering the pace of the yield's ascent, with the benchmark sitting at only 1.50% at the start of the year.

Everything bubble deflates: The Dow Jones slipped further into a bear market and the S&P 500 fell to its lowest level in almost two years on Tuesday, while the Nasdaq Composite inched higher, but is still off nearly 32% YTD. Meanwhile, home prices were shown to have fallen for the first time in a decade as demand gets dented amid soaring rates. In another indicator of the times, reports now suggest that Apple (AAPL) is pulling plans to boost production despite raising projections as it headed into the September launch event for the iPhone 14.

Futures at 8:50, Dow +.3%. S&P +.15%. Nasdaq -0.2%. Crude +1.7% to \$79.85. Gold +.5% to \$1645. Bitcoin flat at \$19,065. Ten-year Treasury Yield -8 bps to 3.85% VIX 32.95 +1%

On this day in 1987, the cover of *Fortune* magazine asked, "ARE STOCKS TOO HIGH?" The world's leading hedge-fund manager, George Soros, told the magazine that "while the market is already unstable and overvalued, it has not yet reached the point of collapse. Indeed, it could yet move much higher." Then again, it could move much lower: Just 14 trading days later, the stock market dropped by 23%.

BMO Commentary: 10-year yields made it above 4% and to their highest level since 2008 as the selloff in bonds continued overnight, until the Bank of England's surprise announcement that they will begin purchasing long dated UK bonds beginning today until October 14. The price action across markets this week always ran the risk of breaking something and given the BoE's rationale centered on restoring "orderly market conditions" we will point to the combination of the pound and gilts as the first thing to give way. The kneejerk rally in US 10s brought the benchmark swiftly back below 3.90% before rates bounced as the flight to quality impulse of the necessity for central bank support in one of the world's most developed markets benefited Treasuries across the curve. Away from sovereign debt markets explicitly, our concern surrounding the fallout of 4% 10s remains well intact, and especially as cracks begin to appear, we're wary that today could very well be a session during which the price action becomes self-fulfilling. In terms of levels to monitor from here in 10s, 4.015% is the new high yield print set overnight and a double top from 2008, and in the event we see the bid extend there is an opening gap from 3.713% to 3.685% that will be resistance.

Even following this morning's emergency announcement from London, 10-year gilts are still ~100 bp cheaper than they were on the day of the Bank of England meeting last week when the MPC delivered a 50 bp hike. In the wake of Britain's latest stimulative (read inflationary) fiscal announcement and the BoE's heretofore absent response, investors have taken the development as a license to sell. Over the past decade such increases in governmental borrowing had a far more benign effect on markets, so what has changed?

The short answer is inflation, and the impact that rising prices are having on both monetary policy and economic activity that now translate to a higher price tag following what had been an extended period of historically low rates and easy access to capital. This is true not only on the official side, but corporations as well, as debt taken on at far lower rates now needs to be refinanced at much higher rates. Over an extended time horizon, when combined with a more temperate consumption profile, this adds to our more cautious take on the economy. The crucial difference between gilts and Treasuries is that the latter benefits disproportionately from the dollar's status as the global reserve currency. This means that in times of stress and economic trouble, being long Treasuries remains prudent even with inflation running at a forty year high.

Returning to the domestic fundamentals, in the ongoing debate on inflation and state of growth as a whole, housing remains near the top of the list given the share of core-inflation that is accounted for by real estate. In Harker's (non-voter) speech on Wednesday the Philadelphia Fed President highlighted, "Shelter inflation, as it is known, is a major driver of the far-too-high inflation plaguing our country. Housing represents about a third of the value of the baskets of goods that the BLS examines when preparing the Consumer Price Index. For renters, shelter inflation measures both rent and utility payments. For homeowners, the BLS calculates what it would cost to rent a similar house. Inflation in other sectors of the economy are also drivers of inflation; if the cost of commodities like lumber rises, so does the cost of building a home. It's a feedback loop. Of course, inflation is far too high across most goods and services in our economy. But I find shelter inflation, along with food inflation, particularly alarming. Food and shelter are quite literally essential..." While clearly the signs of the impact of the Fed's tightening are already showing up in markets, it is precisely the risk of stickier inflation in the necessity categories that we expect will leave the Fed more resolute in retaining their restrictive stance. Not a dynamic that is going to dictate today's price action, but as the October 13th release of CPI approaches and the Fed's commitment continues to be debated, useful food for thought if nothing else.

Tactical Bias: Coming in from the overnight session into Tuesday morning it seemed as if Treasuries had cheapened sufficiently to elicit more substantial buying interest, that is until New York came online and the overnight opening gap in 10-year yields was quickly filled with follow on selling pressure once again pushing rates higher. Within the volatility, the heavy dose of economic data showed a mixed housing print, and consumer sentiment that improved this month despite the angst that is increasingly rippling through market. Wednesday will once again serve as a test of the staying power of 10s in this new higher rate plateau, and with stocks setting new lows and back to November 2020 levels, the only uncertainty of relevance in both equities and bonds is when currently sidelined cash begins to be deployed to take advantage of the current market discounts. Along with the psychological gravity of 4% 10s, that level is also a double top from 2009-2010, and even as momentum is decidedly oversold, a break there leaves little in the way of support until 4.103% that is a weekly high yield print from October 2008.

The final coupon auction of the week will be Wednesday's \$36 bn 7-year auction; 7s are rarely the marquee supply event, but in the current paradigm of scarce liquidity and thin trading, in one of the more illiquid points of the curve, the value of supply is enhanced. 7s are the latest benchmark to join the land of the 4-handle with yields reaching as high as 4.11% on Monday. This leaves Wednesday's auction as the highest yielding on record, and with rates at effectively their highest since 7s were reintroduced

in 2009, the outright level of rates should be enough to keep the result close to the screws.

Also on a relative value basis, the 5s/7s/10s cash butterfly has put in a solid cheapening effort and is back to nearly the top of its range which presents a compelling tactical buying opportunity as well. Recall August's 7-year auction stopped through an impressive 2.9 bp which was the largest since March 2020 and this is an encouraging anecdote given just a month ago 7s cleared at 3.13%. Of all this week's auctions, this leaves us most constructive on 7s of this week's auctions, although that certainly doesn't rule out a tail given current market conditions.

The 7-year auction will also contribute to the ongoing debate surrounding Japanese participation in Treasuries given that demand from Tokyo has historically played a more outsized role in 7-year auctions than other tenors. Especially following the MoF's intervention to support the yen last week, we're of the mind that the market has not yet reached the point when Japan once again returns as a buyer in the Treasury market. Questions on the path forward for the BoJ have once again resurfaced, and in the debate on the likelihood the weakness in JPY reverts, we recently fielded the inquiry on what an adjustment to Kuroda's yield curve control policy would mean for Treasury yields. In the kneejerk, the central bank allowing higher JGB rates would undoubtedly offer an additional bearish impulse for Treasuries, however as the market would recalibrate, there is actually a longer-term bullish case to be made as a stronger yen would actually help increase the appeal of Treasuries for overseas buyers. By no means is a policy shift from Kuroda our base case, but as the lone central bank holding in accommodative territory and especially as the fallout from the latest surge in yields starts to reverberate more significantly, this promises to be a space to watch.- Ben Jeffery and Ian Lyngen

FT: BOE Acted Amid Concern Cash Calls Today Would Trigger Gilt Crash (attached)

U.K. Seeks to Calm Investors Over Clash Between Inflation Fight and Truss Tax Cuts (WSJ) In the wake of a financial markets selloff, the government said it was working closely with the Bank of England

Worst Bond Rout in Decades Intensifies With UK Losing 27% (Bloomberg, attached)

- Global bond index posts longest string of declines since 2016
- UK tax cut plans trigger slump in sterling, selloff in gilts

A Credit Risk Gauge in Europe Just Surpassed Its Pandemic Peak (Bloomberg, attached)

- iTraxx Europe index spreads hit their highest level since 2012
- Level indicates concern over central bank, recession risks

FT - IMF urges UK to 're-evaluate' tax cuts in biting attack on fiscal plan (attached, Ling Yu) Multilateral lender warns 'untargeted' fiscal package risks stoking inflation

British Pound Falls Against Dollar After IMF 'Rebuke' (WSJ)

FT - 'Volatility vortex' slams into \$24tn US government bond market (attached, Ling Yu) Key measure of turbulence in Treasuries reaches highest level since 2020 coronavirus crisis *(Somebody call Matt Levine and tell him to end his pooh -poohing comments on bond market liquidity --- Dano)*

FT Opinion by Martin Wolf - Why the strength of the dollar matters (attached, Ling Yu) The financial tide is going out as a rising US currency has recessionary effects elsewhere

WSJ: Bonds are in the midst of one of their worst selloffs of the past century. Yields on 2 year and 10-year Treasuries are on pace for the biggest yield gains through the first three quarters of a year since 1981. The most popular options contract on Tuesday was a **put option tied to investment-grade corporate bonds**. The heavy activity shows that many traders are positioning for the recent bond selloff to continue.

Stock Bear Market Will Get Whole Lot Worse When Credit Cracks (Bloomberg, attached)

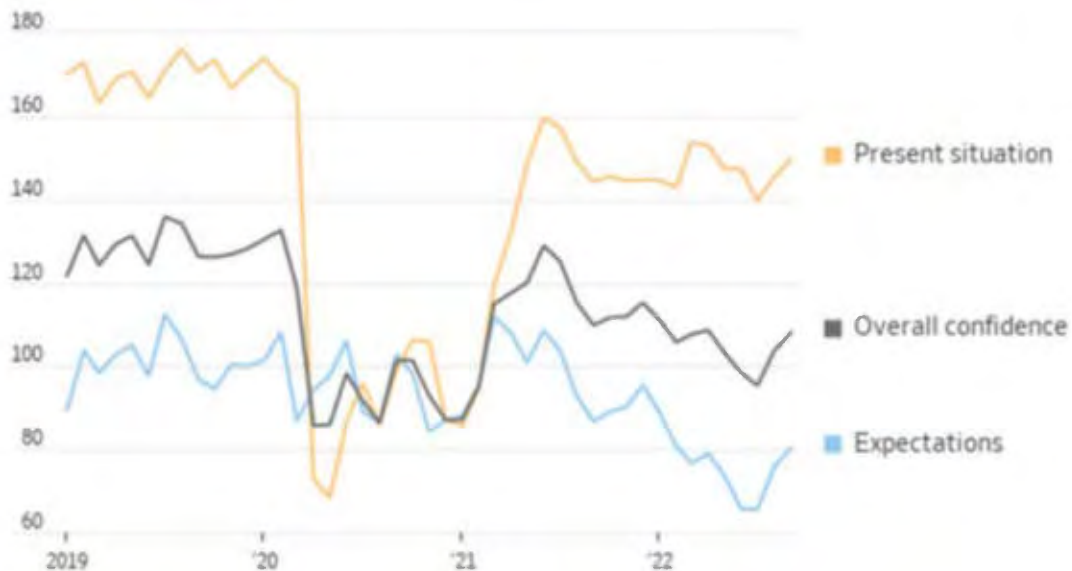
- High-grade US spreads have long way to widen if recession hits
- Credit repricing is another threat for stock traders: Boockvar

Bullard Leads Fed Speakers Pushing Hikes, Defending Credibility (Bloomberg, attached)

- St. Louis Fed chief wants rates held high for some time
- Chicago Fed's Evans, Kashkari in Minneapolis back rate hikes

The Unease You Feel Is the Fed Pushing a Recession: John Authers (Bloomberg, attached) There are increasing signs that inflation is abating, but the Fed seems determined to keep hiking despite the cost to the economy and jobs.

Consumer Moods Improved in September as Gasoline Prices Fell (WSJ) Separate reports showing a jump in new-homes sales and a pullback on orders for long-lasting goods offer mixed picture on demand



Note: Seasonally adjusted; 1985=100

Source: The Conference Board

[Wall Street to Pay \\$1.8 Billion in Fines Over Traders' Use of Banned Messaging Apps \(WSJ\)](#) Eleven banks and brokerages admit they violated rules that require storage of written communications. (Congratulations to Zach Sturges & Osman Nawaz of CFI for their work on a very important case)

[Ether Cryptocurrency Falls After 'Merge' Software Upgrade \(WSJ\)](#) Higher-risk financial assets seeing declines in wake of Fed raising interest rates

[The Earnings Crunch Is Only Just Getting Going \(WSJ\)](#) Corporate profits have actually held up pretty well so far this year. But it probably can't last.

[New Fed Working Paper May Explain Stubborn Labor-Market Mystery \(Bloomberg, attached\)](#) The research contains clues as to whether the US might avoid a deep recession.

[The Secret Sauce for Private Equity Runs Dry \(Bloomberg, attached\)](#) As banks cut funding and borrowing costs rise, investors question industry performance.

[Goldman Sachs Banks \\$9.7 Billion for Buyouts \(WSJ\)](#) The firm collected its largest private-equity fund since 2007 in a time of belt-tightening for investors

[Mortgage refinancing drops to a 22-year low as interest rates surge even higher \(CNBC, Ling Yu\)](#)

[CREDIT DAYBOOK AMERICAS: Issuers Look to Sell; Spreads Widen \(Bloomberg\)](#) -- Investment-grade issuers are once again looking for a window to sell new debt on Wednesday, as sales continue to lag behind estimates. High-grade spreads continue to widen and are nearing the July peak.

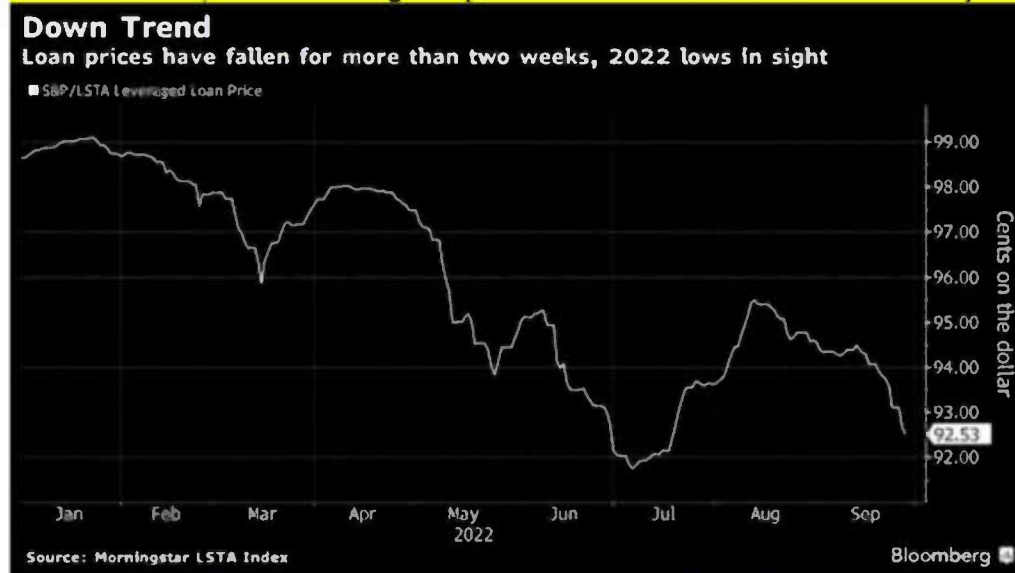
- The spread on the Markit CDX North American Investment Grade Index, which declines as credit risk drops, widened 1.96 basis points to 113.1 as of 7:18 a.m. New York time
- Issuers could come to market Wednesday, depending on market tone and backdrop
 - Only a pair of borrowers came to market Tuesday after a two-day hiatus, combining to sell \$1.1 billion
- Spreads widened seven basis points Tuesday to 155 basis points, only five basis points off the 160 peak seen in July
 - Earlier in the year, credit analysts and investors warned spreads reaching 150 basis points was a caution signal for credit markets
- Banks continue to market a \$2 billion leveraged loan offering to help fund Apollo Global Management's acquisition of telecom and broadband assets from Lumen Technologies
 - Commitments on the deal are due Thursday
- Wednesday marks the expiration date of Bausch Health's exchange offer of \$3.1 billion in unsecured debt to bring it one step closer to separating its eye care unit
- Treasury 10-year yields climbed above 4% to the highest level since October 2008, as investors were rattled by Federal Reserve hawkishness and concern over potential Japanese sales of US government debt.
- The surge in US Treasury yields will add to the refinancing burden of companies and push defaults higher in global credit markets, according to Chang Wei Liang, a macro strategist at DBS Bank

[US HY OPEN: Soaring Yields, Lack of Demand Stifle New Sales \(Bloomberg\)](#) -- US junk bonds plunged for the fourth straight session as yields headed toward 10% after a slew of Federal Reserve officials made clear their resolve to curb inflation, heightening worries of a recession. Sales of new junk bonds remain subdued. September volume is a modest \$9b, the lowest since 2011, as the rising cost of debt and a broader risk-off mood stifle supply. The long-awaited Citrix \$4b bond sale to fund its leveraged buyout is the

- The year-to-date tally of about \$87b is the lowest since 2008. The number of LBOs and strategic acquisitions has fallen, helping to make this quarter the worst since 2020 for supply. Deals agreed to in early 2022 face an uphill climb to complete funding
- **This week's sharp moves in the UK currency and bond markets are helping to fuel fears of a spike in default rates, as reflected in the high yield CDX plummeting to a more than two-year low**
- Junk bond yields rose across ratings, with CCC yields breaching the 15% level to close at a new 29-month high of 15.12% on Tuesday. They've risen for 11 consecutive sessions, the longest such streak since November 2015
 - Equities dropped to a near two-year low after falling for six sessions in a row, the longest losing streak since February 2020
 - Single B yields crossed the 10% level for the first time since March 2020. The yield rose to 10.06%
 - BB yields jumped to near 8% and closed at 7.81%, a new 30-month high, after rising for six successive sessions
- Market demand is shriveling
 - Investors pulled \$1.77b from the two big high-yield exchange-traded funds (ETFs) - HYG and JNK - since the Fed meeting on Wednesday through Tuesday's close
 - US high yield funds estimate an outflow of \$1.8b through Monday's close, JPMorgan wrote on Tuesday, citing Refinitiv Lipper
- Telecommunication-service provider Brightspeed is the sole borrower in the market this week. The roadshow for the \$1.865 billion 7-year secured bonds to fund Apollo's acquisition of Lumen Technologies' local exchange-carrier assets will close Sept. 28
- Early discussions have the bonds pricing at a discount to yield 10%; the coupon could be in the 8% range
- Telecom and cable analyst Davis Hebert at CreditSights wrote that the bonds are "unattractive at the price talk of 10% (OID \$92), given the significant risks." Even if the deal were sweetened with a bigger discount or more investor-friendly covenants, "the high execution risk and unknown sponsor intentions" were reason enough to steer clear
- Also, the terms of acquisition have drawn the ire of a group of existing bond holders who claim the financing terms would put one of its subsidiaries in default
- Read Apollo Debt Deal for Brightspeed LBO Has Creditors Crying Foul
- US equity futures are down. Earlier, futures strengthened after the BOE said it would postpone the beginning of its quantitative tightening bond sales, due to begin next week

US LEVLOANS DAILY: Loan Prices Near 2022 Lows as Selloff Extends (Bloomberg) US leveraged loan prices are within inches of this year's lows after more than two weeks of relentless declines. The selloff Tuesday was less brutal than the previous two days with average secondary loan prices down 0.15% to 92.53 cents. Still, they're getting closer to the lows of 91.75 cents reached in early July, according to the

Morningstar LSTA US Leveraged Loan Price Index, as recession fears continue to pressure risk assets. Prices have also partly fallen because banks have been forced to offload recent large deals, such as those for Citrix Systems Inc., at steep discounts in the low 90 cents range. A \$2 billion loan offering for Brightspeed, that has commitments due Thursday, is offered at 92 cents on the dollar. Clearing that deal -- as well as others yet to emerge such as Nielsen Holdings and Tenneco Inc. -- may help lend some support to secondary prices. "Once arrangers can work through the current backlog, we do expect lower levels of new underwriting activity during Q2/Q3 to positively impact market technicals as there will be limited new issue supply in the forward calendar," said Michele Cousins, head of leveraged capital markets in the Americas at UBS Group AG.



STRUCTURED PIPELINE: New ABS Deal Flow Light; Trio of CLOs Price (Bloomberg) -- New issue activity in the structured finance

Case 1:24-cv-01858-ACR Document 34-5 Filed 06/20/25 Page 410 of 672
markets remains on the lighter side as volatility grips broader financial markets, however, a trio of CLOs for Ballyrock, Monroe Capital, and Palmer Square were priced on Tuesday. YTD new issue CLO sales stand at approximately \$102 billion compared to \$128.2 billion at this time last year, according to data compiled by Bloomberg News. Imperial Funds also priced its latest non-QM RMBS.

- ABS deals began premarketing for Libra Solutions and Reach Financial. While activity remains light, a ton of filings remain in the queue
- Fitch and Moody's have also issued presale reports for the inaugural ABS trade from T-Mobile Financial
- A single-family rental trade from CoreVest was privately priced on Tuesday, but details were not made available

Structured Highlights:

- Atalaya Snaps Up Asset-Backed Securities in Consumer-Credit Bet
- BofA Strategists Shift Underweight CMBS as Powell Delivers Pain
- CMBS, CLOs Most Vulnerable to Downgrades in Recession, S&P Says

MBS DAILY: Mortgage Application Index Level Is Lowest Since 1999 (Bloomberg) -- The MBA mortgage applications index declined 3.7% in the week ended Sept. 23 after rising 3.8% in the prior week; index level of 254.8 lowest since 1999.

- Purchases were down 0.4% after rising 1.0% in prior week; down ~28.9% y/y
 - The average loan size for a purchase was \$411.7k
- Refis fell 10.9% after rising 10.4% in prior week; down 84.4% y/y
 - Refinancing comprised 30.2% of applications last week, with an average loan size of \$271.8k
- Avg. 30-yr fixed rate 6.52%, up from 6.25% in prior week and highest since Aug. 2008
- Refis 30.2% of loans versus prior week's 32.5%

NOTABLE NEWS

- The Fannie Mae 30-year current-coupon spread to the 5/10-year blend tightened 7 basis points on Tuesday to +168 as the U.S. Treasury 10-year yield rose 2 basis points to 3.95% and volatility rose
 - The spread decreased the most in more than seven weeks
 - Yields on Treasuries were the highest at least since January 2013
 - Volatility was the highest in more than two years
- The convexity profile of the broader market, as measured by a Bloomberg index, has been fundamentally transformed, according to a research note from Oppenheimer & Co.
 - As of Sept. 26, the agency mortgage market as measured by the Bloomberg MBS Index closed at a record OAC (option adjusted convexity) to Treasuries of +0.16
 - "Across the 431 product/coupon/vintage cohorts in the Index, 332 now trade to a positive OAC. These 332 cohorts represent 82.4% of the Index market value"
 - Data over the past five years shows the average OAC of the index at -1.39; currently the most negatively convex cohort in the index is the 2022 vintage 30Y Freddie Mac 5.5%, with an OAC of -1.01
 - "Relative value has shifted in favor of MBS and away from highly call protected assets such as DUS and Freddie K's"
- Bigger mortgage loans, along with the Fed's exit as the buyer of the weakest "worst to deliver" new issue supply, make prepayment protection in the specified pool market more attractive. The coming inclusion of specified-pool "cohorts" in the agency MBS index may increase trading and focus on the sector: Bloomberg Intelligence Erica Adelberg and Ira Jersey
- In addition to a negative home price appreciation (HPA) reading for July by CoreLogic and the American Enterprise Institute, home prices turned negative on a national basis, according to the FHFA and the S&P Case-Shiller Indices. The biggest impact of these declines may be on the Ginnie Mae (GNMA) side, writes Scott Buchta, managing director at Brean Capital
 - GNMA loan-to-values (LTV) are high to begin with and declining HPA would cause seasoning ramps to begin stretching out once again
 - "This is especially true for FHA to conventional and cash-out refis"
 - "We continue to stand by our earlier projections that HPA could fall by 3%-5% during the second half of this year, and 5%-10% from their peak levels over the next 12 months. This would put 2022 HPA in the 6%-8% range, which is still up 40% from where home prices were at the beginning of 2020, and +/-5% in 2023"
 - Affordability remains key constraint as the 325bps increase in primary rates has increased mortgage payments by 45% and reduced purchasing power for the marginal borrower by 31%; extended sell-off may easily push primary rates up to 7.00% or more
- MBS valuations are attractive as the sharp widening has pushed production coupon spread measures close to the widest levels, with the exception of Covid related widening, in the post financial crisis period, Citigroup analysts led by Ankur Mehta wrote in a Sept. 27 research note

- Technicals remain uncertain as marginal buyer remains elusive
- “We estimate REITs would have needed to sell roughly \$25 billion of agency MBS to keep their leverage unchanged given the recent move in rates/spreads. Fund redemptions have been muted so far but pose another risk to the basis in the short-term”
- Prefer FN 5.5s for long term investors
- US home loan costs continue to soar as the average contract rate on a 30-year fixed mortgage pushed north of 6.5% last week for the first time since 2008, risking a more pronounced downturn in the housing market
- The dollar rose to another record after the White House talked down the prospect of weakening the currency, while UK bonds surged after the Bank of England said it would buy long-dated government bonds in whatever quantities were needed to restore order to the market
- This week’s economic data includes Pending Home Sales later Wednesday (survey -1.5% m/m; -24.5% y/y), GDP Annualized q/q (survey: -0.6%) on Sept. 29 and PCE Deflator m/m (survey: 0.1%) and y/y (survey 6%) on Sept. 30

QUOTABLE

- “At the moment, just shy of 70% of all home owners pooled within UMBS 30-year mortgage bonds are at least 300 basis points out of the money. We do not foresee mortgage lending rates dropping back to the low 3% area any time soon, and if they do in the near-term that would probably mean we’d have bigger concerns on our hands than prepayment speeds” - Christopher Maloney, mortgage strategist at BOK Financial in a Sept. 27 note to clients

IN FOCUS

- Bloomberg US MBS index returned 0.6% on Tuesday and is down 14.24% YTD
 - Corporate index decreased 1.15% and has returned -19.16% YTD
 - US Treasuries returned -0.6% and have dropped 13.79% YTD
- The Bloomberg US MBS index excess return was -1.84%

DISTRESSED DAILY: Isagenix Cuts Forbearance Deal With Lenders (Bloomberg) -- Isagenix and a group of its term lenders reached a forbearance agreement, helping the supplement maker stave off a liquidity crisis stemming from falling sales. The supplement maker and a majority of its lenders cut a deal letting Isagenix delay interest and amortization payments on its loan in exchange for a 1.5% payment-in-kind fee, according to a person with knowledge of the matter who asked not to be named because the matter is private. The Gilbert, Arizona-based company announced the agreement Monday, without specifying terms. Isagenix, a multi-level-marketing company, has seen its sales slide amid increased competition, a smaller pool of sellers and higher costs, Moody’s Investors Service wrote in a note last week. “We are confident in the steps we’ve taken so far to further strengthen our balance sheet,” Isagenix’s Chief Executive Officer Sharon Walsh said in a statement. In April 2021, Isagenix repurchased a chunk of its term loan at around 65 cents on the dollar, a move credit graders called tantamount to default. The company has “high potential” for another distressed exchange given debt maturities it has due in 2023, according to Moody’s. Isagenix’s revolver, which had \$29 million in borrowings as of June 30, matures in June 2023. The company also has to fund about \$5 million in acquisition-related notes due in March and its term loan amortization over the next 12 months is \$18.8 million, Moody’s analyst Irina Lak wrote. The company had just \$19 million of cash on hand as of June. Representatives for Isagenix, Berkeley Research Group, O’Melveny & Myers and FTI Consulting Inc. either declined to comment or referred Bloomberg to the company’s previous statement. Isagenix’s term loan was last quoted around 42 cents, according to Bloomberg data.

• DATA POINTS

• QUOTABLE

- “The challenge going forward is getting reacquainted with a traditional credit cycle. Weaker corporate structures and a preference for spread over credit risk is likely to get tested.”

- Lale Topcuoglu, head of credit at Swiss Re AG, on what worries her the most in credit markets

• DEADLINES AND DOCKETS

- All times are U.S. Eastern unless specified and are subject to late revision or cancellation.

• Wednesday, Sept. 28

- Endo International, bankruptcy hearing, 10 a.m.
- SAS, bankruptcy hearing, 11 a.m.
- Hertz Global Holdings, bankruptcy hearing, 11 a.m.

• READING LIST

- News, research and insight relevant to distressed investing
- Rapid Meltdown of Avaya Loan Reveals Market’s Yield Hunt Risks
- Apollo- Backed Steel Mill Servicer Phoenix Files for Bankruptcy
- US Bankruptcy Tracker: Distressed Debt Back in Expansion Mode
- Celsius CEO Resigns as Bankrupt Crypto Firm Works to Survive

Daniel J. Nigro

Sr. Specialized Examiner/U.S. Securities and Exchange Commission

100 Pearl St., Suite 20-100, New York, NY 10004-2616

(O) (b)(6) (M) (b)(6)

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To: Tveiten-Rifman, Jennifer [JTveitenRifman@CFTC.gov]; Passman, Allison [APassman@CFTC.gov]
From: Diamantopoulos, Tina
Sent: 2022-10-14T16:59:11Z
Subject: RE: [EXTERNAL] RE: Speaker for Crypto Panel
Received: 2022-10-14T16:59:11Z

Fantastic! Thank you

From: Tveiten-Rifman, Jennifer <JTveitenRifman@CFTC.gov>
Sent: Friday, October 14, 2022 11:54 AM
To: Passman, Allison <APassman@CFTC.gov>; Diamantopoulos, Tina (b)(6) @SEC.GOV>
Subject: RE: [EXTERNAL] RE: Speaker for Crypto Panel

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It seems like I can edit the PDF, so I am adding Tina’s updated bio, my bio, and the new description and the first meeting date/time. I can send it to you after I get out of a meeting from Noon-1



Jennifer L. Tveiten Rifman
Special Counsel, *Division of Market Oversight*
Commodity Futures Trading Commission
(b)(6) mobile)
312-596-0618 (office)
JTveitenRifman@cftc.gov

From: Passman, Allison <APassman@CFTC.gov>
Sent: Friday, October 14, 2022 11:50 AM
To: Diamantopoulos, Tina (b)(6) @SEC.GOV>; Tveiten-Rifman, Jennifer <JTveitenRifman@CFTC.gov>
Subject: RE: [EXTERNAL] RE: Speaker for Crypto Panel

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Tina, happy for you to do the supervision group talk. If you don’t want to I’ll pull it off, just been super MIA but I think starting next week things will turn around and I may become human again. Fingers crossed.
Thanks for picking up everything and keeping it moving

From: Diamantopoulos, Tina (b)(6) @SEC.GOV>
Sent: Friday, October 14, 2022 9:35 AM
To: Tveiten-Rifman, Jennifer <JTveitenRifman@CFTC.gov>; Passman, Allison <APassman@CFTC.gov>
Subject: RE: [EXTERNAL] RE: Speaker for Crypto Panel
Importance: High

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Hi,
TGIF! Attached is Marni’s bio and I updated her availability below. Jennifer it would be great if you could go ahead and reach out to the panelists.

Re BIOS, Jennifer you may want to submit a longer one as a speaker / moderator if you like but the sheet that we need to edit for (b)(6) is our Supervision Summary doc – just forwarded (b)(6) email – does someone know how to edit it with our updated Summary, revised BIOS, next meeting or should we just send everything to (b)(6) ?

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Special Counsel of Examinations and was responsible for advising the broker-dealer examination program, representing the Commission in dealings with the securities industry, state and federal officials and the public, and handling enforcement referrals. Previous to that appointment, Tina served for over ten years in the Commission's Division of Enforcement. For five of those years, she served as a Branch Chief, supervising a group of attorneys. During her tenure in the Enforcement Division, she investigated, litigated and supervised several distinguished cases involving violations of the federal securities laws, such as financial and offering fraud, sales practice abuses, failure to supervise, insider trading, market manipulation, disclosure issues and pay-to-play. Throughout her tenure, Tina has worked with several US Attorney's Offices across the country and was deputized as a Special Assistant United States Attorney in the District of Minnesota and was co-counsel in a multi-million dollar criminal jury trial involving securities, mail and wire fraud, and money laundering. Tina received her Juris Doctor degree from Northwestern Pritzker School of Law and her Bachelor of Arts degree from Marquette University.

Thank you,
Tina

(b)(5)

#6. 1/24/23 at 11:00 am
#7. See dates below

From: Tveiten-Rifman, Jennifer <JTveitenRifman@CFTC.gov>

Sent: Thursday, October 13, 2022 3:18 PM

To: Diamantopoulos, Tina (b)(6) @SEC.GOV>; Passman, Allison <APassman@CFTC.gov>

Subject: RE: [EXTERNAL] RE: Speaker for Crypto Panel

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Okay- sorry guys- I am getting caught up after (b)(6) Hopefully I am responding to everything:

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- January 24, 2023 sounds good for the first meeting
- I like the description of what the group did last year, with Tina's changes.

I personally cannot be available on October 27th or the time on the 1st. I would like to reach out to the speakers to get some questions to ask at the end of the presentation as moderator, but I do not want to duplicate efforts. Okay to reach out to them? For dry run, I think I consolidated the responses, adding my own-

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312-596-0618 (office)

JTveitenRifman@cftc.gov



From: Diamantopoulos, Tina (b)(6) @SEC.GOV>

Sent: Thursday, October 13, 2022 1:06 PM

To: Passman, Allison <APassman@CFTC.gov>; Tveiten-Rifman, Jennifer <JTveitenRifman@CFTC.gov>

Subject: RE: [EXTERNAL] RE: Speaker for Crypto Panel

Jorge is out 10/24 – the rest of the non-red days are good with him

From: Diamantopoulos, Tina

Sent: Thursday, October 13, 2022 12:37 PM

To: 'Passman, Allison' <APassman@CFTC.gov>; 'Tveiten-Rifman, Jennifer' <JTveitenRifman@CFTC.gov>

Subject: RE: [EXTERNAL] RE: Speaker for Crypto Panel

Also – just emailed Marni and Jorge re BIOS and dates for call – will let you know as soon as I hear back

From: Diamantopoulos, Tina

Sent: Thursday, October 13, 2022 12:32 PM

To: 'Passman, Allison' <APassman@CFTC.gov>; Tveiten-Rifman, Jennifer <JTveitenRifman@CFTC.gov>

Subject: RE: [EXTERNAL] RE: Speaker for Crypto Panel

Hi – I have not reached out to KY or SEC for availability yet. Thanks for tracking BIO and title down for Lauren. I'm good with 1/24 at 11 am.

Also thank you for putting the below together – it's great! Just a couple minor suggestions in blue below.

Lastly, do you have any changes to your BIOS?

Thank you again,

Tina

From: Passman, Allison <APassman@CFTC.gov>

Sent: Wednesday, October 12, 2022 12:04 PM

To: Diamantopoulos, Tina <(b)(6)> <[@SEC.GOV](mailto:(b)(6)@SEC.GOV)>; Tveiten-Rifman, Jennifer <JTveitenRifman@CFTC.gov>

Subject: FW: [EXTERNAL] RE: Speaker for Crypto Panel

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Below in red are the dates Lauren cannot participate – did you reach out to the other folks to get their availability? I will send Lauren's bio when I get it. I am still having trouble with my computer and don't have all functionality, I have included the language of the summary below for us to noodle here instead – I have to confirm Lauren's title b/c the office keeps changing names and now apparently she's back at DOE. Also, for our first meeting how does January 24 at 11 am sound?

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From: Diamantopoulos, Tina
Sent: 2022-10-14T16:58:39Z
Subject: RE: [EXTERNAL] RE: Speaker for Crypto Panel
Received: 2022-10-14T16:58:40Z

Thank you both very much! Allie totally up to you re the group talk, really happy for you to do or step in if you prefer 😊
Tina

From: Passman, Allison <APassman@CFTC.gov>
Sent: Friday, October 14, 2022 11:50 AM
To: Diamantopoulos, Tina (b)(6) SEC.GOV>; Tveiten-Rifman, Jennifer <JTveitenRifman@CFTC.gov>
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Case 1:24-cv-01838-ACR Document 34-5 Filed 06/20/25 Page 420 of 672

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To: Tveiten-Rifman, Jennifer [JTveitenRifman@cftc.gov]
Cc: (b)(6) [redacted], Passman, Allison [APassman@cftc.gov]
From: Diamantopoulos, Tina
Sent: 2022-10-17T00:02:10Z
Subject: Re: MWIA- Supervision Working Group-
Received: 2022-10-17T00:02:11Z

- [image001.png](#)
- [image002.png](#)
- [image003.png](#)
- [image004.png](#)
- [image005.png](#)
- [Supervision Group Oct 2022- MWIA.pdf](#)

Thank you everyone - hope you had a great weekend!

Tina

On Oct 16, 2022, at 3:24 PM, Tveiten-Rifman, Jennifer <JTveitenRifman@cftc.gov> wrote:

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Hi (b)(6) [redacted]

I have been trying to edit the attached PDF for the Supervision Group and while I was successful in updating the bios, I am coming up short trying to paste in the description of the events from 2022.

I am pasting the text below, in hopes you can assist:

(b)(5) [redacted]

Jennifer

|

Jennifer L. Tveiten Rifman
Special Counsel, *Division of Market Oversight*

Commodity Futures Trading Commission

(b)(6) (mobile)

312-596-0618 (office)

JTveitenRifman@cftc.gov

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To: Harrington, James (b)(6) [redacted]; Hansen, Lars (b)(6) [redacted]; Bloch, David (b)(6) [redacted]; Millman, Phillip (b)(6) [redacted]
From: Nigro, Daniel
Sent: 2022-11-03T12:48:54Z
Subject: Markets Daily: Powell Re-Frames - From Size of Hikes, to Terminal Rate & Duration - Markets Pivot to No Pivot - Hawkishness Leaves Markets Worldwide to Reflect, Reconsider
Received: 2022-11-03T12:48:55Z

- [Twitter Loans Seen as Tough Sell for Big Buyers of the Debt.pdf](#)
- [SEC Accountant Warns of Heightened Fraud Risk Amid Recession Fears. Market.pdf](#)
- [Bait-and-Switch Powell Puts Lights Out on Half-Hour Market Party.pdf](#)
- [When Powell Makes Doves Cry With Disappointment.pdf](#)
- [Deeper US Recession Looms as Resilient Labor Market Spurs Fed.pdf](#)
- [FT -SEC proposes mutual fund-pricing rule to protect long-term investors - 11-02-2022.pdf](#)
- [FT - Federal Reserve's inflation fight enters a new phase - 11-03-2022.pdf](#)
- [FT -GOP Reps. Smell Whiff Of Hypocrisy In SEC's Texting Fines - 11-02-2022.pdf](#)
- [Law360 -SEC Chair Gensler Warns Of Further WhatsApp Sweeps - 11-02-2022.pdf](#)
- [Law360 -SEC Requires Fund Managers Disclose More About Votes - 11-02-2022.pdf](#)
- [US Homeowners Have a Fat Equity Cushion for Real-Estate Downturn.pdf](#)
- [FT -Crypto miners hit hard in digital asset industry's downturn - 11-03-2022.pdf](#)

Wall St. Breakfast Summary: Futures are drifting lower, pointing to major indexes extending declines that came after the Federal Reserve signaled that interest rates may be heading higher than previously expected. The size of future rate increases could be smaller than the recent spate of 0.75-percentage-point jumps, but a higher final level may be required to bring down inflation. Treasury yields are climbing and the dollar is rising in early trading. The Bank of England raised rates 75bps and forecast an 8 quarter recession. [Read our live markets coverage here.](#)

Investors need some time off after a topsy-turvy year, but things may not be better at the local amusement park. Fed Chair Jay Powell took the market on another rollercoaster on Wednesday, with a series of loop-the-loops aboard a ride known as the Dove-Hawk Twister. When all was said and done, the Dow dropped 500 points, while the S&P 500 and Nasdaq slumped 2.5% and 3.6%, respectively, after initially soaring on the Fed's announcement (that came along with a 75 bps rate hike). **Steep turns:** "With the lags between policy and economic activity, there's a lot of uncertainty, so that we note that in determining the pace of future increases will take into account the cumulative tightening of monetary policy, as well as the lags with which monetary policy affects economic activity and inflation... that's why I've said at the last two press conferences that at some point it will become appropriate to slow the pace of increases. So that time is coming, and it may come as soon as the next meeting or the one after that." **"We may ultimately move to higher levels than we thought at the time of the September meeting. The incoming data since our last meeting suggests the ultimate level of interest rates will be higher than previously expected. The risks are asymmetric. If the Fed does too much, it can cut. If it doesn't tighten enough, then you're in real trouble... It is very premature to be thinking about pausing... We think we have a ways to go."** Bottom line: Powell and Co. will be watching the data and evolving market conditions before making any significant pivot. The Non-Farm Payrolls report for October is out tomorrow, followed by the Consumer Price Index on Nov. 10, and Personal Consumption Expenditures on Dec. 1. The latter is the Fed's preferred measurement for inflation as it captures changes in consumer behavior and has a broader scope than the CPI. Global macro events will also be considered like Russia's war against Ukraine and the effects of China's zero-COVID policy.

In a bid to drive down costs, Elon Musk plans to eliminate 50% of Twitter workforce today, which would result in nearly 3,700 layoffs, according to Bloomberg. The platform's work-from-anywhere policy would also be rescinded, with most of the remaining employees required to report to the office. In one scenario being considered, laid-off workers will be offered 60 days' worth of severance pay as Musk looks to gut a business for which he says he overpaid
Futures at 8:45, Dow -0.6%. S&P -0.8%. Nasdaq -1.05%. Crude -1.3% to \$88.86. Gold -1.65% to \$1623.10. Bitcoin -0.5% to \$20,094.
10Yr Treasury Yield +9 bps to 4.19% VIX: 26.5 +2.4%

BMO Commentary: Japanese markets were closed overnight, limiting the post-FOMC follow-through to weakness in London as the market readies for a 75 bp rate hike from the Bank of England this morning. Cash Treasury trading volumes were half of the overnight norms, a backdrop which brings into question the move toward sustainably higher yields. That said, in the wake of Powell's hawkish press conference and guidance toward a higher terminal estimate, we're in the bearish camp for the time being with the caveat that the more enduring aspect of the current move will be a deeper curve inversion. Said differently, 4.34% 10-year yields might be breached, and fresh cycle highs established in the event of a particularly strong payrolls report or another upside surprise on core-CPI next week, however, ultimately the demand destruction from restrictive global monetary policy will lead to a recession both domestically and overseas. The US remains on strong economic footing for the time being; even as the Fed warns of the impact from 'cumulative tightening and the 'lagged impact' of policy action.

In keeping with the theme of deeper inversion, 2s/10s slipped to -54.8 bp this morning as the cycle low of -58.2 bp achieved on August 10 quickly approaches. -58 bp has held twice already and today appears poised to offer another challenge. Flattening momentum is also strong in the 2s/30s curve with stochastics and MACD pointing toward deeper inversion as the jobs report approaches. Unlike 2s/10s however, the 2s/30s spread is currently ~15 bp from the cycle extreme of -68 bp. As a result, there will be less resistance on the path to -60 bp in 2s/30s. Fundamentally, the more hawkish the Fed is, the higher the probability investors

In the runup to the Fed, our take was that it was too soon for investors to expect a 'true' pivot from Powell given the distance yet to be traveled on the journey to terminal. That said, it is notable that the Committee effectively signaled that the next move is more likely than not to represent a downshift to 50 bp and still the market's takeaway was decidedly bond bearish. **Clearly, it was the Chair's reframing of the conversation from the size of hikes to the ultimate terminal rate that led to the hawkish read. There are risks embedded in the Fed's smaller hike transition; specifically, as timeline to achieve terminal is extended, the probability of reaching the telegraphed endpoint is lowered – at least on the margin. With a March hike now penciled in to achieve Powell's revised terminal, we'll observe there are five core-CPI prints between now and then. There is a great deal that can change in the macro narrative with the such an updated understanding of the direction on consumer inflation and the broader implications for the real economy.**

The latest developments in China serve as a reminder that the world's second largest economy is a great distance from its pre-pandemic norms, and despite rumblings on an adjustment to Beijing's covid zero policy, for the time being it appears as if economic activity will remain distorted by virus-mitigating measures. To say nothing of simmering geopolitical tensions and the flashpoint potential that will linger in the market background over the balance of 2022 and through 2023. We're left to consider what a more fully reopened China would do to the inflation outlook. On the one hand, stronger global consumption and a more unencumbered buying landscape domestically in China would be another inflationary impulse that the world economy will need to consider. However, on the other hand, production closures and shipping disruptions would also wane which would help alleviate some supply-side pressures that have been a defining feature of the post covid trade regime. While admittedly outside of our analytical wheelhouse, there are also bullish implications for commodity markets as raw input prices have recalibrated to a demand backdrop without a fully participating China. Not something we expect will be resolved in the near term, but food for thought as we watch 2-year yields reach a new cycle high this morning.

Tactical Bias: The Fed delivered on laying the groundwork for a downshift to a 50 bp hike in December – the surprising aspect of the information was that it was delivered within the formal language of the statement. The fact the Committee codified the acknowledgment of the lagged, and cumulative influence of its tightening represents the first indication that rather than pressing forward with 75 bp hikes, a bias to evaluate the fallout on the real economy is becoming increasingly appropriate. However, as Powell affirmed in the press conference, this certainly does not preclude further tightening, and while the "ongoing rate increases" may not be of three-quarter point variety, deeper into restrictive territory is the Fed's destination. 2s/10s made it to -53 bp in response, and especially as investors shift their focus to another strong jobs report on Friday and core-CPI seen coming in at 6.6% next Thursday, we're on board with a revisit to the cycle flats of -58 bp.

The market will not have a great deal of time to catch its collective breath in the wake of the Fed as October's payrolls report quickly approaches and US rates move from trading the meeting to focusing on the labor market's ongoing resilience in the face of a nearly unprecedented hiking campaign. Given what the ADP numbers revealed, it's unlikely that October was the month when hiring slowed or the jobs landscape changed to a sufficient degree to alter the collective mindset on the FOMC. However, in terms of market pricing, this will not prevent Treasuries from undergoing the traditional process of pricing to the NFP consensus as the Fed's rate decision is traded and the debate on size of December's hike continues.

On a related note, an especially astute client posed a relevant question in the wake of the fourth consecutive 75 bp rate hike. Specifically, if the market's habituation to 75 bp moves lessens their influence on economic activity given the shock that was associated with the initial three quarter point hike has been all but removed. We'll offer two observations in this regard, on the one hand, the tactical relevance and kneejerk tradability of a 75 bp hike has been diminished as Powell has consistently prepared investors for the series of supersized hikes we have seen. On the other, in real economic terms as monetary policy moves further into the restrictive territory, each additional basis point of tightening holds increasingly severe fallout for the real economy. Said differently, the hike from 3.25% to 4% means more as it relates to economic activity than the move from 2.5% to 3.25% fed funds. As for what this means for future hikes, with monetary policy now well into restrictive territory with more hikes to be realized, the lagged influence of this cycle's tightening will begin to accumulate with increasing severity as 2022 concludes and next year gets underway.

There is one aspect of the current international economic reality that will not change in response to tighter monetary policy – the trend of onshoring production and a generally less-open trade environment. As investors continue to ponder whether a true structurally-higher inflationary paradigm will define the post pandemic period, the most compelling argument in favor of durably loftier inflation is that the realignment of the means of the production in higher cost locations will not present the type of higher prices that monetary policy is equipped to address. While not tradable in the traditional sense, Thursday's trade balance data nonetheless offers a reminder that even before the pandemic, international trade was undergoing a dramatic shift – a process that was only accelerated by covid. How precisely this resolves in contrast to the deflationary forces that were so prevalent over the better part of the last decade will not be resolved in the near term, but remains the critical macro unknown. - Ian Lyngen and Ben Jeffery

[Federal Reserve Hikes by 0.75 Point, Signals Slower Increases but Ultimately Higher Rates \(WSJ\)](#) Chairman Jerome Powell says too soon to talk about pausing rate increases

[Federal Reserve Chief Tells Markets to Focus on Interest-Rate Endpoint \(WSJ\)](#) But Jerome Powell didn't detail what will determine

it will take longer to get there

Bait-and-Switch Powell Puts Lights Out on Half-Hour Market Party (Bloomberg, attached)

- After surging 1% in the half-hour after the Fed decision was released, the S&P 500 Index sank
- Stocks post worst Fed-day showing since Jan 2021 after rally
- Potential of higher terminal rate spooking risk assets: Bianco

When Powell Makes Doves Cry With Disappointment: John Authers (Bloomberg, attached) The Fed has been misunderstood before, but shouldn't be this time. Investors need to stop imagining pivots that will only lose them money.

Fed Tries to Thread the Needle, Drawing Blood (WSJ) The financialized U.S. economy is at risk if it gets the wrong idea about the Federal Reserve—an effect on full display Wednesday

To Solve Inflation, First Solve Deficits, This Theory Advises (WSJ) Expect to hear more about the fiscal theory of the price level as governments struggle with rising debt and inflation, especially if Republicans make gains in Congress.

Deeper US Recession Looms as Resilient Labor Market Spurs Fed (Bloomberg, attached)

- Labor demand outstripping supply keeps wage pressures elevated
- Unemployment may need to hit 6% for inflation to drop to 2%

Bank of England raises its benchmark rate by 75 basis points, its biggest hike in 33 years (CNBC, Ling Yu) The 75 basis point increase takes the Bank Rate to 3%, its eighth consecutive hike to the main lending rate. AND they forecast an 8 quarter recession in the UK.

High-Speed Trader Simplex Warned About Potentially Abusive Options Strategy (WSJ) Finra notifies firm that 'signaling' may violate market rules, prompting it to pull back from handling individual investors' trades

SEC Pulls In Record Enforcement Haul, Moves to Rewrite Mutual-Fund Rules (WSJ) The agency collected \$6.4 billion for the year ended Sept. 30

SEC Accountant Warns of Heightened Fraud Risk Amid Recession Fears, Market Selloff (WSJ, attached) The warning comes as regulators increase their scrutiny of auditors. The audit regulator is getting **tougher on rule-breaking accountants**. Big fines for auditors are part of **record monetary sanctions** imposed by the SEC in the latest fiscal year.

FT - SEC proposes mutual fund-pricing rule to protect long-term investors (attached, Ling Yu) Industry warns of 'enormous negative impact' for clients as it faces higher costs

US Homeowners Have a Fat Equity Cushion for Real-Estate Downturn (Bloomberg, attached)

- Foreclosure wave unlikely even for distressed owners: Attom
- Almost half of mortgage borrowers have at least 50% equity

Broken Deal Triggered Currency Losses for Barclays, Deutsche Bank and Citigroup (WSJ) The damage, around \$100 million for Barclays, related to hedges the banks provided on Prosus' failed deal for BillDesk

WSJ: Venture-capital funds raised \$151 billion in the first three quarters of this year, exceeding any prior full-year fundraising, according to recently released information from PitchBook Data

Twitter Loans Seen as Tough Sell for Big Buyers of the Debt (Bloomberg, attached)

- Collateralized loan obligations have high exposure to tech
- Tech debt makes up the largest portion of B- loans in CLOs

FT - Crypto miners hit hard in digital asset industry's downturn (attached, Ling Yu) High energy costs and flat coin prices push companies close to the edge

Law360 - SEC Chair Gensler Warns Of Further WhatsApp Sweeps (attached, Ling Yu)

Law360 - GOP Reps. Smell Whiff Of Hypocrisy In SEC's Texting Fines (attached, Ling Yu) In a **Tuesday letter**, top Republicans on the House Financial Services Committee and other House panels told SEC Chair Gary Gensler that it is "curious" for his agency **to be fining banks** for recordkeeping lapses related to employee personal device usage when its own staff appears to do the same thing.

"Evidence uncovered during Freedom of Information Act (FOIA) litigation suggests the SEC is failing to identify and produce records of official business conducted on non-email or 'off-channel' platforms, such as Signal, WhatsApp, Teams, and Zoom — regardless of whether the communication took place on a personal or business device," the lawmakers wrote. "The SEC must practice the transparency and accountability it preaches," they added.

Law360 - SEC Requires Fund Managers Disclose More About Votes (attached, Ling Yu) The 169-page rules package will also require that fund managers provide more detail on how they cast their proxy votes, arguing that current disclosures are inconsistent and make it difficult for investors to analyze reports. The rules will overhaul the existing Form N-PX, first developed in 2003 to inform investors how fund managers vote shares on their behalf.

CREDIT DAYBOOK AMERICAS: CDX Widens; Nielsen Buyout's Junk Bonds (Bloomberg) -- Credit risk gauges increased for a second day after the Federal Reserve raised rates by 75 basis points for the fourth time in a row. Banks kicked off a high-yield bond sale that will help finance the leveraged buyout of TV ratings business Nielsen Holdings.

- The spread on the Markit CDX North American Investment Grade Index, which declines as credit risk drops, widened 1.07 basis points to 92.4 as of 7:17 a.m. New York time
- Banks led by Bank of America already funded the Nielsen deal using their own cash in October when the acquisition closed, and are now taking advantage of a rare window of opportunity to offload the debt to investors
 - Early pricing discussions for the bond are for a yield in the high-10% to 11% range and a coupon of between 9.25% and 9.5%, implying that the notes will be sold at a discount to face value
 - Separately, a group of banks is offering steep discounts on a \$2.4 billion debt sale to help fund the LBO of auto-parts maker Tenneco by Apollo
 - Meanwhile, Dish Network is seeking to sell \$2 billion of junk bonds with the early pricing discussions in the mid- to high 11% range, including an original issue discount that would bring the price to 98 cents on the dollar
- Elsewhere, the US leveraged loan market appears to have a window opening with some positive risk-on sentiment
 - Ineos boosted the EUR and USD term loans and firmed pricing at the tight end, while Starwood accelerated the timing of commitments due
- A group of Bed Bath & Beyond creditors is seeking better terms on part of a bond swap the retailer proposed last month in a bid to reduce its debt load, according to people with knowledge of the matter
- A judge overseeing the five-year bankruptcy case for Puerto Rico's main power utility is pressuring island officials to come up with a debt-cutting plan by Dec. 1, saying she aims to complete the workout by June
- In earnings, Bombardier, Bausch Health and Royal Caribbean Cruises report this morning while Starbucks, Carvana and GoDaddy post after the closing bell

US HY OPEN: Nielsen, Dish Rush to Borrow as Market Reopens (Bloomberg) -- The US junk bond primary market moved from famine to feast after Apollo's Tenneco launched a \$2.4b debt sale earlier this week. Nielsen Holdings, a US TV rating business firm, kicked off a \$1.96b bond sale on Wednesday to fund its buyout by Elliott Investment Management and Brookfield Asset Management.

- Satellite TV company Dish Network also jumped into the market on Wednesday to start selling \$2b 5-year notes to fund the buildout of wireless infrastructure, among other purposes.
- Issuers are selling now to take advantage of a recent rally in junk bonds as yields plunged below 9% and spreads close below +450bps
- On Tuesday, Ford Motor Credit sold \$1.5b 5-year notes at the lower end of early price guidance
- Among upcoming deals, Dish is expected price new bonds on Friday. Early price discussions indicate the secured bonds may price at a discount to yield 11%
 - Read Dish Network Taps High-Yield Market for \$2 Billion Debt Raise
 - Nielsen is on the road until sometime next week. The bonds are slated to price the week of November 7. Early price indications suggest bonds may price at a discount to yield in the high-10% to 11% range. The coupon is expected to be between 9.25% and 9.5%
 - Read Banks Kick Off \$2 Billion Junk-Bond Sale for Nielsen Buyout
- The recent market rally was partly fueled by an influx of cash into US junk bond funds
 - HYG and JNK, the two big high yield exchange-traded funds, reported a cash intake of more than \$1b just in three sessions this week
 - Broader US high yield funds estimate an inflow of about \$4.7b through Tuesday's close, JPMorgan wrote Wednesday, citing Refinitiv Lipper
 - The cash haul came in at the time of acute shortage of new supply, bolstering secondary market prices
- The recent rally in junk bonds also suggests that the high-yield market is coming around to the view that the pace of inflation is slowing and may even begin to decline in the middle 2023
 - Despite continued near-term pressures Morgan Stanley expects a "significant deceleration in the inflation path" to take hold by mid-2023, Morgan Stanley's Srikanth Sankaran wrote last week
 - And Fed Chair Jerome Powell opened the door to slowing the tempo of rate hikes
 - Time to slow rate hikes could come as soon as in the next meeting, Powell said, while adding that "we still have some ways" before rates were tight enough
- US junk bonds largely shrugged off the equity selloff as yields rose just 2bps to 8.99%. Spreads were unchanged at +446bps
- US junk bonds rally may pause for equity volatility to settle down. Equity futures fell Thursday morning
 - Bob Michele, JPMorgan Asset Management CIO and head of global fixed income, sees significant pain is in store for high-yield bonds as the US heads into a likely recession next year. He expects at least 300 basis points of spread widening from current high-yield index levels

STRUCTURED PIPELINE: Fed Keeps Primary Quiet; Verus RMBS On Tap (Bloomberg) -- Invictus Capital Partners plans to price its VERUS 2022-INV2 private-label RMBS deal later today. The transaction is backed entirely by business purpose investment loans. Deal flow was mostly quiet on Fed day, yet a few managed to cross the finish line. Barclays and co-structuring agent Deutsche Bank

priced a new issue CLO for AGL while Freddie Mac priced its K-F145 multifamily CMBS

- An ABS-15G was filed on Wednesday by Greenworks Lending

Structured Highlights:

- Ares Joins 'Print and Sprint' Ranks as Loan Prices Remain Low
- Tetragon Unit Markets 'Print and Sprint' CLO as Loan Prices Limp
- Credit Risk Transfer Index Stumbles Again on Rates: Fontanilla
- Libor's 'Unloved' Heir Plagued by Dim Demand, JPMorgan Says (1)
- Usual CMBS Spread Rally to Start Year May Skip 2023, BofA Says

DISTRESSED DAILY: 9/11 Fund Director Plays Key Role in J&J Suits (Bloomberg) -- The same lawyer who oversaw payments to victims of the Sept. 11 terrorist attacks has become a crucial factor in Johnson & Johnson's fight against tens of thousands of cancer lawsuits. Kenneth R. Feinberg was approved Monday to continue as mediator for two bankrupt companies that supplied J&J with talc for its baby powder. In a separate case in New Jersey, a federal judge has asked Feinberg to estimate J&J's liability in about 40,000 lawsuits alleging tainted talc causes cancer. J&J disputes claims that the talc it used to making baby powder and other products is harmful. Of the three talc insolvencies, J&J is most involved in the New Jersey case of LTL Management, a subsidiary it placed in bankruptcy in an attempt to resolve all the talc lawsuits at once. The judge overseeing that bankruptcy has asked Feinberg to estimate the value of all the talc claims. The other two Chapter 11 cases were filed by talc providers Imerys Talc America and Cyprus Mines. They are facing thousands of talc lawsuits, but claim J&J is legally is on the hook for those -- an argument the company disputes. In those cases, Feinberg is mediating disputes between the two talc companies, including a key fight over each company's contention that J&J must foot the bill for talc-related litigation. Should Feinberg succeed, Imerys and Cyprus would reach a deal that would allow each company to set up a victim trust fund for people who claim to be injured by talc. Those trusts would likely demand money from J&J. Feinberg, whose work has been chronicled in books and movies, previously spent years helping distribute \$7 billion to victims of the Sept. 11 terrorist attacks. His firm has been paid as much as \$500,000 a month in other bankruptcies.

- DATA POINTS
- QUOTABLE
- "We excel in this kind of market. We are leaning in, we are out talking with investors and we are apologizing for nothing"
 - Apollo Global Management Chief Executive Officer Marc Rowan during the company's third-quarter earnings call
- DEADLINES AND DOCKETS
 - All times are U.S. Eastern unless specified and are subject to late revision or cancellation.
- Nov. 3
 - Bausch Health, quarterly results, pre-market
 - Carvana, quarterly results, post- market
 - Glatfelter, quarterly results, pre-market
- READING LIST
 - News, research and insight relevant to distressed investing
- Bed Bath & Beyond Creditor Group Seeks to Sweeten Debt Swap Plan
- Distressed Supply's Climb May Be Slow and Steady, No Rapid Surge: BI
- Moelis Is Tapped by Creditors to Bitcoin Miner Core Scientific

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Cryptofinance Cryptocurrencies

Crypto miners hit hard in digital asset industry's downturn

High energy costs and flat coin prices push companies close to the edge



Industry analysts and executives have questioned the sustainability of cryptocurrency mining © FT montage/Dreamstime

Martha Muir and **Scott Chipolina** in London 6 HOURS AGO

Crypto mining companies are coming under heavy pressure from this year's digital asset downturn as the high cost of energy and the flatlining price of coins pushes more names close to the financial cliff edge.

Nasdaq-listed Core Scientific [warned last week](#) it could file for bankruptcy protection as its cash resources would be depleted by the end of the year. On Monday, London-listed Argo Blockchain echoed that gloomy outlook, saying it may be forced to cease operations after a critical fundraising fell through.

Those warnings came only weeks after US's Computer North, which operated data centre services for miners, filed for bankruptcy, owing up to \$500mn and blaming tough market conditions.

Their dire financial situations show how [crypto](#) mining — the process by which coins are generated and transactions are verified — is next in line to feel the impact of the crash in the price of popular cryptocurrencies such as bitcoin over the past 12 months.

What is crypto mining?

The act of employing a large network of computers to work together to solve cryptographic calculations that verify cryptocurrency transactions. Typically, one party will solve the puzzle, known as a hash, that creates the next block in the chain. The others will verify it. In return for maintaining the blockchain, miners are rewarded with new tokens for being the first to solve the cryptographic proof. They also collect transaction fees.

Read more in the [FT crypto glossary](#).

The downturn has already claimed a series of once-prominent crypto firms such as lending platform [Celsius Network](#) and Three Arrows Capital, the hedge fund.

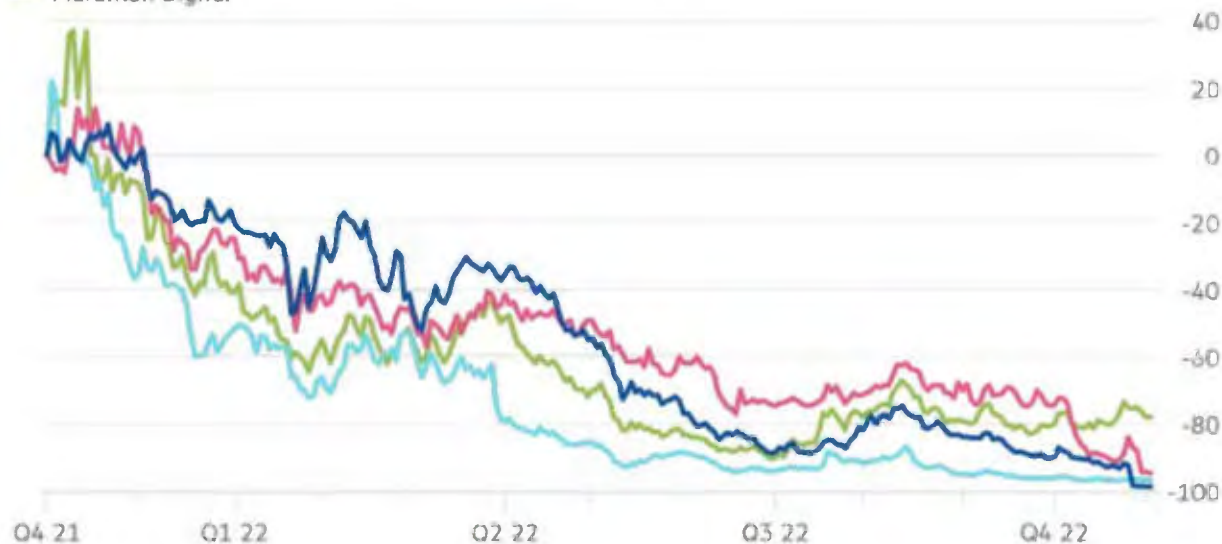
“The crypto winter is having negative ramifications for the overall ecosystem, including the miners. It’s a chain reaction as this long cold crypto winter continues,” said Dan Ives, managing director of Wedbush Securities.

Industry analysts and executives have questioned the sustainability of mining especially after prices of leading tokens have been rangebound since June. Bitcoin has rarely risen above \$21,000 after reaching a high of almost \$70,000 late last year.

Crypto miners fail to strike gold

% change over past 12 months

Core Scientific Argo Blockchain Stronghold Digital Mining
Marathon Digital



Local currency terms

Source: Refinitiv

© FT

Miners play a crucial role in the operation of so-called “proof of work” tokens such as bitcoin. They verify new blocks on blockchains, effectively taking on the role as guarantor that deals are trustworthy in a system that bypasses third parties such as banks and exchanges. In return for mining, they are rewarded with new tokens. Ether, the world’s second-biggest crypto token, recently moved away from the type of system that requires miners.

Many miners were enticed by ever-rising prices for coins. When the price of bitcoin crashed in 2021, companies poured money into buying mining equipment, including fast computers that suck up large amounts of power. Hut 8, a mining company, added 9,592 machines for mining in the first quarter of 2022, increasing its capacity by nearly a third.

The extra mining capacity has arrived on the market just as the price has tumbled, meaning miners are racing harder to win the token. Bitcoin’s total hashrate, the computing power directed towards mining, has increased by 57 per cent in the last year to a record 260 exahash — or quintillion — operations a second, according to Hashrate Index.

The high cost of energy has also caught many out and punctured miners’ ambitions. Miners race against each other to solve complex mathematical puzzles and earn bitcoin. They expend large amounts of energy regardless of whether or not they claim the bitcoin before their competitors. Argo admitted that energy costs for its Texas facility were nearly three times the average price for August.

That has been exacerbated by the threat of energy blackouts in the US. In July, Argo, Core Scientific and Riot Blockchain scaled back their Texas operations, as demand for energy threatened to overwhelm the power grid.

Competition hots up in bitcoin mining

Hashrate (exahash per second)



“The bottom line is the competition has been increasing recently, even though power costs are high and the bitcoin price is kind of stable . . . I think they are still profitable, but the profit spreads are shrinking,” said Chris Brendler, a senior research analyst at DA Davidson, an investment bank. He remains positive on some miners, including Stronghold Digital Mining, which has shed more than 95 per cent of its value in the past year.

Conditions may not improve in the short term. Since the Ethereum “Merge” in September made Ethereum mining effectively obsolete by switching to a different system for transaction verification, companies such as Hive and Hut 8 said they planned to fill their capacity with bitcoin mining.

Moreover, in less than two years the rewards for mining bitcoin is expected to halve, in a four-yearly event that is preset into bitcoin’s code.

“The only way for miners to increase their bitcoin production through the upcoming halving is to grow capacity much faster than their competitors,” said Jaran Mellerud, an independent crypto mining analyst.



[Click here](#) to visit Digital Assets dashboard

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To: Passman, Allison [APassman@CFTC.gov]; Tveiten-Rifman, Jennifer [JTveitenRifman@CFTC.gov]
From: Diamantopoulos, Tina
Sent: 2022-11-07T01:40:34Z
Subject: RE: Tomorrow!
Received: 2022-11-07T01:40:34Z

Hi Allie,
I am looking forward to seeing you both tomorrow too! Thank you both for doing this all and it all sounds good. I am the group's Sponsor.
Thank you again,
Tina

From: Passman, Allison <APassman@CFTC.gov>
Sent: Sunday, November 6, 2022 6:46 PM
To: Tveiten-Rifman, Jennifer <JTveitenRifman@CFTC.gov>; Diamantopoulos, Tina <(b)(6)@SEC.GOV>
Subject: Tomorrow!

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Hi guys
I'm excited to see you in real life tomorrow! Jennifer, I'm not sure I know how to pronounce your last name - can you let me know in the morning?
For the supervision summary, I don't think I have much to add to the summary we prepared in the one-pager. I planned on introducing us (Jennifer as Vice Chair, Tina as the Steering Committee representative), the way our group is structured, and the programs we offered this year. If there is anything else you would like to include let me know. Also, I'm sorry I'm doing this at the eleventh hour. I am coming up for air but I truly have had a very hard time the past 6 weeks and I've got a lot of digging out of all the stuff I put off.
Thanks for all of your help this year, and especially recently. Jennifer, I really appreciate all the work you've put into our panel. Looking forward to the conference!
Allie

From: Tveiten-Rifman, Jennifer <JTveitenRifman@CFTC.gov>
Sent: Friday, November 4, 2022 9:08 AM
To: (b)(6) <(b)(6)@chi.frb.org>
Cc: Passman, Allison <APassman@CFTC.gov>
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Thank you!!



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Subject: RE: [EXTERNAL] RE: MWIA- Supervision Working Group-

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To: (b)(6) <(b)(6)@chi.frb.org>
Cc: Passman, Allison <APassman@CFTC.gov>
Subject: [External] RE: [EXTERNAL] RE: MWIA- Supervision Working Group-

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Hi- sorry, I meant, could you please email me a copy?



Jennifer L. Tveiten Rifman
Special Counsel, *Division of Market Oversight*
Commodity Futures Trading Commission

(b)(6) (mobile)
312-596-0618 (office)
JTveitenRifman@cftc.gov



From: (b)(6) <(b)(6)@chi.frb.org>
Sent: Friday, November 4, 2022 8:54 AM
To: Tveiten-Rifman, Jennifer <JTveitenRifman@CFTC.gov>
Cc: Passman, Allison <APassman@CFTC.gov>
Subject: [EXTERNAL] RE: MWIA- Supervision Working Group-

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NONCONFIDENTIAL // EXTERNAL

NONCONFIDENTIAL // EXTERNAL

Hi Jennifer—
Yes, I have the information below thank you!
Best,



(b)(6)

Federal Reserve Bank of Chicago
230 South LaSalle Street, Chicago, IL 60604
Phone: (b)(6) | Mobile: (b)(6)

From: Tveiten-Rifman, Jennifer <JTveitenRifman@CFTC.gov>

Sent: Friday, November 4, 2022 8:49 AM

To: (b)(6) <[@chi.frb.org](mailto:(b)(6)@chi.frb.org)>

Cc: Passman, Allison <APassman@CFTC.gov>

Subject: [External] FW: MWIA- Supervision Working Group-

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Hi (b)(6)

Do you have the attached, but with the information in the email below included? (The Supervision working group page) I am sure it is in my email somewhere but I could not locate it

- Jennifer



Jennifer L. Tveiten Rifman
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From: Tveiten-Rifman, Jennifer

Sent: Sunday, October 16, 2022 3:24 PM

To: (b)(6) <[@chi.frb.org](mailto:(b)(6)@chi.frb.org)>

Cc: Diamantopoulos, Tina <(b)(6)@SEC.GOV>; Passman, Allison <APassman@CFTC.gov>

Subject: MWIA- Supervision Working Group-

Hi (b)(6)

I have been trying to edit the attached PDF for the Supervision Group and while I was successful in updating the bios, I am coming up short trying to paste in the description of the events from 2022.

I am pasting the text below, in hopes you can assist:

(b)(5)

Jennifer



Jennifer L. Tveiten Rifman
Special Counsel, *Division of Market Oversight*
Commodity Futures Trading Commission

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To: Harrington, James (b)(6) [redacted]; Busdoj.gov (b)(6) [redacted]; Hansen, Lars (b)(6) [redacted]; Bloch, David (b)(6) [redacted]; Millman, Phillip (b)(6) [redacted]
From: Nigro, Daniel
Sent: 2022-11-07T13:42:27Z
Subject: Markets Daily: Inflation Watch Week; SCOTUS to Hear Arguments Today to Rein in Regulators; Fed warns sharply higher interest rates could spark financial distress
Received: 2022-11-07T13:42:27Z
[CLO Activity to Pick Up in Second Half of 2023, Barclays Says.pdf](#)
[The Death of Crypto Has Been Greatly Exaggerated, Again Institutional Investor.pdf](#)
[Reasons Are Adding Up for Optimism on Inflation.pdf](#)
[Wall Street Hopes History Repeats With a Post-Election Comeback.pdf](#)
[Ethereum Insiders to Get Fee Cuts That Others Won't in Upgrade.pdf](#)
[Billions in Capital Calls Threaten Forced Sales of Stocks, Bonds.pdf](#)
[Billions in Capital Calls Threaten Forced Sales of Stocks, Bonds.pdf](#)
[FT -Fire sale begins as property funds face rush of UK redemptions - 11-04-2022.pdf](#)
[UK House Prices Fall Most in Almost Two Years.pdf](#)
[Law360 - SEC Seeks Early Win Over Biz Groups' Proxy Rule Challenge - 11-04-2022.pdf](#)
[FT -US Supreme Court to consider restraining regulators' power - 11-07-2022.pdf](#)
[Law360 - SEC Says Crypto 'Club' Was \\$295M Ponzi Scheme - 11-04-2022.pdf](#)
[FT - Fed warns sharply higher interest rates could spark financial distress - 11-04-2022.pdf](#)
[Fed - Financial Stability Report, November 2022.pdf](#)
[The Shadow \(Banking System\) How the Fed Helped Spawn a \\$23.7 Trillion Market.pdf](#)

Wall St. Breakfast Summary: Futures are inching up a day before midterm elections that could see one or both chambers of Congress shift to Republican control. Even with politics in focus this week, stocks are likely to continue to respond mostly to expectations around the Federal Reserve's plans for interest rates. The central bank last week signaled that coming rate rises could be smaller than this year's spate of 0.75-percentage-point jumps, but also that the level at which rates ultimately top out could be higher than recently anticipated. [Read our live markets coverage here](#)

Broader market earnings will go nowhere next year, according to the latest forecast from Goldman Sachs. Strategist David Kostin said S&P 500 margins have inflected downward, and as a result, he is trimming the S&P EPS forecast for 2023 to 0% growth from 3%. **Quote:** "Following a weak Q3 earnings season in which S&P 500 net margins declined year/year for the first time since the pandemic, we lower our EPS forecasts for 2022 (to \$224 from \$226), 2023 (to \$224 from \$234) and 2024 (to \$237 from \$243)," he wrote in a research note. "The revised estimates reflect annual growth of 7%, 0%, and 5%, respectively. We model sales and margins separately, given the nuanced impact of various macro factors on each variable. But economic growth is the primary driver of EPS growth." Goldman still expects a year-end S&P 500 target of 3600 (-5%) in 2022 and 4000 (+6%) in 2023, given a notable exception to the downturn in the energy industry. "The backdrop of high oil prices and capex discipline has provided an earnings tailwind to energy firms. Net margins during the first three quarters of the year equaled 14%, the highest level on record." **Other risks:** "In a [moderate] recession, we expect S&P 500 EPS would fall by 11% to \$200. Our economists assign a 35% probability of recession in the next 12 months and note that a recession would likely be mild given the lack of major financial imbalances in the economy. However, many equity investors believe a recession will begin at some point during 2023. A deeper or more prolonged recession poses downside risk to our recession scenario EPS. Revisions to bottom-up 2023 EPS estimates have been particularly sharp this year, but we see room for further cuts." "A lot of disruption is going on in the tech space, with knock-on effects being seen across the whole industry. An example of this is the recent advertising debacle witnessed during Snap's (NYSE:SNAP) earnings, which foreshadowed the stock plunges of Big Tech the following week. While it is no longer publicly traded, the fact that Twitter axed half of its workforce on Friday could inform investors in other social media platforms of what might be coming in the not-so-distant future.

Case in point: Meta Platforms is planning to begin large-scale layoffs this week, according to the *Wall Street Journal*. The firings are expected to impact "many thousands of employees" of the company's more than 87,000-strong workforce, with Meta even telling staff to cancel non-essential travel. Shares of META have tumbled 35% over the past month and more than 70% YTD amid intensive spending on the metaverse and threats to the firm's core social-media business (free cash flow tumbled 98% in Q3). What is still to be seen is if any of the big editorial changes at Twitter will end up impacting Facebook, Instagram, Messenger or WhatsApp. So far, Chief Twit Elon Musk appears to be making a lot of rules on the fly, and a tweetstorm over the weekend pointed to additional adjustments in the making. "Previously, we issued a warning before suspension, but now that we are rolling out widespread verification, there will be no warning," "any name change at all will cause temporary loss of verified checkmark" and "going forward, any Twitter handles engaging in impersonation without clearly specifying 'parody' will be permanently suspended." **Too far, too fast?** Bloomberg reported that Twitter is reaching out to dozens of employees who lost their jobs and asking them to return. Some of those who are being asked to come back were "laid off by mistake," while others "were let go before management realized that their work and experience may be necessary to build the new features Musk envisions." The *NYT* also suggested that Twitter would delay its \$8/month model - for blue check verification marks, less ads, the ability to post longer videos and priority ranking for quality content - until after the midterm elections. Will Meta eventually go subscription?

U.S. Indices Last Week: Dow -1.4% to 32,403. S&P 500 -3.4% to 3,771. Nasdaq -5.7% to 10,475. Russell 2000 -2.6% to 1,798. CBOE Volatility Index -4.7% to 24.55.

BMO Commentary: The combination of last week's Fed hike, accompanying statement, Powell press conference, and October's strong payrolls report has served to reinforce the prevailing expectations for policy rate increases at each of the next three meetings (Dec/Feb/Mar). The debate has shifted to the magnitude of the upcoming hikes, and increasingly, the degree to which the real economy will reveal evidence of the impact from the tightening executed thus far. We're encouraged to see a resumption of the inversion trend this morning after 2s/10s dipped to -62 bp on Friday before reversing back to -50 bp. The fundamentals supporting a deeply inverted curve remain intact; if anything, Powell's hawkish press conference and the solid NFP release have galvanized expectations for a deeper inversion. The Chair indirectly confirmed that the upside surprise on September's core-CPI contributed to concerns peak inflation has yet to be realized and thereby lift the Fed's terminal target above the 4.6% indicated in the September SEP. The resulting price action reflected the higher terminal messaging; although we're left to ponder how sensitive terminal is to a single inflation print.

To be fair, it's been much more than the most recent CPI release that has continued to illustrate ongoing consumer price inflation; even if it is striking how quickly the Fed has been willing to shift terminal guidance based on the incremental input. It's with this context that a deeper inversion resonates; after all, Powell's hawkishness is a credibility enhancing development as evidenced by the 15 bp decline in 10-year breakevens following the Fed. As with the curve, there was a degree of post-NFP giveback that has brought 10-year breaks off the 238.4 bp low from last week (which was also the 40-day moving-average). Breakevens will continue to be biased lower as Powell delivers on the roadmap to higher policy rates and headlines for global growth begin to mount. Thursday's CPI report is unquestionably the most relevant fundamental input of the week. The consensus is for another strong core print of +0.5% in October; only a marginal downshift from the +0.6% pace in August and September. The bigger question is whether a disappointing core-CPI read will trigger as dovish a Fed response as the upside did a hawkish one – it's doubtful. That said, a slowing in the pace of consumer price gains would contain how far beyond the 5.00%-5.25% target range would be priced into the fed funds futures market. For context, investors have settled into expectations for a half point hike in December, followed by 75 bp in additional tightening to reach the effective terminal rate of 5.08% (with the tail risk of an additional 25 bp move). It goes without saying that there is a lot of realized data between now and the second quarter that could drive a material revision of the Fed's estimation of terminal. However, for the time being we struggle to see any compelling reason to fade Powell's messaging on a higher endpoint for the cycle.

Tomorrow is the US midterm elections and expectations are for the GOP to gain power in Congress; the degree to which seats shift remains the most relevant unknown. Conventional wisdom holds that equities and risk assets perform better with greater GOP control of Congress; if nothing else a theme of gridlock will be the primary takeaway and, as such, new spending initiatives should be limited. The wildcard is the extent to which the midterm results indirectly endorse Trump's potential candidacy in 2024 – a reality that could ultimately trigger a more sizeable response in risk assets as echoes of the 2016 post-election price action continue to inform near-term expectations. As results come in on Tuesday evening, we'll look for the bulk of the response in financial markets to occur on Wednesday as the details of the 118th Congress emerge.

HIGHLIGHTS FROM THE LYNGEN US RATES WEEKLY: In the holiday-shortened week ahead, investors will continue to digest the implications from Powell's non-pivot with the backdrop of the ongoing strength in the US labor market. The Committee signaled that a slower hiking cadence is in the offing and the market is focused on the December meeting with expectations firming for a 50 bp move – a pivot by any other name is just as relevant. We're sympathetic to investors' eagerness to lock in the pricing of next month's Fed decision; however, the reality is that there remains an array of data and potential macro developments between now and the final meeting of 2022. The October CPI release is on deck and likely to have a far more material impact on US rates than payrolls has accomplished. The data calendar is light ahead of the inflation update, leaving anticipation of Thursday's print an underlying influence as the Treasury Department auctions \$40 bn 3-years on Tuesday and \$35 bn 10s on Wednesday.

Expectations for October's consumer price index are for the headline figures to increase +0.7% for the month and core to advance +0.5% versus September's gains of +0.4% and +0.6%, respectively. These inflation stats would bring the yearly headline pace to 8.0% from 8.2% in a continued deceleration from June's peak of 9.1% -- undoubtedly a welcome development for the Fed and consistent with a downshift to 50 bp in December. That said, the most compelling reasons for smaller moves from the FOMC are precisely those outlined in the statement; 'cumulative tightening' and 'lagged impact' of monetary policy actions. It also merits acknowledging that core-CPI is anticipated to remain at its peak of 6.6% in annual terms; the essential driver of the Fed's hawkish renaissance.

Within the core measure, we'll be watching the contribution of OER/Rent with the bias that while higher mortgage rates have slowed the real estate market and marginally weighed on prices, there has yet to be any evidence of this flowing through to the inflation data. There is no case to be made for an outright decline in shelter costs during the fourth quarter; although a moderation in the pace of increases remains our baseline assumption. In addition, the decline in used car prices that is evident in the wholesale data has heretofore been conspicuously absent as an influence on the prevailing inflation complex. To be fair, these factors have been stubbornly high, and our expectations were for an earlier moderation. Given the reaction of the FOMC and the market, we

take solace that we haven't been alone in that thinking.

The policy outlook will also be further refined by an array of Fed speakers including voters Collins, Mester, Williams, and George. The messaging from the statement will be the template for official commentary in the wake of the 75 bp hike; the question is how dovish the tone appears as a contrast to Powell's press conference. Investors are likely to come away with the understanding of a more balanced take on terminal than what is currently being priced in as futures indicate a terminal range of 5.00-5.25%. Let us not forget the mid-term election results and the prospects for one or both chambers of Congress to be in the control of the GOP in the new year. Historically, a strong showing for the GOP has been associated with outperformance of equities – a kneejerk response that we see no reason to fade. Such a scenario is complicated by the impact of a stock market rally on financial conditions – i.e. an easing impulse. Easier financial conditions would not only provide the Fed greater flexibility in targeting a higher terminal rate, it might also compel the Committee to err on the higher side as reduced realized equity vol partially offsets the recent increase in real yields.

Tactical Bias: Despite the condensed trading week and Friday's market holiday, the week ahead holds one of the two most potentially paradigm shifting data releases via October's CPI data. It was last month's CPI print that cemented Wednesday's 75 bp rate hike, and with two more inflation reads before December's rate decision, the onus for determining the size of the final hike of the year and where terminal will ultimately emerge is on the combination of October and November's inflation data. As it stands, the market has priced to an upper bound of 5.25% to be reached in the second quarter of next year, and along with the size of the December rate hike, we expect the SEP and revised dotplot will be updated to match this pricing. Within CPI the primary question is whether enough time has elapsed to see a meaningful deceleration in shelter appreciation given that OER and Rent accounted for nearly 60% of the core inflation increase in September. While the slowdown in housing will eventually show up more substantially within the inflation data, this pillar of strength will keep upward pressure on yields for the time being. Adding to the case for an elusive bid in the near term are November's refunding auctions with \$35 bn 10s and \$21 bn 30s hitting the market on Wednesday and Thursday, respectively. It's the first time that coupon sizes are unchanged from the prior quarter since August 2021, which will leave the extent of any pre-auction concession relevant in early trading during the shortened week ahead. As has been the case throughout the bulk of 2022, the overall level of volatility has translated to a generally uninspired trend at supply events – we've only seen two stop throughs for 10s, with an average result of a 1.0 bp tail. As for new issues specifically, the elevated foreign sponsorship that tends to materialize at refundings versus reopenings should translate to a comparatively stronger outcome. We're skeptical November will be the month that foreign buyers return to aggressively take advantage of the liquidity provided by supply, which points to a larger concession on Wednesday.

It will undoubtedly be the consumer price numbers that dominate the discourse, but let us not forget the midterm elections potential shift of legislative control in Washington that promises to offer at least some tradable headlines. As has been the case historically, and especially with inflation remaining economic and political issue number one, at this stage consensus is for Republicans to gain control of one, if not both chambers of Congress. Unlike in previous instances of either party controlling the executive and legislative branches and the potentially meaningful policy implications, the most likely outcome on the other side of the elections is gridlock. As for what this means for the Treasury market, the lack of any sweeping new fiscal initiatives suggests that this particular stimulative impulse will not come to pass before 2024.

November is underway, and we're already fielding inquiries on the calendar turn and what to expect in terms of balance sheet needs and funding costs into 2023. There's a collective angst on the potential for funding pressures to push rates higher despite over \$2 trn in cash remaining at the RRP facility as the distortions related to the aftermath of QE, monetary policy uncertainty, and collective preference to remain in as short-dated investments as possible continues to distort the front-end. There clearly remains a surplus of cash in the system, but that capital is not necessarily finding its way to the balance sheets where it is needed.

Admittedly a bit early to begin framing the setup into the end of the year, but food for thought as CPI approaches and monetary policy estimates are refined further. - Ian Lyngen and Ben Jeffery

Reasons Are Adding Up for Optimism on Inflation: John Authers (Bloomberg, attached) A range of indicators look better as we head for fresh CPI data this week. Will they give the Fed any cause to relent?





Wall Street Hopes History Repeats With a Post-Election Comeback (Bloomberg, attached)

- S&P 500 historically posts best returns following US midterms
- Options signal a Democratic sweep would briefly rattle index

FT - US Supreme Court to consider restraining regulators' power (attached, Ling Yu) The Supreme Court will hear arguments today... Decision against SEC or FTC could complicate enforcement proceedings at federal agencies

FT - Fed warns sharply higher interest rates could spark financial distress (attached, Ling Yu) Financial stability report says banks are well capitalised against shocks from a downturn

Overview of financial system vulnerabilities

 <p>Asset valuations</p>	 <p>Borrowing by businesses and households</p>	 <p>Leverage in the financial sector</p>	 <p>Funding risks</p>
<ul style="list-style-type: none"> • Prices of risky assets generally fell amid a less favorable outlook and rising interest rates. • Risk premiums in equity and corporate bond markets were near the middle of their historical distributions. • Real estate valuations remained very elevated even though activity weakened and price increases slowed markedly. 	<ul style="list-style-type: none"> • Although debt of nonfinancial businesses and households grew in the first half of 2022, the ratio of debt to gross domestic product (GDP) was little changed and remained at a moderate level. • Interest coverage ratios for large businesses reached historically high levels, and debt issuance by the riskiest companies slowed. The business debt-to-GDP ratio remained high. • Household debt was at modest levels relative to GDP and concentrated among prime-rated borrowers. 	<ul style="list-style-type: none"> • Banks' risk-based capital ratios have remained in the middle of the range that has prevailed since 2010, and stress tests show the system remains resilient to a severe recession. • Leverage was somewhat elevated at hedge funds, and bank lending to the broader set of nonbank financial institutions continued to grow. • Monitoring some parts of the nonbank financial sector, where hidden pockets of leverage could amplify adverse shocks, could be enhanced with more comprehensive and timely data. 	<ul style="list-style-type: none"> • Domestic banks maintained high levels of liquid assets and stable funding. • Structural vulnerabilities persist at money market funds, some other mutual funds, and stablecoins. • Central counterparties maintain elevated margin requirements amid high market volatility, which clearing members have continued to meet.

Raising Money on Wall Street Hasn't Been This Hard in a Decade (WSJ) Mergers, stock and bond offerings slowed in October to lowest level in over a decade as Fed rate hikes sucked capital out of the markets

Capital-markets activity in October



Source: Dealogic

Billions in Capital Calls Threaten Forced Sales of Stocks, Bonds (Bloomberg, attached)

Capital calls outweigh distributions for private markets funds

❑ Cash-strapped investors forced to consider stock, bond sales

[Fidelity to open commission-free crypto trading to retail investors](#) (CNBC)

[Ethereum Insiders to Get Fee Cuts That Others Won't in Upgrade](#) (Bloomberg, attached)

❑ Change called WARM Coinbase will reduce some fees builders pay

❑ Builder Flashbots already has a lot of power on Ethereum

[The Death of Crypto Has Been Greatly Exaggerated, Again, \(Institutional Investor, attached\)](#)

[Frackers Say Oil Production Slowing in the Shale Patch](#) (WSJ) U.S. oil-and-gas companies offer little relief for tight global markets

[FT - Fire sale begins as property funds face rush of UK redemptions](#) (attached, Ling Yu) Investors withdrawing millions of pounds triggers sale of prime property

[UK House Prices Fall Most in Almost Two Years](#) (Bloomberg, attached)

[The Shadow \(Banking System\) How the Fed Helped Spawn a \\$23.7 Trillion Market](#) (Bloomberg, attached) The origin story of the ultimate economic antihero.

[CFOs Boost Currency Protections, Extend Hedge Contracts as Strong Dollar Takes Toll](#) (WSJ) Coca-Cola, Kimberly-Clark and Prologis are among the U.S. businesses that have added layers or lengthened hedges

[CLO Activity to Pick Up in Second Half of 2023, Barclays Says](#) (Bloomberg, attached) Economic uncertainty will affect CLO issuance in 2023, yet activity may pick up in the second half of the year if central banks manage to control inflation, Barclays analysts Keyur Vyas and Pranava Boyidapu write in an outlook report.

[Law360 - SEC Seeks Early Win Over Biz Groups' Proxy Rule Challenge](#) (attached, Ling Yu) The SEC asked the court to rule in its favor in the [suit filed by the U.S. Chamber of Commerce](#), along with the [Business Roundtable](#) and Tennessee Chamber of Commerce & Industry, who allege that the agency overstepped in July when it [scrapped certain proxy advisory rules](#) enacted two years ago during the Trump administration.

[Law360 - SEC Says Crypto 'Club' Was \\$295M Ponzi Scheme](#) (attached, Ling Yu) The SEC alleged that Trade Coin Club was marketed as an opportunity to profit from crypto asset trading activities using a bot that Braga had stated made "millions of microtransactions" every second and assured minimum daily trading profits for investors. But in reality, Trade Coin Club had no external source of funding for investor withdrawals or redemptions, and withdrawals were paid solely with investor deposits.

[Bank of America Projects Defaults at 6% Next Year, Mostly CCC](#) (Bloomberg) -- Bank of America says defaults will be at 6% next year as a base-case (Note: Peak was 12% during the GFC --- Dano), with 22% of triple C-rated facilities at risk of not paying.

- There is a high possibility defaults will be closer to 4% to 6%, analysts Oleg Melentyev and Eric Yu wrote in a report Friday
 - "All it would take is for the Fed to downshift the policy tightening soon and reduce the risk of doing too much damage to the economy with outsized hikes before the full extent of cumulative tightening is known," the analysts wrote
 - The probability of the central bank downshifting policy has increased after Wednesday's rate hike decision, they added
- The bank also expects 1% of defaults in double-B rated facilities and 8% in single-Bs
- High-yield senior unsecured credit facility recoveries are expected to be 41 points overall
 - Recoveries will be 55 points in double-Bs, 46 points in single-Bs and 37 points in triple-Cs
- With defaults in mind, BofA recommends raising cash now and staying overweight with high-quality facilities

[US HY OPEN: Junk Market Eyes on Tenneco, Nielsen And DISH](#) (Bloomberg) -- US junk bonds are in the middle of a busy and crowded primary market this week after Apollo's Tenneco shook the dormant market and is on the road with \$1b 6-year notes until Thursday. Tenneco was soon followed by Nielsen Holdings, a US TV rating business firm, which kicked off a \$1.96b bond sale to fund its buyout by Elliott Investment Management and Brookfield Asset Management. Nielsen is also slated to price these bonds this week. While all eyes are on the outcome of mid-term elections and its implications for the economy and market in the coming year, satellite TV company DISH Network is set to price the \$2b 5-year secured notes Monday at a discount to yield about 12%.

- The primary market was steadily getting crowded as bankers rushed to clear the pending calendar before the year-end, with yields dropping from near 10% in the middle of October to near 9% and spreads hovering near +450bps
- While the October rally drew investors into the junk bond market as US high-yield funds reported a cash intake of \$4.28b for week ended Nov 2, the third biggest weekly inflow this year
 - The cash influx came at the time of acute shortage of new supply fueling secondary market prices and emboldening bankers to push highly leveraged LBO deals such as Tenneco and take advantage of the window of opportunity
 - Canadian software company OpenText Corp has just begun marketing \$3.08b 7-year term loan to fund the acquisition of Micro Focus International. The debt financing package additionally includes at least \$1.5b senior secured notes. The bond sale could follow sometime this month or early December
 - The sudden rush of borrowers, alongside Federal Reserve's repeated assertion that rate hike campaign will continue, even if the pace slows down a bit while raising the target terminal rate, led to the erasure of the recent gains
 - The rally was sapped after the Federal Reserve signaled a higher terminal rate against a backdrop of slowing growth. "We continue to think this is not supportive of credit spreads," and so remain bearish, Brad Rogoff of Barclays wrote on Friday

While elevated macro uncertainty and the Fed's aggressive rate-hiking cycle ground the primary market to halt in recent months, Barclays expects issuance to be higher in the back half of 2023 as the central-bank rate-hiking cycle slows and the growth and inflation pictures become more clear, Rogoff wrote Friday

- Barclays estimates 2023 junk bond supply to be in the range of \$170b- \$210b; Though higher than 2022, it is still below the 2010-2020 average of \$277b

- US junk bonds may rebound on Monday amid a broader risk-on move. Equity futures advanced and bond selloff stalled as some investors bet a period of disinflation has already begun and the midterm election results will be favorable to markets

CREDIT DAYBOOK AMERICAS: Dish Junk Deal to Price; More Defaults (Bloomberg) -- Dish Network may sell a \$2 billion junk-bond deal on Monday after the firm sweetened the yield and pushed back the pricing date. Wall Street syndicate desks are forecasting as much as \$30 billion in fresh investment-grade debt issuance this week. Meanwhile, S&P is warning of an \$89 billion mountain of distressed bonds.

- The spread on the Markit CDX North American Investment Grade Index, which declines as credit risk drops, tightened 1.19 basis points to 88.8 as of 7:28 a.m. New York time
- US debt sellers may have to again seek out a short window to issue new bonds and loans as a slew of key economic indicators threatens to spur market volatility this week
 - The spectrum-backed secured Dish bonds are now expected to price on Monday from an original date of Nov. 4, a sign the deal is struggling to attract demand from investors
- Elsewhere, Canada's Open Text kicked off a roughly \$3.1 billion leveraged loan sale to help finance its acquisition of British software business Micro Focus International. Banks will hold a lender call for the seven-year offering on Monday at 1:30 p.m. New York time
- Banks are also offering steep discounts on \$2.4 billion of junk bonds and loans to help finance Apollo's leveraged buyout of auto-parts maker Tenneco
 - A separate group of banks kicked off a \$1.96 billion high-yield bond sale to help finance the LBO of TV ratings business Nielsen Holdings
- Some 7.6% of US low-grade bonds traded at least 1,000 basis points above Treasuries as of mid-October, eclipsing the five-year average, according to S&P. That puts the total volume of distressed bonds at \$89 billion, from \$26 billion in October 2021, with health-care and retail sectors responsible for the largest annual surges in the riskiest bonds**
- A unit of Walgreens Boots Alliance is nearing a deal to combine with a big owner of medical practices and urgent-care centers in a transaction worth roughly \$9 billion including debt, WSJ reported
- Goldman Sachs, Bank of America and Royal Bank of Canada have provided bridge financing commitments to help fund the acquisition of US auto retailer IAA by Canada's Ritchie Bros. Auctioneers in a transaction worth about \$6.2 billion, according to a statement Monday
- A group of lenders to Serta Simmons Bedding sued rival lenders and the company over a controversial 2020 debt deal that saw certain creditors jump ahead of the repayment line, and are seeking to invalidate the deal
- The private market is coming to collect -- and it threatens to wreak havoc across global stocks and bonds. As financial conditions tighten around the world, private-market funds are demanding that investors stump up more of the cash they pledged during the easy-money days of the pandemic
- The investment firm of a leading member of Abu Dhabi's royal family is making a foray into the \$1.3 trillion global private-credit market, partnering with US-headquartered Alpha Wave Global to make loans to middle-market companies

STRUCTURED PIPELINE: Data Center Deal Likely to Jump Start Week (Bloomberg) -- World Omni, Stonebriar, GM Financial and Kansas Gas Service are among the ABS issuers expecting to price new deals this week. Aligned may be first out of the gate with a data center transaction later on Monday. With approximately \$247.9 billion issued, US primary market volume in 2022 is roughly 9.3% lower from this time in 2021, according to data compiled by Bloomberg News. ABS-15Gs were filed on Friday by Mercedes-Benz, Nissan Auto Leasing and Mercury Financial. Earlier on Monday, a filing was issued by Enterprise Fleet Management.

- Last week's private-label CMBS supply was limited to one single asset, single borrower. YTD volume is down approximately 26.6% year-over-year at \$95.7 billion
 - The BANK 2022-BNK44 conduit is expected to price this week
- Freddie Mac is expected to price its SB-104 and Q-020 agency CMBS deals later this week
- New issue US CLO sales are lower by roughly 25% year-over-year at \$114.7 billion
- Private-label RMBS supply stands at approximately \$123.6 billion compared to \$178.5 billion at this time last year, according to data from Bloomberg LEAG

Structured Highlights: Last Week

- CLO Managers Pounce on Lower Loan Prices: Structured Weekly
- 'Buy Now, Pay Later' Lender Affirm Drops \$350 Million Bond Plan
- Barclays Analysts Anticipate Flat to Lower CMBS Supply in 2023

- CLO Activity to Pick Up in Second Half of 2023, Barclays Says
- Fitch Says Most CMBS Conduit Loans Can Still Be Refinanced
- Ares Joins 'Print and Sprint' Ranks as Loan Prices Remain Low
- Tetragon Unit Markets 'Print and Sprint' CLO as Loan Prices Limp
- Credit Risk Transfer Index Stumbles Again on Rates: Fontanilla
- Libor's 'Unloved' Heir Plagued by Dim Demand, JPMorgan Says (1)
- Usual CMBS Spread Rally to Start Year May Skip 2023, BofA Says

DISTRESSED DAILY: No Post-Pandemic Jolt for Learfield's Finances (Bloomberg) -- Learfield Communications LLC., the college sports broadcasting giant, is struggling to find its financial footing even though sporting events have made a broad post-pandemic comeback. Despite multimedia, ticketing and licensing revenues bouncing back from pandemic lows, colleges that demand more in fees for multimedia rights dented Learfield's profitability for fiscal year 2022, according to a recent note from Moody's Investors Service. The Jefferson City, Missouri-based firm also maintains an "extremely high leverage" ratio of 30 times its measure of earnings and has a series of loans due in the next 24 months, factors that concern Moody's analysts. The credit rating company warned that Learfield will continue to have elevated leverage and see negative free cash flow through 2023. Additionally, analysts said they fear that it will struggle to meet its debt maturities as refinancing conditions tighten with higher interest rates and dim economic forecasts. There is promise for Learfield though. The company touts strong business prospects with a significant market presence --especially after its merger with IMG College -- a fervent fan base for college sports, a substantial amount of pre-sold ad inventory and solid relationships with universities. Still, Moody's outlook remains grim. Learfield has weak liquidity with a \$125 million revolver and \$58 million asset based SPV facility that will mature in September 2023. The company \$88 million cash on hand, though that amount will fall under pressure as a result of higher costs for broadcasting rights, Moody's wrote. Analysts cut the company's rating further into junk territory on Nov. 1.

- DATA POINTS

- QUOTABLE

- "We'd rather keep our product for customers that we expect will pay us with no issues and no problems."
 - Richard Elden, Dbest Products Inc. chief executive officer, on supplying troubled retailer Bed Bath & Beyond Inc.

- DEADLINES AND DOCKETS

- All times are U.S. Eastern unless specified and are subject to late revision or cancellation.
- Monday, Nov. 7
 - Cineworld Group plc, emergency sale motion, 3 p.m.
 - Compute North Holdings, sale hearing 10 a.m.
 - Kabbage Inc., cash collateral and cash management motions, 1 p.m.
 - Purdue Pharma, AP Avrio Health v. AIG, 10 a.m.

- READING LIST

- News, research and insight relevant to distressed investing
- Blackstone-Backed TeamHealth Starts Confidential Financing Talks
- S&P Warns of \$89 Billion Mountain of Distressed US Company Bonds
- Apollo, Angelo Gordon Sue Serta Simmons Over 2020 Financing
- Rochester Diocese Strikes \$55 Million Deal With Abuse Victims

Daniel J. Nigro

Sr. Specialized Examiner/U.S. Securities and Exchange Commission

100 Pearl St., Suite 20-100, New York, NY 10004-2616

(O) (b)(6) (M) (b)(6)

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To: (b)(6) <(b)(6)@bankofengland.co.uk>
From: Hutchinson, Kathleen
Sent: 2022-11-29T14:22:44Z
Subject: RE: [EXTERNAL] Meeting
Received: 2022-11-29T14:22:44Z

Hi (b)(6)
I was able to confirm everyone's availability for 12:30/5:30pm today. Please let me know if you received the webex.
Thanks,
Kathleen
Kathleen M. Hutchinson
Deputy Director | Office of International Affairs
US Securities and Exchange Commission
100 F St. NE
Washington, DC 20549
Direct Dial: (b)(6)

From: (b)(6) <(b)(6)@bankofengland.co.uk>
Sent: Tuesday, November 29, 2022 9:20 AM
To: Hutchinson, Kathleen <(b)(6)@sec.gov>
Cc: Latson, LaShawn (Contractor) <(b)(6)@SEC.GOV>; Klimow, Daniel <(b)(6)@SEC.GOV>; Macdonald, Morgan G <(b)(6)@SEC.GOV>; Sheppard, Lesli <(b)(6)@SEC.GOV>; (b)(6) <(b)(6)@bankofengland.co.uk>; (b)(6) <(b)(6)@bankofengland.co.uk>; (b)(6) <(b)(6)@bankofengland.co.uk>; (b)(6) <(b)(6)@bankofengland.co.uk>

Subject: RE: [EXTERNAL] Meeting

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Official Blue

Thanks Kathleen – we could do between 3-4pm UK time tomorrow as well if that helps.

From: Hutchinson, Kathleen <(b)(6)@sec.gov>
Sent: Tuesday, November 29, 2022 1:42 PM
To: (b)(6) <(b)(6)@bankofengland.co.uk>
Cc: Latson, LaShawn (Contractor) <(b)(6)@SEC.GOV>; Klimow, Daniel <(b)(6)@SEC.GOV>; Macdonald, Morgan G <(b)(6)@SEC.GOV>; Sheppard, Lesli <(b)(6)@SEC.GOV>; (b)(6) <(b)(6)@bankofengland.co.uk>; (b)(6) <(b)(6)@bankofengland.co.uk>; (b)(6) <(b)(6)@bankofengland.co.uk>; (b)(6) <(b)(6)@bankofengland.co.uk>

Subject: Re: [EXTERNAL] Meeting

Let me check. If not, is there a time tomorrow that works?
On Nov 29, 2022, at 6:02 AM, (b)(6) <(b)(6)@bankofengland.co.uk> wrote:

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Official Blue

Hi Kathleen,
Really sorry to be a pain, but (b)(6) has just put in a meeting a few of us need to attend at 4.30 UK time.
Would 5.30 work instead? If so would you mind sending a Webex.
Sorry for the short notice change.

Thanks

(b)(6)
From: Hutchinson, Kathleen <(b)(6)@sec.gov>
Sent: Sunday, November 27, 2022 6:15 PM

(b)(6) @SEC.GOV>; Sheppard, Lesli (b)(6) @SEC.GOV>; (b)(6)
(b)(6) bankofengland.co.uk>; (b)(6) bankofengland.co.uk>; (b)(6)
(b)(6) bankofengland.co.uk>

Subject: RE: [EXTERNAL] Meeting

Hi (b)(6)

Sorry for the delay. Yes, Tuesday at 4:30pm London/11:30 DC works for us. I will send a WebEX shortly.

Best,

Kathleen

Kathleen M. Hutchinson

Deputy Director | Office of International Affairs

US Securities and Exchange Commission

100 F St. NE

Washington, DC 20549

Direct Dial: (b)(6)

(b)(6)

From: (b)(6) @bankofengland.co.uk>

Sent: Friday, November 25, 2022 4:19 AM

To: Hutchinson, Kathleen (b)(6) @sec.gov>

Cc: Latson, LaShawn (Contractor) (b)(6) @SEC.GOV>; Klimow, Daniel (b)(6) @SEC.GOV>; Macdonald, Morgan G

(b)(6) @SEC.GOV>; Sheppard, Lesli (b)(6) @SEC.GOV>; (b)(6)

(b)(6) bankofengland.co.uk>; (b)(6) bankofengland.co.uk>; (b)(6)

(b)(6) bankofengland.co.uk>

Subject: RE: [EXTERNAL] Meeting

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Official Blue

Hi Kathleen,

Just checking if any of these times worked for you. If not, we can try and find another slot.

Thanks

(b)(6)

From: (b)(6)

Sent: Wednesday, November 23, 2022 10:08 AM

To: Hutchinson, Kathleen (b)(6) @sec.gov>

Cc: Latson, LaShawn (Contractor) (b)(6) @SEC.GOV>; Klimow, Daniel (b)(6) @SEC.GOV>; Macdonald, Morgan G

(b)(6) @SEC.GOV>; Sheppard, Lesli (b)(6) @SEC.GOV>; (b)(6)

(b)(6) bankofengland.co.uk>; (b)(6) bankofengland.co.uk>; (b)(6)

(b)(6) bankofengland.co.uk>

Subject: RE: [EXTERNAL] Meeting

Official Blue

Hi Kathleen,

Unfortunately that doesn't work, would any time between 4pm and 6pm UK time on Tuesday work for you?

Thanks

(b)(6)

From: Hutchinson, Kathleen (b)(6) @sec.gov>

Sent: Tuesday, November 22, 2022 5:56 PM

To: (b)(6) @bankofengland.co.uk>

Cc: Latson, LaShawn (Contractor) (b)(6) @SEC.GOV>; Klimow, Daniel (b)(6) @SEC.GOV>; Macdonald, Morgan G

(b)(6) @SEC.GOV>; Sheppard, Lesli (b)(6) @SEC.GOV>; (b)(6)

(b)(6) @bankofengland.co.uk>; (b)(6) @bankofengland.co.uk>; (b)(6)

(b)(6) bankofengland.co.uk>

Subject: RE: [EXTERNAL] Meeting

Hi (b)(6)

Thanks for reaching out. We would be happy to discuss the note. Folks here are available at 10am DC/3pm London on Tuesday, November 29. Please let me know if that works for you. If not, I will see if I can try to find another slot.

Kathleen
Kathleen M. Hutchinson
Deputy Director | Office of International Affairs
US Securities and Exchange Commission
100 F St. NE
Washington, DC 20549
Direct Dial: (b)(6)

(b)(6)
From: (b)(6) <(b)(6)@bankofengland.co.uk>
Sent: Tuesday, November 22, 2022 12:27 PM
To: Hutchinson, Kathleen (b)(6) <(b)(6)@sec.gov>
Cc: Latson, LaShawn (Contractor) (b)(6) <(b)(6)@SEC.GOV>; Klimow, Daniel (b)(6) <(b)(6)@SEC.GOV>; Macdonald, Morgan G (b)(6) <(b)(6)@SEC.GOV>; Sheppard, Lesli (b)(6) <(b)(6)@SEC.GOV>; (b)(6) <(b)(6)@bankofengland.co.uk>; (b)(6) <(b)(6)@bankofengland.co.uk>; (b)(6) <(b)(6)@bankofengland.co.uk>
Subject: RE: [EXTERNAL] Meeting

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Official Green

Hi Kathleen,

Our crypto team have prepared a note on the Ethereum Merge and what it might tell us about (b)(5)

(b)(5)
(b)(5) Before we did we would really welcome the opportunity to discuss with you and your colleagues. Would you have time early next week for a call with a mix of international and any of your crypto specialists to discuss the note?

Thanks

(b)(6)
From: (b)(6)
Sent: Tuesday, November 22, 2022 9:51 AM
To: Hutchinson, Kathleen (b)(6) <(b)(6)@sec.gov>
Cc: Latson, LaShawn (Contractor) (b)(6) <(b)(6)@SEC.GOV>; Klimow, Daniel (b)(6) <(b)(6)@SEC.GOV>; Macdonald, Morgan G (b)(6) <(b)(6)@SEC.GOV>; Sheppard, Lesli (b)(6) <(b)(6)@SEC.GOV>; (b)(6) <(b)(6)@bankofengland.co.uk>; (b)(6) <(b)(6)@bankofengland.co.uk>
Subject: RE: [EXTERNAL] Meeting

Official Blue

Hi Kathleen,

Good to hear you are coming to London for the FRWG. We would be very happy to meet you and YJ on 13th December.

(b)(6) cc'ed, should be able to find a slot.

Thanks

(b)(6)
From: Hutchinson, Kathleen (b)(6) <(b)(6)@sec.gov>
Sent: Monday, November 21, 2022 10:52 PM
To: (b)(6) <(b)(6)@bankofengland.co.uk>
Cc: Latson, LaShawn (Contractor) (b)(6) <(b)(6)@SEC.GOV>; Klimow, Daniel (b)(6) <(b)(6)@SEC.GOV>; Macdonald, Morgan G (b)(6) <(b)(6)@SEC.GOV>; Sheppard, Lesli (b)(6) <(b)(6)@SEC.GOV>
Subject: [EXTERNAL] Meeting

This email has reached the Bank via the Internet or an external network. Please be cautious of any links or attachments in this email.

Hi (b)(6)

I hope all is well. Yi. Morgan and I will be in London for the FRWG meeting on December 14 and wanted to check whether you, (b)(6) and colleagues would be available to meet on December 13. We would be interested in exchanging views on the FSB agenda, crypto, climate and asset management topics.

We look forward to hearing from you.

Kind regards,

Kathleen

Kathleen M. Hutchinson

Deputy Director | Office of International Affairs

US Securities and Exchange Commission

100 F St. NE

Washington, DC 20549

Direct Dial: (b)(6)

(b)(6)

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From: Hutchinson, Kathleen

Importance: Normal

Subject: FW: SEC-BoE call on Ethereum Merge note

Start Date/Time: 2022-11-29T17:30:00Z

End Date/Time: 2022-11-29T18:00:00Z

-----Original Appointment-----

From: Hutchinson, Kathleen

Sent: Sunday, November 27, 2022 1:12 PM

To: Hutchinson, Kathleen; Fischer, YJ; Fischer, Amanda; Frayer, Corey; Szczepanik, Valerie; Starr, Amy; Balcom, Jonathan; Baumann, Kevin

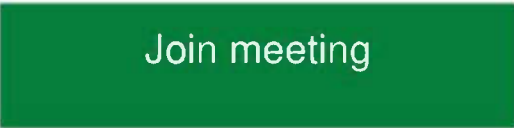
Subject: SEC-BoE call on Ethereum Merge note

When: Tuesday, November 29, 2022 12:30 PM-1:00 PM (UTC-05:00) Eastern Time (US & Canada).

Where:

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When it's time, join your Webex meeting here.



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(b)(6)

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Meeting number (access code): (b)(6)

Meeting password: (b)(6) from phones and video systems)

Tap to join from a mobile device (attendees only)

(b)(6) USA Toll 2
US Toll

Some mobile devices may ask attendees to enter a numeric meeting password.

Join by phone

(b)(6) USA Toll 2
US Toll

Global call-in numbers

Join from a video system or application

Join using Microsoft Lync or Microsoft Skype for Business

Dial

If you are a host, [click here](#) to view host information.

Need help? Go to <https://help.webex.com>

To: 'Bo Howell'[bo.howell@fintechlegal.io]
From: Foor, Jeffrey A.
Sent: 2023-02-24T21:44:33Z
Subject: RE: Ethereum Fund
Received: 2023-02-24T21:44:33Z

Thanks Bo. I am working on your question. I will get back to you as soon as possible.

Best,
Jeff

From: Bo Howell <bo.howell@fintechlegal.io>
Sent: Tuesday, February 21, 2023 3:06 PM
To: Foor, Jeffrey A. (b)(6) @SEC.GOV>
Subject: Ethereum Fund

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Jeff,
It's been a few months since we talked about the Ethereum Fund. Given that the merge occurred without a hitch, is the staff ready to entertain an Ethereum Fund submission?

Bo J. Howell
Managing Director
FinTech Law
(b)(6)
bo@fintechlegal.io

Want to chat? Schedule time with me via [Calendly](#).



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there is little that we anticipate will meaningfully shift the macro narrative. Instead, the combination of Fed speakers and the FOMC minutes will reinforce Powell's bid for flexibility while the ongoing debt-ceiling negotiations will leave investors appropriately wary of becoming too optimistic as it relates to the outlook. One aspect of this week about which we have high conviction is that there will not be a debt-ceiling deal in place by the time the holiday weekend arrives.

HIGHLIGHTS FROM THE LYNGEN/JEFFERY US RATES WEEKLY: In the week ahead, investors in the US rates market will continue following the progress of a debt-ceiling deal as the Treasury Department aspires to avoid missing a payment. It's difficult to avoid images of Schoolhouse Rock's "[I'm Just a Bill](#)"—One of the late Dave Frishberg's greatest contributions; second only to "My Attorney Bernie". We digress. It goes without saying that any roadblocks on the bill's journey to become a law will be a risk-off trigger and associated with a bull steepening in the Treasury market. An uneventful trip through the House and Senate on the way to Biden's desk is what's currently reflected in the US rates market; therefore, any delays or increased risk that a compromise isn't achieved by early-June will rekindle default concerns. Our expectations are that a deal will be reached in enough time to avoid a missed payment, however, it won't be the smooth sailing that 2-year yields as high as 4.34% imply. The probability of a June hike continues to increase, further supporting rates in the front-end of the market.

The Fed's biggest challenge this year won't be executing another quarter-point increase in policy rates to a higher terminal, rather it will be mustering the conviction to hold the endpoint into 2024 as monetary policymakers have been signaling. Our take is that the bearishness is over-extended and 2-years currently represents a buying opportunity. We're onboard with the notion that avoiding default decreases the probability the Fed needs to adjust rates (albeit low to begin with); although it is much less obvious that there has been sufficient time since the banking sector turmoil to assume the Fed's reaction function to the data once again resembles Q4 2022. Justifying each incremental hike now that rates are restrictive takes on a different character. It's this underlying tension that has us skeptical that the proverbial stars will align in favor of a hike.

Alas, regardless of whether a move is ultimately in the cards, the price action and optimism can extend even further from current levels. Building odds of a hike will bring into question Powell's willingness to follow the traditional pattern of taking rate hike opportunities afforded to the Fed by market participants. It's this backdrop that has us cautious against completely writing off the potential for a June move. The May FOMC meeting minutes will provide context for the Fed's thinking two weeks ago – which presumably hasn't changed dramatically given the details of the April CPI release. In terms of an inflection point from flattening to steepening in the week ahead, we'll be watching the combination of the 2- and 5-year auctions as well as the minutes.

Accommodating supply and anchoring policy expectations will provide the needed buying impetus for investors.

Risk assets have performed better than one might have anticipated given investors' collective angst regarding the potential for the US to default. While the chances of a missed payment have been reduced by the progress reported by Biden and McCarthy, it's not a stretch to envision the pendulum quickly swinging in the other direction after the holiday weekend as the process comes down to the wire. Investors that have remained sidelined from the equity market in anticipation of a recession could see a test of this conviction as the S&P 500 is now up 9.7% year-to-date. Ongoing equity performance will keep financial conditions skewed easier than the Fed would like to see – incrementally adding to the case for a June rate move from the Committee.

Tactical Bias: It's not an especially pivotal upcoming week in terms of economic data, however, after the impressive bear flattening that has brought rates and the curve to the extremes, the staying power of the repricing will be the operative takeaway ahead of Friday's early close and the unofficial start to summer. After a week in which hawkish Fed speak was the main driver of the price action, the FOMC minutes promise to add more nuance around the Committee's interpretation of the balance of risks facing the outlook. Despite the renewed push of higher terminal pricing and the increased probability of a June hike, one of the critical unknowns remains the tightening that will result from the turmoil in the banking sector. In practical terms, this means our steepening view will need the benefit of time for the realized data to reflect the impact of higher rates. Of course, the optimism surrounding a debt ceiling will also need to see actual progress as the process of avoiding a sovereign default continues to play out.

Following a week full of official Fed communication including Powell's comments on Friday, along with a continuation of the rhetoric, Wednesday's FOMC minutes will provide greater clarity on the conversation at the May meeting, and the likelihood that the final hike of the cycle is in hand. Related to this line of thinking will be any update on how much tightening the Committee thinks the banking crisis is worth. With no dotplot update provided on May 3, our operating assumption is that the credit constriction resulting from the volatility pulled what had been a 5.75% terminal upper bound assumption to our baseline that 5.25% will serve as the fed funds peak for this cycle.

We'll argue the more relevant portion of the debate at this point is whether the turmoil warrants a sooner hiking reversal than what we've seen during typical cycles. A historically-average 7 months on hold would leave the December meeting as the first "live" unknown, although the consistency of the messaging from across the Committee that policy needs to stay on hold into 2024 shows little sign that the minutes will lay the groundwork for cuts as soon as July. When the Fed met on May 3rd, monetary policymakers did not have the benefit of the April CPI report, but the degree of solace that the Fed had taken in the already-realized moderation in consumer prices will nonetheless contribute to the overall takeaway from the minutes. As Kashkari highlighted in his comments early in the week just passed, it would be folly to declare victory over inflation after just a few months of data, while Logan said the data does not yet justify a pause, and the extent of this sentiment among the broader Committee will be informative.

This week's auctions include \$42 bn 2s, \$43 bn 5s, and \$35 bn 7s, that will help investors gauge the staying power of the backup in US rates as the market assesses the most probable policy response to the latest economic data inputs. Four of the five coupon

auctions since the May FOMC meeting have stepped through in a testament to growing dip buying interest in Treasuries. Particularly salient for this week's offerings, we would highlight 3s' impressive 3.0 bp stop through that speaks to the attractiveness of front-end rates at current levels – though that auction took place before the dramatic climb in yields over the last week. Since February, the trend is middling during 2s/5s/7s auction weeks – only 5s have managed to stop through (0.8 bp in March, 0.8 bp in April) while 2s have tailed by an average of 1.0 bp and 7s by an average of 1.3 bp. We expect the heightened volatility in terms of monetary policy expectations has been a large reason for the relatively softer sponsorship at the offerings of these more Fed-sensitive tenors. Considering the point in the policy cycle, we expect there will be solid demand for the discount offered by 2s back above 4.25% as well as 5- and 7-year yields trading near the top of their range over the last two months. - Ian Lyngen and Ben Jeffery

Debt-Ceiling Standoff Could Start a Recession, but Default Would Be Worse (WSJ) Economists assess the damage that could occur in three scenarios ranging from a last-minute deal to lengthy impasse

FT - Harness the power of AI to tackle financial crime (attached, Ling Yu) Within the world of finance, the role of the technology in stopping crime is perhaps its most compelling use case

Bank Runs Trash Long-Held Assumption on Deposits (WSJ) Regulators and lenders valued customer accounts higher when rates rose

London's Allen & Overy to Merge With Shearman & Sterling to Create \$3.4 Billion Global Law Firm (WSJ) The proposed merger is among the biggest tie-ups in the industry in recent memory, forming one of the largest law firms in terms of revenue

FT - Why the wisdom of the market crowd beats AI (attached, Ling Yu) The collective judgment of investors provides the most accurate representation of the pricing of stocks and bonds

Crypto Exchange Hotbit Halts Operations, Cites Falling Cash Flow (Bloomberg, attached)

- The Hong Kong-registered venue suspends business as of May 22
- Platform users are asked to withdraw funds before June 21
- The platform accounted for \$109 million in trading volume in the last 24 hours

Ripple Underdog Status vs. SEC Could Change as Case Advances (Bloomberg, attached)

Law360 - Gov't Backtrack On Ether As Security May Spur Crypto Clash (attached, Ling Yu)

Zero-Day Options Are Reordering the Way the Stock Market Behaves (Bloomberg, attached)

- Evidence grows that ODTE boom is messing with equity patterns
- Intraday volatility and muted daily moves both linked to ODTE

Private Credit Offers About the Only Path to Funding LBOs Now (Bloomberg, attached)

- Rising interest rates have wreaked havoc on leveraged buyouts
- Average loan costs have nearly doubled since January 2022

PacWest to Sell \$2.6 Billion Real Estate Loans at Discount (Bloomberg, attached) Kennedy-Wilson Holdings Inc. will buy the loans.

The buyer will also assume all future funding obligations of about \$2.7 billion.

FT/Ignites.com - Most People Still Have No Opinion on ESG: Gallup (attached, Ling Yu)

Highlights From the 5-19-23 Issues of the Asset Backed & Commercial Mortgage Backed Alerts (attached, Ling Yu)

FT - US companies pull forward bond deals amid debt ceiling nerves (attached, Ling Yu) Investment grade bond issuance so far this month is more than double last May's levels

CREDIT DAYBOOK AMERICAS: Debt Talks Continue; PacWest Asset Sale (Bloomberg) -- President Joe Biden and Republican House Speaker Kevin McCarthy meet again Monday to continue talks over the US debt ceiling impasse. PacWest agreed to sell a portfolio of real estate construction loans to help shore up cash.

- The spread on the Markit CDX North American Investment Grade Index, which declines as credit risk drops, widened 0.17 basis points to 79.7 as of 7:17 a.m. New York time
- Traders are bracing for turbulence in markets with repayment of US Treasury debt, long regarded as the global benchmark for financial safety, in question as soon as June 1
 - Goldman Sachs economists see the Treasury's cash levels below the bare-minimum \$30 billion mark by June 8 or 9, or sooner. On Friday, they assigned a 30% chance of a deal this week and the same odds "shortly before" the deadline
- PacWest agreed to sell a \$2.6 billion portfolio of 74 real estate construction loans to Kennedy-Wilson as part of its its previously announced plan to bolster liquidity
- JPMorgan will gain an even bigger benefit from rising interest rates because of its purchase of First Republic Bank
 - The biggest US bank raised its guidance for net interest income this year to \$84 billion, excluding its trading business, up from a previous forecast of \$81 billion, according to a presentation on its website released ahead of its Investor Day Monday
- Dealers surveyed by Bloomberg are expecting up to \$20 billion of US high-grade corporate bond sales, most of it at the start of the week
- Platinum Equity-backed chemical supplier Solenis is in the market with a \$1.63 billion US junk-bond sale that will help fund its acquisition of Diversey Holdings
 - It held an investor call Wednesday

- It's also selling a \$750 million leveraged loan to back the purchase. Both parts of the financing are set to price this week
- In the US leveraged loan market, KinderCare's \$1.33 billion term loan to refinance debt, and PG&E's \$2.67 billion term loans to extend maturities, both have commitments due
 - There are now about eight transactions working in the primary market
- **Bond-market titans BlackRock, Pacific Investment Management Co. and Vanguard Group are warning that recent violent swings in US Treasuries are only the beginning of a new era of volatility that's here to stay until central banks conquer inflation**
- Non cyclicals led US high- yield spread widening over the past week
 - The average US high- yield risk premium rose 6 basis points to 477 basis points, according to Bloomberg index data
 - Financials push average investment-grade spreads 2 basis points tighter to 143 basis points
- US credit ratings deteriorated last week as the main ratings companies issued 68 downgrades and 33 upgrades. Financials had the most downgrades, while consumer discretionary had the most upgrades
- A dollar note due July 23 from Wanda Properties Overseas Ltd., a unit of Dalian Wanda Group Co., fell 5.5 cents to 70 cents Monday, according to Bloomberg-compiled prices

US HY OPEN: Yields Surge on Debt Ceiling Angst (Bloomberg) -- US junk bond borrowers crowded the primary market spurred by the standoff over the debt ceiling negotiations and rushing to get ahead of any sudden surge in yields and spreads. Yields rose 24bps to close at a seven-week high of 8.85% on Friday, the biggest weekly jump in more than two months. Rising yields triggered by worries over negotiations to raise the debt ceiling drove the biggest weekly loss of 0.4%, the most in two months. The losses extended across high yield ratings, with BBs posting the biggest weekly loss in 10 weeks as yields climbed for the third straight week to 7.18%.

- Rising volatility and fears that the debt ceiling impasse could threaten a default caused investors to pull cash out of the junk bond market last week. US high yield funds reported an outflow of \$1.15b week ended May 17, the third consecutive week of outflows
 - The uncertainty and elevated volatility also pushed borrowers to rush before markets slowdown or even freeze temporarily
 - The primary market priced \$7.5b last week, the busiest in six weeks
 - Venture Global LNG sold \$4b on Friday after drawing orders of more than \$7b
 - Contract services provider to pharmaceutical, biotechnology and medical device companies, IQVIA Holdings sold \$500m 7-year notes last week at the tight end of talk after drawing orders of more than \$1.6b
 - A consortium of private equity sponsors led by Blackstone sold \$400m 7-year notes to fund the buyout of the software company Cvent Holding Corp. The bonds also priced at the lower end of talk
- The month- to-date supply jumped to more than \$17b, a 331% jump from May 2022. The year-to-date volume stood at almost \$75b
- **The primary market was also boosted by strong technicals — that is, relatively thin supply by historical standards**
 - The US high yield universe contracted by 4% year-to-date after rising stars — Occidental, Ford Motors and Kraft - made a big dent to the size of the junk bond market
 - The market shrunk by 11% in 2022
- **The primary market is seeing extensive private equity-backed activity**
 - Platinum Equity-backed chemicals company Solenis began marketing \$2.125 billion 5.5-year senior secured notes in dollars and euros to fund the acquisition of Diversey Holdings
 - Madison Dearborn Partners started the roadshow for long- awaited bonds to finance the buyout of MoneyGram International, a P2P payments and money transfer services provider
 - Aventiv Technologies, also owned by Platinum Equity, remains in the market. The prison phone company is looking to sell a \$400 million 4-year secured notes offering to refinance debt. Bankers have been trying to lure investors with a yield of roughly 11%. The bonds and loans could price this week. Investor commitments were due May 12

STRUCTURED PIPELINE: Slew of Auto ABS Issuers Line Up New Deals (Bloomberg) -- At least seven ABS issuers are likely to price transactions later this week, joining at least one CMBS offering that's marketing and about to get wrapped up.

- Around \$3 billion of auto ABS was poised to be announced early this week, including a prime offering by Carvana and a revolving prime debt sale by GM Financial
- A conduit CMBS led by BMO and other banks is set to price early this week, on the heels of a Friday pricing of a Morgan Stanley and Wells Fargo-led transaction

Structured Highlights: Week of 5/22/23

- Blackstone Bond Pair to Help Thaw CMBS Market: Structured Weekly

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Gov't Backtrack On Ether As Security May Spur Crypto Clash

By **Matthew Lindenbaum, Robert Lindholm and Richard Levin** (May 19, 2023, 5:28 PM EDT)

Cryptocurrency entrepreneurs should be forgiven if they feel a bit like the confused and embittered Lando Calrissian at the climax of "The Empire Strikes Back," when Darth Vader once again changes the terms of their deal. Similarly, concerns about U.S. Securities and Exchange Commission Chair Gary Gensler and New York Attorney General Letitia James' power are compounded by the fact that their views on what sort of cryptocurrency counts as a security diverge from that of past senior personnel at the SEC and the states.

In his famous 2018 speech, "Digital Asset Transactions: When Howey Met Gary (Plastic),"[1] William Hinman, the former director of the SEC's Division of Corporation Finance, asked:

"Can a digital asset that was originally offered in a securities offering ever be later sold in a manner that does not constitute an offering of a security?" In cases where the digital asset represents a set of rights that gives the holder a financial interest in an enterprise, the answer is likely "no." In these cases, calling the transaction an initial coin offering, or "ICO," or a sale of a "token," will not take it out of the purview of the U.S. securities laws.[2]

Hinman added:

But what about cases where there is no longer any central enterprise being invested in or where the digital asset is sold only to be used to purchase a good or service available through the network on which it was created? I believe in these cases the answer is a qualified "yes." [3]

Apparently, James and her team disagree.

On March 9, James **announced** a sweeping enforcement action against digital currency exchange KuCoin, a leading global crypto exchange based on trading volume.

She alleged in her petition that KuCoin violated New York's Martin Act, the state's "blue sky" securities law, by (1) selling and purchasing securities and commodities without being registered as a New York commodities broker-dealer or securities broker or dealer; (2) issuing "KuCoin Earn," a proprietary savings and staking token, which the New York attorney general considers an unregistered security; and (3) falsely holding itself out as an exchange.[4]

New York investigators claim to have created and used a KuCoin account using a New York IP address, even though KuCoin is not registered to operate in the Empire State. Specifically, James alleges that KuCoin collected transaction fees from purchases and sales of digital currencies ether, luna, UST and KuCoin Earn, all of which the New York attorney general deems commodities and securities.



Matthew Lindenbaum



Robert Lindholm



Richard Levin

The action follows KuCoin's failure to provide testimony in compliance with a January subpoena.

Also worth noting is James' reliance on SEC v. LBRY Inc., a November 2022 U.S. District Court for the District of New Hampshire decision. The ruling found that when applying the Howey test — referring to the U.S. Supreme Court's 1946 decision in SEC v. W.J. Howey Co. — statements characterizing a token as an investment with growth potential tied to its founders' futures weighed in favor of a holding that the token at issue was a security.[5] James cited LBRY in concluding that ether, luna and UST are securities under New York law.

The New York attorney general seeks to permanently enjoin KuCoin from selling and buying securities and commodities in New York, a detailed accounting of KuCoin's transactions, and payment of restitution and disgorgement of all revenue obtained through allegedly illegal conduct.

This action is part of James' ongoing campaign to rein in what her office has characterized as "shadowy" players. In February, for example, she brought a similar enforcement action against CoinEx, a much smaller exchange.[6]

Has the Government Treated Ether Unfairly?

In a first-of-its-kind move, James argues that ether — the second largest cryptocurrency by market capitalization at over \$170 billion, according to the New York attorney general — constitutes a security under New York law. This classification came just days after U.S. Commodity Futures Trading Commission Chair Rostin Behnam reaffirmed in Senate testimony the CFTC's position that ether is a commodity.[7]

Gensler, however, recently opined that "[e]verything other than bitcoin" was within the SEC's jurisdiction, subtly signaling the commission's evolving, more aggressive posture with respect to ether.[8] By arguing that ether constitutes both a security and commodity, James fanned the flames of an ongoing debate over ether's regulatory future, seemingly avoided a confrontation with both the SEC and the CFTC, and introduced a third, novel approach.

The New York attorney general's position runs contrary to Hinman's opinion that ether was sufficiently decentralized so as to not be a security. In his speech, Hinman noted:

And putting aside the fundraising that accompanied the creation of Ether, based on my understanding of the present state of Ether, the Ethereum network and its decentralized structure, current offers and sales of Ether are not securities transactions. And, as with Bitcoin, applying the disclosure regime of the federal securities laws to current transactions in Ether would seem to add little value. Over time, there may be other sufficiently decentralized networks and systems where regulating the tokens or coins that function on them as securities may not be required. And of course there will continue to be systems that rely on central actors whose efforts are a key to the success of the enterprise. In those cases, application of the securities laws protects the investors who purchase the tokens or coins.[9]

Hinman's speech has since become a subject of contention in the SEC's enforcement action against Ripple Labs.

James' position is consistent with Gensler's view prior to joining the SEC. In a 2018 New York Times interview, Gensler opined that ether and Ripple Labs' crypto token XRP were likely issued and traded in violation of securities regulations, stating, "[t]here is a strong case for both of them — but particularly [XRP] — that they are noncompliant securities." The article went on to say that Gensler "believes Bitcoin, the original virtual currency, can remain exempt from securities regulations." [10]

On April 19, however, House Financial Services Committee Chair Patrick McHenry, R-N.C., asked whether an asset could be both a commodity and a security, and Gensler did not directly answer.[11] Gensler had seemingly left the door open that ether could be a security — even potentially if it was not always a security — when he commented back in September 2022 after a Senate Banking Committee meeting that cryptocurrencies that allow holders to "stake" their crypto may be defined as a security under the Howey test.[12]

Gensler reportedly said in September that "[f]rom the coin's perspective ... that's another indicia that

under the Howey test, the investing public is anticipating profits based on the efforts of others." [13] Whether coincidental or not, that same day ethereum transitioned to proof-of-stake, which means the network no longer relies on proof-of-work mining and instead allows validators to verify transactions and create new blocks in a staking process.

Gensler said then that allowing holders to stake coins results in "the investing public ... anticipating profits based on the efforts of others," a key part of the Howey test. [14]

Despite the various public debates about whether ether is a security or a commodity, James' action is the first litigation that has alleged ether is a security.

We anticipate the parties in this case will argue over, among other issues, whether ether, and the other digital assets identified in the petition, are securities under the Martin Act. The petition does not address whether the offer and sale of ether and other digital assets are barred by New York's three-year statute of limitations.

The ripple effect of any court concluding that ether is a security would be significant. From a registration perspective, any exchange that wants to bring together multiple buyers and sellers of ether would need to register with the SEC as a securities exchange or a broker-dealer and alternative trading system. Any transactions involving the sale of ether would be subject to federal securities law, including registration and disclosure requirements.

From a regulation perspective, any such decision would embolden regulators and private plaintiffs to bring actions against any exchange or issuer on the theory that all digital assets other than bitcoin are securities.

Bittrex Must Never Again Operate in the U.S.

The SEC's **recent action** against Bittrex is illustrative. [15]

In its April 17 complaint, the SEC alleged that the domestic and foreign entities operating under Bittrex's holding company worked in concert to sell securities to U.S.-based customers in violation of federal securities laws. Much like the New York attorney general, the SEC applied Howey in concluding that Bittrex sold several tokens constituting securities.

As a result, the SEC further alleges that Bittrex violated the Securities Exchange Act of 1934 by failing to register as a national securities exchange, broker-dealer and clearinghouse.

Importantly, however, the tokens listed in the SEC's complaint, pale in comparison to ether in terms of market capitalization. Insofar as the Exchange Act allows courts to impose penalties based on a violator's pecuniary gain, there exists a possibility for large penalties in an environment where regulators consider ether a security.

Less than a month after the SEC filed its complaint, Bittrex voluntarily filed for bankruptcy protection under Chapter 11 as part of an effort to exit the U.S. market.

Return of the Remedial Measures

Parties that have conducted initial coin offerings or token offerings that do not want to litigate against the SEC may be able to enter into an order that requires them to pay a monetary penalty and register their token as a security under Section 12(g) of the Exchange Act. Such an order will likely contain a number of remedial measures. [16]

The remedial model may seem burdensome to parties that believe they did not violate the securities laws when they offered their tokens to the public, but the approach is likely more economical than engaging in protracted and costly litigation with the SEC.

Conclusion — A New Hope

While the regulatory status of certain digital assets is unclear, the commitment of Gensler and James to taking action against the issuers of assets that were allegedly offered, sold and secondarily traded

in violation of the securities laws is clear.

Certain issuers of digital assets and trading platforms may have the financial wherewithal to litigate the matter. Other issuers of digital assets may find a resolution of the matter with the SEC and New York attorney general a preferable option short of some plucky galactic freedom fighters coming to their rescue — in the form of new legislation or other governmental relief — but we do not advise waiting for the rebels.

Matthew G. Lindenbaum is a partner at Nelson Mullins Riley & Scarborough LLP.

Robert L. Lindholm is a partner at the firm.

Richard B. Levin is chair of the fintech and regulation practice at the firm.

Nelson Mullins associate Daniel M. Curran contributed to this article.

The opinions expressed are those of the author(s) and do not necessarily reflect the views of their employer, its clients, or Portfolio Media Inc., or any of its or their respective affiliates. This article is for general information purposes and is not intended to be and should not be taken as legal advice.

[1] Hinman, W., Digital Asset Transactions: When Howey Met Gary (Plastic) (June 14, 2018), available at: <https://www.sec.gov/news/speech/speech-hinman-061418>.

[2] Id.

[3] Id.

[4] People of the State of New York, v. MEK Global Limited, available at: https://ag.ny.gov/sites/default/files/2023.03.09_-_memorandum_of_law_-_people_v_mek_global_limited_and_phoenixfin_pte_ltd_dba_kucoin.pdf.

[5] No. 1:21-cv-00260-PB (D.N.H. Nov. 7, 2022).

[6] Attorney General James Sues Cryptocurrency Platform for Failing to Register in New York (ny.gov) (Feb. 22, 2023).

[7] Behnam, R., Testimony of Chairman Rostin Behnam Before the U.S. Senate Committee on Agriculture, Nutrition, & Forestry (Mar. 8, 2023), available at: <https://decrypt.co/123032/cftc-chair-says-ethereum-is-a-commodity-despite-genslers-bitcoin-only-position>.

[8] Khardori, A., Can Gary Gensler Survive Crypto Winter? D.C.'s top financial cop on Bankman-Fried blowback (Feb. 23, 2023), available at: <https://nymag.com/intelligencer/2023/02/gary-gensler-on-meeting-with-sbf-and-his-crypto-crackdown.html>.

[9] Supra note 1.

[10] Popper, N., A Former Top Wall Street Regulator Turns to the Blockchain, New York Times (April 22, 2018), available at: <https://www.nytimes.com/2018/04/22/technology/gensler-mit-blockchain.html>.

[11] SEC Chair Gensler Declines to Say if Ether Is a Security in Contentious Congressional Hearing (coindesk.com) (April 19, 2023), available at: <https://www.coindesk.com/policy/2023/04/19/sec-chair-gensler-declines-to-say-if-ether-is-a-security-in-contentious-congressional-hearing/>.

[12] Kiernan, P. and Huang, V., Ether's New 'Staking' Model Could Draw SEC Attention, The Wall Street Journal (Sep. 15, 2022), available at: <https://www.wsj.com/articles/ethers-new-staking-model-could-draw-sec-attention-11663266224>.

[13] Id.

[14] Id.

[15] SEC v. Bittrex, Inc. (April 17, 2023), available at <https://www.sec.gov/litigation/complaints/2023/comp-pr2023-78.pdf>.

[16] See In the Matter of Bloom Protocol, LLC (Aug. 9, 2022), available at: <https://www.sec.gov/litigation/admin/2022/33-11089.pdf>, In the Matter of Salt Blockchain Inc. (Sep. 30, 2020), available at: <https://www.sec.gov/litigation/admin/2020/33-10865.pdf>, In the Matter of Enigma MPC (Feb. 19, 2020), available at: <https://www.sec.gov/litigation/admin/2020/33-10755.pdf>, and In the Matter of Paragon Coin, Inc. (Nov. 16, 2018), available at: <https://www.sec.gov/litigation/admin/2018/33-10574.pdf>.

To: steven.stokdyk@lw.com[steven.stokdyk@lw.com]
From: CF Office of Finance
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The Securities and Exchange Commission’s Division of Corporation Finance has attached to this email a letter relating to an SEC filing.

If you have any questions regarding this letter, please contact one of the staff members identified in it.

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U.S. Securities & Exchange Commission
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DIVISION OF
CORPORATION FINANCE

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

November 8, 2022

Lewis Silberman
Co-Chief Executive Officer
GSR II Meteora Acquisition Corp.
840 Park Drive East
Boca Raton, Florida 33432

Re: GSR II Meteora Acquisition Corp.
Preliminary Proxy Statement on Schedule 14A
Filed October 5, 2022
File No. 001-41305

Dear Lewis Silberman:

We have reviewed your filing and have the following comments. In some of our comments, we may ask you to provide us with information so we may better understand your disclosure.

Please respond to these comments within ten business days by providing the requested information or advise us as soon as possible when you will respond. If you do not believe our comments apply to your facts and circumstances, please tell us why in your response.

After reviewing your response to these comments, we may have additional comments.

Proxy Statement filed on October 5, 2022

General

1. We note your disclosure that Bitcoin Depot operates cash-to-cryptocurrency BTMs. Please clarify if your BTMs offer only the one-way exchange of cash-to-cryptocurrency and, to the extent applicable, please provide detailed disclosure regarding any additional exchange services that your BTMs offer.

Certain Defined Terms, page 3

2. Please clarify the distinction, if any, in the terms you use to refer to crypto assets, and add the terms "cryptocurrency" and "digital assets" to your list of defined terms on page 2. If there is no distinction, please revise the filing to use a single defined term throughout.

Lewis Silberman
GSR II Meteora Acquisition Corp.
November 8, 2022
Page 2

Questions and Answers About the Proposals for PubCo Stockholders

Q: What equity stake will current PubCo stockholders, the Sponsor and BT Assets hold in PubCo..., page 19

3. Please revise the "fully diluted" share ownership table on page 20 to include all potential sources of dilution that shareholders who elect not to redeem their shares may experience in connection with the business combination. Provide disclosure of the impact of each significant source of dilution, including the impact of any PIPE investments and any Incentive Issuances.

Q: What interests do the current officers and directors of PubCo have in the business combination?, page 24

4. Please revise to quantify the aggregate dollar amount and describe the nature of what the Sponsor and its affiliates have at risk that depends on completion of a business combination. Include the current value of securities held, loans extended, fees due, and out-of-pocket expenses for which the Sponsor and its affiliates are awaiting reimbursement. Provide similar disclosure for the company's officers and directors, if appropriate.

Q: Do I have redemption rights?, page 25

5. We note that the Sponsor and PubCo's directors and officers have agreed to waive their redemption rights. Please describe any consideration provided in exchange for this agreement.

Summary of the Proxy Statement

Regulatory Matters, page 36

6. Please discuss, including quantitatively if possible, how the regulatory environment in which you operate has driven operating costs and strategy with respect to where you operate and what crypto assets you support through your BTMs and BDCheckout. Similarly revise the applicable risk factors and your Business section.

Board of Directors of PubCo Following the Business Combination, page 41

7. We note your statement that "PubCo expects to be a controlled company within the meaning of the Nasdaq corporate governance standards, and may elect not to comply with certain Nasdaq corporate governance requirements." Please confirm whether you intend to opt out of any corporate governance requirements under the Nasdaq Market Rules as a result of being a "controlled company".

Summary Unaudited Pro Forma Condensed Combined Financial Information , page 50

8. It appears that underwriting fees remain constant and are not adjusted based on redemptions. Revise your disclosure to disclose the effective underwriting fee on a

Lewis Silberman
GSR II Meteora Acquisition Corp.
November 8, 2022
Page 3

percentage basis for shares at each redemption level presented in your sensitivity analysis related to dilution.

Risk Factors, page 54

9. We note that you include various references to insurance coverage in your risk factors section. Under an appropriately captioned heading, please disclose the types of insurance coverage you carry, including any insurance that you or the third-party custodians with which you transact carry covering crypto assets held on your behalf or on behalf of customers. Please disclose the amount of coverage, term, termination provisions, renewal options and limitations on coverage. To the extent you or the third-party custodians with which you transact do not carry insurance covering crypto assets, please revise your disclosure to so clarify and expand your risk factor disclosure as appropriate. In addition, we note your disclosure on page 56 that you may self-insure against certain business risks and expenses where you believe you can adequately self-insure against the anticipated exposure and risk or where insurance is either not available or deemed not cost-effective. Please expand your disclosure to describe the risks that you may self-insure against.

Major bank failure or sustained financial market illiquidity...., page 69

10. We note your disclosure under this heading that a "substantial portion of [y]our cash, cash equivalents and interest-bearing deposits are either held at banks that are not subject to insurance protection against loss or exceed the deposit insurance limit." Please revise to quantify the amount of your cash, cash equivalents and interest-bearing deposits that you are referring to.

We depend on major mobile operating systems and third-party platforms...., page 72

11. We note your disclosure under this heading that you rely on third-party platforms for the distribution of certain products and services and that "these distribution platforms often contain restrictions related to digital assets that are uncertain, broadly construed, and can limit the nature and scope of services that can be offered." Please expand your disclosure to explain the restrictions to which you are referring which could result in you no longer being able to offer your products and services through such platforms.

Risks Related to Government Regulation and Privacy Matters, page 73

12. We note that you are currently licensed to operate as a money transmitter in nine U.S. states, Puerto Rico and the District of Columbia and that you operate in 47 states. Please identify the nine states in which you are currently licensed to operate as a money transmitter, and identify any states in which you have a money transmitter license application pending. Please also confirm whether you believe you are not required to obtain a money transmitter license in the other jurisdictions in which you operate, or confirm what actions you are taking to obtain any required licenses.

Lewis Silberman
GSR II Meteora Acquisition Corp.
November 8, 2022
Page 4

The status of various cryptocurrencies as a "security" is subject to a high degree of uncertainty...., page 81

13. We note your statements that "the legal test for determining whether any given digital asset is a security is a highly complex, fact-driven analysis that may evolve over time," that "[t]he SEC generally does not provide advance guidance" and that "it is difficult to predict the direction or timing of any evolution in regulations." Please remove these statements as the legal tests are well-established by U.S. Supreme Court case law and SEC staff have issued reports, orders, and statements that provide guidance on when a crypto asset may be a security for purposes of the U.S. federal securities laws.

Many of our kiosks and key components to these kiosks are procured from a single or limited number of suppliers...., page 82

14. We note your disclosure that you have a significant vendor from which you purchase substantially all of your kiosks and from which you license related technology and that the term of the agreement with this vendor continues for as long as you retain ownership or use of the kiosks you purchased, unless otherwise terminated due to a breach. Please revise to clarify what would constitute a breach.

Risks Related to Management and Employees, page 83

15. Please revise the conflicts of interest discussion so that it highlights all material interests in the transaction held by the sponsor and the company's officers and directors. This could include fiduciary or contractual obligations to other entities as well as any interest in, or affiliation with, the target company. In addition, please clarify how the board considered those conflicts in negotiating and recommending the business combination, and include this discussion in the section "Proposal No. 1 - The Business Combination Proposal - PubCo's Board of Directors' Reasons for the Approval of the Business Combination" on page 146.
16. Your charter waived the corporate opportunities doctrine. Please address this potential conflict of interest and whether it impacted your search for an acquisition target.

Risks Related to GSRM and the Business Combination, page 97

17. Please specifically highlight the risk that the Sponsor will benefit from the completion of a business combination and may be incentivized to complete an acquisition of a less favorable target company or on terms less favorable to shareholders rather than liquidate.
18. Please expand your discussion of the material risks to public warrant holders to include those arising from differences between private and public warrants. Clarify whether recent common stock trading prices exceed the threshold that would allow the company to redeem public warrants. Clearly explain the steps, if any, the company will take to notify all shareholders, including beneficial owners, regarding when the warrants become eligible for redemption.

Lewis Silberman
GSR II Meteora Acquisition Corp.
November 8, 2022
Page 5

19. Please highlight material differences in the terms and price of securities issued at the time of the IPO as compared to private placements contemplated at the time of the business combination. Disclose if the SPAC's sponsors, directors, officers or their affiliates will participate in the private placement.

Business of Bitcoin Depot, page 220

20. We note your disclosure that your BDCheckout locations are sourced and connected through your relationship with a leading payment processing provider. Please revise your disclosure to identify the payment processing provider to which you refer.

Our Products, page 222

21. We note your statement on page 223 that "based on historical enforcement actions and existing regulations and laws, we believe that our activities and the cryptocurrencies that we sell (Bitcoin, Litecoin and Ethereum) do not subject us to SEC regulation, and thus we believe we are not required to be registered with the SEC to sell such cryptocurrencies at our BTMs and via BDCheckout. Please revise to disclose the policies and procedures you have in place which allow you have made this determination and advise us as to whether (and, if so, how) you have evaluated the characterization of Ether in light of the recent Ethereum merge. In addition, please revise to clarify, if accurate, that such processes are risk-based judgments made by the company and not a legal standard or determination binding on any regulatory body or court.
22. Please provide a complete description of typical purchase and sale transactions at a Bitcoin Depot BTM. In particular, please:
- At each stage of the transaction, identify who has custody of any funds going out to fund a transaction;
 - At each stage of the transaction, identify who has custody of any asset, digital or otherwise, that goes back to a customer's brokerage account;
 - Please clarify whether, in a user purchase transaction, the crypto assets distributed to a BTM user are held in a Bitcoin Depot wallet or are purchased on an exchange or from a liquidity provider at the time of order;
 - Please clarify whether, in a user sale transaction, the crypto assets purchased from a BTM user are held in a Bitcoin Depot wallet or are immediately offered for sale on an exchange or to a liquidity provider; and
 - Clarify the extent of regulatory approvals to perform these tasks.
23. Please revise this section to discuss in greater detail your custodial practices for crypto assets. To provide more clarity, please address the items below:
- briefly discuss how you determine what portion of the crypto assets are held in hot wallets and cold wallets, respectively;
 - disclose the geographic location where the crypto assets are held in cold wallets and how the private keys are located;
 - identify the person(s) that have access to the digital assets and whether any persons

Lewis Silberman
GSR II Meteora Acquisition Corp.
November 8, 2022
Page 6

- (e.g., auditors, etc.) are responsible for verifying the existence thereof. Also clarify whether any insurance providers have inspection rights associated with the digital assets held in storage;
- identify the person(s) that have the authority to release the proceeds from your wallets; and
 - briefly discuss how the existence, exclusive ownership and software functionality of private cryptocurrency keys and other ownership records are validated by the relevant parties.
24. We note your disclosure that kiosk users can "create and use a Bitcoin Depot-branded wallet (un-hosted and non-custodial)." Please fully describe the nature of Bitcoin Depot-branded wallets, including the procedure by which a user creates the wallet, what app or other means through which users can access the wallet, how private keys are transmitted to users, and whether Bitcoin Depot is liable or responsible for any losses users may experience.
25. We note that your kiosks are manufactured and supplied by ATM companies, including Genmega. Please provide a breakdown of your kiosks by manufacturer, and confirm whether your relationship with any manufacturer is material.
26. Please provide a description of the differences between a BDCheckout transaction and a kiosk transaction, including any fees payable to third parties and a comparison of the costs and relative profitability of the two products.
27. We note your disclosure on page 223 that as of June 30, 2022, your contracts with your top 10 retail partners had a weighted average remaining life of 2.8 years. Please identify your top 10 retail partners, the total revenues derived from each partner and the remaining life for each of these contracts. In addition, we note your disclosure throughout that your BDCheckout product is available at 8,000 "well-known retail locations." Please revise your disclosure to clarify what you mean by "well-known retail locations."

Our Competitive Strengths, page 225

28. We note your statement on page 226 that you "have invested in and maintain robust, multi-layer compliance procedures to evaluate potential users, open user accounts and monitor transactions at [y]our BTMs." Please revise to describe your AML/KYC procedures, including how users are verified at the kiosk, and describe any challenges with kiosk-based verification given your use of and connectivity with non-hosted, non-custodial wallets, which are more anonymous and harder to verify.
29. We note your disclosure that you maintain a relatively low balance of crypto assets at any given time from which you satisfy your users' demand from kiosk or BDCheckout transactions and that as you send users crypto assets, you will immediately replenish your crypto asset balance. Please revise to clarify what you mean by a "relatively low balance of crypto assets at any given time" and to clarify how long you hold the crypto assets in which you transact.

Lewis Silberman
GSR II Meteora Acquisition Corp.
November 8, 2022
Page 7

30. We note your disclosure that your compliance team routinely rejects user applicants that fail authentication requirements, and bans users who violate the terms of service from transacting at our kiosks and via BDCheckout. Please revise to quantify how frequently your compliance team rejects user applicants and bans users. In addition, please revise to disclose the "terms of service" to which you refer.

Management's Discussion and Analysis of Financial Condition and Results of Operations of Bitcoin Depot, page 233

31. We note your disclosure that you use a sophisticated cryptocurrency replenishment process to reduce your exposure to volatility in cryptocurrency prices and maintain a relatively low balance of cryptocurrency at any given time. Please tell us, and revise your next amendment, to provide a clear and concise discussion of the working capital requirements needed to enter into the required buying and selling of digital assets inventories necessary to support the customer requested order fulfillment activities received through both the ATM and BDCheckpoint transactions.
32. In your reconciliation for 'Adjusted Gross Profit,' we noted that you reconcile from 'Adjusted Gross Profit,' the Non-GAAP indicator, to 'Gross Profit,' the GAAP measure. This represents a prominence issue. Please revise your next amendment to reconcile from the GAAP measure to the Non-GAAP indicator. Refer to Question 102.10 in the SEC's Non-GAAP Financial Measures Compliance & Disclosure Interpretations.
33. We note on page 151 Bitcoin's revenue assumptions reflect historical actual average performance of transaction volume in each deployed kiosk for the first 24 months. Please revise your discussion of revenues to quantify and explain this historic average monthly performance per Bitcoin kiosk for each period presented to disclose the trends that support your current and future transaction volume.
34. We note your various disclosures regarding how you determine the prices used in your cryptocurrency transactions. Please revise to also disclose the following:
- How you determine your flat fees;
 - Whether the cryptocurrency prices include markups;
 - Whether pricing differs between the customer's use of a Bitcoin Depot BTM or the BDCheckout product;
 - Differences in the pricing components of trades for user purchase versus user sales transactions; and
 - How your markups differ between digital assets and your other transactions.
35. If material, please revise to disclose the markups recognized in each period presented, and whether your markups are dependent upon the type of crypto asset purchased or sold.

Our Business Model, page 233

36. Please disaggregate and quantify your transaction volume by year for the periods presented.

Lewis Silberman
GSR II Meteora Acquisition Corp.
November 8, 2022
Page 8

Key Factors Affecting Our Performance, page 234

37. We note your statement that your "business is dependent on the broader use and adoption of cryptocurrencies, which can to an extent be impacted by the spot price of the cryptocurrencies [you] sell (including Bitcoin, Litecoin, and Ethereum)." Please confirm whether you sell crypto assets other than Bitcoin, Litecoin and Ethereum. Please also quantify the transaction volume for each of the crypto assets in which you transact for the periods presented.

Key Business Metrics, page 235

38. To the extent available, please provide a discussion of a metric such as average monthly transaction volume per kiosk to provide a sense of per-kiosk profitability, and provide a discussion of trends.

Components of Results of Operations, page 237

39. Please revise to discuss the purchase activities of crypto assets for each of the periods presented by asset type and discuss the working capital required to exercise these activities.

Summary of Critical Accounting Policies, page 244

40. We note that your statement that "We determine the fair value of our Bitcoin, Litecoin and Ethereum on a nonrecurring basis in accordance with ASC 820, Fair Value Measurement, based on quoted (unadjusted) prices on the Coinbase exchange, the active exchange that we have determined is our principal market (Level 1 inputs)." Please confirm whether Bitcoin Depot transacts with other exchanges, and whether you have any formal arrangements with Coinbase or any other exchanges, or any liquidity providers such as Cumberland DRW, including the material terms of such arrangements regarding order flow or other terms that could impact pricing for users.

Unaudited Interim Financial Statements of GSR II Meteora Acquisition Corp.

Notes to Financial Statements

Note 7. Redeemable Class A Common Stock and Stockholders' Equity, page F-35

41. Please provide us with your analysis under ASC 815-40 to support your accounting treatment for the Private Warrants as equity.

Lewis Silberman
GSR II Meteora Acquisition Corp.
November 8, 2022
Page 9

Lux Vending, LL (DBA Bitcoin Depot) Consolidated Financial Statements
Consolidated Statements of Cash Flows For The Years Ended December 31, 2021 and 2020,
page F-43

42. We note you had purchases of services in digital assets of \$2.4 million, \$6.1 million, and \$3.5 million in 2022, 2021, and 2020, respectively. Please provide a thorough description of the nature, type, and substance of expenses paid to vendors through the issuance of digital assets.

Notes to Consolidated Financial Statements December 31, 2021 and 2020
Summary of Significant Accounting Policies
(e) Digital Assets, page F-46

43. We note your disclosure that you perform impairment testing on digital assets on an annual basis, or more frequently, when events or changes in circumstances occur indicating that it is more likely than not that the indefinite-lived asset is impaired. Please tell us, and revise your next amendment, to disclose in greater detail the frequency of impairment testing in the periods presented. If impairment testing was done annually in the periods presented, tell us how that impairment testing period is appropriate given the nature price changes in digital assets.
44. We note your disclosure that your digital assets are comprised "primarily" of Bitcoin, Litecoin, and Ethereum. Please revise your next amendment to disclose, including quantitatively, if you hold or transacted in any other digital assets other than the three listed in the periods presented.
45. Please reconsider the appropriateness of your statement that there is no official guidance for the accounting for digital assets. We observe that the FASB codification is the source of authoritative generally accepted accounting principles and that there is codification guidance whose scope applies to your transactions.
46. We note that you hold digital assets for two purposes: (1) to sell to customers in exchange for cash, and (2) for investment purposes. Please provide the following:
- Revenues and cost of revenues for digital assets held for sale to customers in exchange for cash and held for investment purposes; and
 - A rollforward of digital assets held for sale to customers in exchange for cash and held for investment purposes by each specific type of digital asset (BTC, LTC, ETH) in the periods presented.
47. Please tell us the accounting literature followed when making the determination that the indefinite-lived intangible assets would be recorded on your consolidated balance sheet on a first-in, first-out ("FIFO") basis. In addition, tell us any alternative methodologies you considered and why you believe FIFO is a more appropriate measurement methodology.
48. We note your disclosure on page F-46 that you, "in limited cases, allow customers to sell these types of digital assets." Please clarify this disclosure, specifically addressing if you

Lewis Silberman
GSR II Meteora Acquisition Corp.
November 8, 2022
Page 10

purchase digital assets from customers through your ATMs or through the BDCheckout product.

(i) Revenue Recognition, page F-48

49. We note you launched BDCheckout in the second quarter of 2022 and have 8,395 locations at June 30, 2022. Please revise your next amendment to specifically discuss your revenue recognition policy for BDCheckout revenues.
50. We note you acquired BitAccess in July 2021. Please revise your next amendment to describe in greater detail your revenue recognition policies for BitAccess hardware and software revenues.
51. Please tell us what constitutes the 'OTC and other revenue' in the periods presented and your revenue recognition policy for these revenues.
52. We note your disclosure on pages F-49 and F-77 that revenues from software services is settled in digital assets. Please tell us the following for these transactions:
 - when ownership or control is determined to have transferred;
 - how the price of the digital asset is determined;
 - the types of digital assets received in these transactions;
 - how the Company uses these digital assets once received;
 - use or reliance on third parties at any stage of the process; and
 - whether the Company acts as a custodian or holds any digital assets off balance sheet at any point in the process.
53. We note your disclosures regarding the Company's policy for providing a mark-up. Please tell us, and revise your amendment, to discuss the following:
 - Disclose the mark-up revenue recognized in the periods presented;
 - Tell us if the mark-up is dependent on the type of digital asset sold;
 - Disclose the average mark-up by digital asset in the periods presented; and
 - Tell us if the Company has sold digital assets at a loss due to price volatility exceeding the amount of the mark-up. To the extent that this has occurred, tell us your consideration of recognizing an impairment charge prior to the sale occurring.
54. Please tell us, and revise your next amendment, to discuss how the prices utilized in digital asset transactions are determined. Indicate if the process for determining the prices utilized are different for ATM or BDCheckout transactions.

(j) Cost of Revenue, page F-49

55. Please revise to disclose, in tabular format, a breakout of the cost of revenue line item by specific cost type (i.e. cost of digital assets, fees paid to obtain digital assets, etc.) for the periods presented. Please discuss any material changes in specific costs items in MD&A.
56. Please tell us how you concluded that it is appropriate to include the gain on sales of digital assets held for investment in cost of revenue. Please reference the GAAP authoritative literature you used to make this determination.

Lewis Silberman
GSR II Meteora Acquisition Corp.
November 8, 2022
Page 11

(n) Fair Value of Financial Instruments, page F-51

57. Please revise your next amendment to provide all of the disclosures in ASC 820-10-50-2. See example disclosure in ASC 820-10-55-100 through 104.

Note 5. Restatement, page F-54

58. Please revise your next amendment to include additional details related to correction adjustments (a), (b), (c), and (d). Specifically, include more information as to what each error relates to, how each error was determined, and the specific details related to how the correction amounts were determined that lead to the total as adjusted amount.

Note 7. Digital Assets, page F-58

59. Please revise to expand your rollforward of digital assets to provide by digital asset type (BIT, LTC, ETH).

We remind you that the company and its management are responsible for the accuracy and adequacy of their disclosures, notwithstanding any review, comments, action or absence of action by the staff.

You may contact David Irving at 202-551-3321 or Bonnie Baynes at 202-551-4924 if you have questions regarding comments on the financial statements and related matters. Please contact Christopher Wall at 202-551-4162 or J. Nolan McWilliams, Acting Legal Branch Chief, at 202-551-3217 with any other questions.

Sincerely,

Division of Corporation Finance
Office of Finance

To: lew@gsrmet.com|lew@gsrmet.com|
From: CF Office of Finance
Sent: 2022-11-08T23:16:36Z
Subject: SEC Comment Letter: GSR II Meteora Acquisition Corp. PREM14A
Received: 2022-11-08T23:16:36Z
[GSR II Meteora Acquisition Corp. PREM14A Letter.pdf](#)

Do not respond to this email address since we do not monitor it for incoming emails.

The Securities and Exchange Commission's Division of Corporation Finance has attached to this email a letter relating to an SEC filing.

If you have any questions regarding this letter, please contact one of the staff members identified in it.

Division of Corporation Finance
U.S. Securities & Exchange Commission
100 F Street, NE
Washington, D.C. 20549
www.sec.gov



DIVISION OF
CORPORATION FINANCE

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

November 8, 2022

Lewis Silberman
Co-Chief Executive Officer
GSR II Meteora Acquisition Corp.
840 Park Drive East
Boca Raton, Florida 33432

Re: GSR II Meteora Acquisition Corp.
Preliminary Proxy Statement on Schedule 14A
Filed October 5, 2022
File No. 001-41305

Dear Lewis Silberman:

We have reviewed your filing and have the following comments. In some of our comments, we may ask you to provide us with information so we may better understand your disclosure.

Please respond to these comments within ten business days by providing the requested information or advise us as soon as possible when you will respond. If you do not believe our comments apply to your facts and circumstances, please tell us why in your response.

After reviewing your response to these comments, we may have additional comments.

Proxy Statement filed on October 5, 2022

General

1. We note your disclosure that Bitcoin Depot operates cash-to-cryptocurrency BTMs. Please clarify if your BTMs offer only the one-way exchange of cash-to-cryptocurrency and, to the extent applicable, please provide detailed disclosure regarding any additional exchange services that your BTMs offer.

Certain Defined Terms, page 3

2. Please clarify the distinction, if any, in the terms you use to refer to crypto assets, and add the terms "cryptocurrency" and "digital assets" to your list of defined terms on page 2. If there is no distinction, please revise the filing to use a single defined term throughout.

Lewis Silberman
GSR II Meteora Acquisition Corp.
November 8, 2022
Page 2

Questions and Answers About the Proposals for PubCo Stockholders

Q: What equity stake will current PubCo stockholders, the Sponsor and BT Assets hold in PubCo..., page 19

3. Please revise the "fully diluted" share ownership table on page 20 to include all potential sources of dilution that shareholders who elect not to redeem their shares may experience in connection with the business combination. Provide disclosure of the impact of each significant source of dilution, including the impact of any PIPE investments and any Incentive Issuances.

Q: What interests do the current officers and directors of PubCo have in the business combination?, page 24

4. Please revise to quantify the aggregate dollar amount and describe the nature of what the Sponsor and its affiliates have at risk that depends on completion of a business combination. Include the current value of securities held, loans extended, fees due, and out-of-pocket expenses for which the Sponsor and its affiliates are awaiting reimbursement. Provide similar disclosure for the company's officers and directors, if appropriate.

Q: Do I have redemption rights?, page 25

5. We note that the Sponsor and PubCo's directors and officers have agreed to waive their redemption rights. Please describe any consideration provided in exchange for this agreement.

Summary of the Proxy Statement

Regulatory Matters, page 36

6. Please discuss, including quantitatively if possible, how the regulatory environment in which you operate has driven operating costs and strategy with respect to where you operate and what crypto assets you support through your BTMs and BDCheckout. Similarly revise the applicable risk factors and your Business section.

Board of Directors of PubCo Following the Business Combination, page 41

7. We note your statement that "PubCo expects to be a controlled company within the meaning of the Nasdaq corporate governance standards, and may elect not to comply with certain Nasdaq corporate governance requirements." Please confirm whether you intend to opt out of any corporate governance requirements under the Nasdaq Market Rules as a result of being a "controlled company".

Summary Unaudited Pro Forma Condensed Combined Financial Information , page 50

8. It appears that underwriting fees remain constant and are not adjusted based on redemptions. Revise your disclosure to disclose the effective underwriting fee on a

Lewis Silberman
GSR II Meteora Acquisition Corp.
November 8, 2022
Page 3

percentage basis for shares at each redemption level presented in your sensitivity analysis related to dilution.

Risk Factors, page 54

9. We note that you include various references to insurance coverage in your risk factors section. Under an appropriately captioned heading, please disclose the types of insurance coverage you carry, including any insurance that you or the third-party custodians with which you transact carry covering crypto assets held on your behalf or on behalf of customers. Please disclose the amount of coverage, term, termination provisions, renewal options and limitations on coverage. To the extent you or the third-party custodians with which you transact do not carry insurance covering crypto assets, please revise your disclosure to so clarify and expand your risk factor disclosure as appropriate. In addition, we note your disclosure on page 56 that you may self-insure against certain business risks and expenses where you believe you can adequately self-insure against the anticipated exposure and risk or where insurance is either not available or deemed not cost-effective. Please expand your disclosure to describe the risks that you may self-insure against.

Major bank failure or sustained financial market illiquidity..., page 69

10. We note your disclosure under this heading that a "substantial portion of [y]our cash, cash equivalents and interest-bearing deposits are either held at banks that are not subject to insurance protection against loss or exceed the deposit insurance limit." Please revise to quantify the amount of your cash, cash equivalents and interest-bearing deposits that you are referring to.

We depend on major mobile operating systems and third-party platforms..., page 72

11. We note your disclosure under this heading that you rely on third-party platforms for the distribution of certain products and services and that "these distribution platforms often contain restrictions related to digital assets that are uncertain, broadly construed, and can limit the nature and scope of services that can be offered." Please expand your disclosure to explain the restrictions to which you are referring which could result in you no longer being able to offer your products and services through such platforms.

Risks Related to Government Regulation and Privacy Matters, page 73

12. We note that you are currently licensed to operate as a money transmitter in nine U.S. states, Puerto Rico and the District of Columbia and that you operate in 47 states. Please identify the nine states in which you are currently licensed to operate as a money transmitter, and identify any states in which you have a money transmitter license application pending. Please also confirm whether you believe you are not required to obtain a money transmitter license in the other jurisdictions in which you operate, or confirm what actions you are taking to obtain any required licenses.

Lewis Silberman
GSR II Meteora Acquisition Corp.
November 8, 2022
Page 4

The status of various cryptocurrencies as a "security" is subject to a high degree of uncertainty...., page 81

13. We note your statements that "the legal test for determining whether any given digital asset is a security is a highly complex, fact-driven analysis that may evolve over time," that "[t]he SEC generally does not provide advance guidance" and that "it is difficult to predict the direction or timing of any evolution in regulations." Please remove these statements as the legal tests are well-established by U.S. Supreme Court case law and SEC staff have issued reports, orders, and statements that provide guidance on when a crypto asset may be a security for purposes of the U.S. federal securities laws.

Many of our kiosks and key components to these kiosks are procured from a single or limited number of suppliers...., page 82

14. We note your disclosure that you have a significant vendor from which you purchase substantially all of your kiosks and from which you license related technology and that the term of the agreement with this vendor continues for as long as you retain ownership or use of the kiosks you purchased, unless otherwise terminated due to a breach. Please revise to clarify what would constitute a breach.

Risks Related to Management and Employees, page 83

15. Please revise the conflicts of interest discussion so that it highlights all material interests in the transaction held by the sponsor and the company's officers and directors. This could include fiduciary or contractual obligations to other entities as well as any interest in, or affiliation with, the target company. In addition, please clarify how the board considered those conflicts in negotiating and recommending the business combination, and include this discussion in the section "Proposal No. 1 - The Business Combination Proposal - PubCo's Board of Directors' Reasons for the Approval of the Business Combination" on page 146.
16. Your charter waived the corporate opportunities doctrine. Please address this potential conflict of interest and whether it impacted your search for an acquisition target.

Risks Related to GSRM and the Business Combination, page 97

17. Please specifically highlight the risk that the Sponsor will benefit from the completion of a business combination and may be incentivized to complete an acquisition of a less favorable target company or on terms less favorable to shareholders rather than liquidate.
18. Please expand your discussion of the material risks to public warrant holders to include those arising from differences between private and public warrants. Clarify whether recent common stock trading prices exceed the threshold that would allow the company to redeem public warrants. Clearly explain the steps, if any, the company will take to notify all shareholders, including beneficial owners, regarding when the warrants become eligible for redemption.

Lewis Silberman
GSR II Meteora Acquisition Corp.
November 8, 2022
Page 5

19. Please highlight material differences in the terms and price of securities issued at the time of the IPO as compared to private placements contemplated at the time of the business combination. Disclose if the SPAC's sponsors, directors, officers or their affiliates will participate in the private placement.

Business of Bitcoin Depot, page 220

20. We note your disclosure that your BDCheckout locations are sourced and connected through your relationship with a leading payment processing provider. Please revise your disclosure to identify the payment processing provider to which you refer.

Our Products, page 222

21. We note your statement on page 223 that "based on historical enforcement actions and existing regulations and laws, we believe that our activities and the cryptocurrencies that we sell (Bitcoin, Litecoin and Ethereum) do not subject us to SEC regulation, and thus we believe we are not required to be registered with the SEC to sell such cryptocurrencies at our BTMs and via BDCheckout. Please revise to disclose the policies and procedures you have in place which allow you have made this determination and advise us as to whether (and, if so, how) you have evaluated the characterization of Ether in light of the recent Ethereum merge. In addition, please revise to clarify, if accurate, that such processes are risk-based judgments made by the company and not a legal standard or determination binding on any regulatory body or court.
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 - Please clarify whether, in a user sale transaction, the crypto assets purchased from a BTM user are held in a Bitcoin Depot wallet or are immediately offered for sale on an exchange or to a liquidity provider; and
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Lewis Silberman
GSR II Meteora Acquisition Corp.
November 8, 2022
Page 6

- (e.g., auditors, etc.) are responsible for verifying the existence thereof. Also clarify whether any insurance providers have inspection rights associated with the digital assets held in storage;
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Our Competitive Strengths, page 225

28. We note your statement on page 226 that you "have invested in and maintain robust, multi-layer compliance procedures to evaluate potential users, open user accounts and monitor transactions at [y]our BTMs." Please revise to describe your AML/KYC procedures, including how users are verified at the kiosk, and describe any challenges with kiosk-based verification given your use of and connectivity with non-hosted, non-custodial wallets, which are more anonymous and harder to verify.
29. We note your disclosure that you maintain a relatively low balance of crypto assets at any given time from which you satisfy your users' demand from kiosk or BDCheckout transactions and that as you send users crypto assets, you will immediately replenish your crypto asset balance. Please revise to clarify what you mean by a "relatively low balance of crypto assets at any given time" and to clarify how long you hold the crypto assets in which you transact.

Lewis Silberman
GSR II Meteora Acquisition Corp.
November 8, 2022
Page 7

30. We note your disclosure that your compliance team routinely rejects user applicants that fail authentication requirements, and bans users who violate the terms of service from transacting at our kiosks and via BDCheckout. Please revise to quantify how frequently your compliance team rejects user applicants and bans users. In addition, please revise to disclose the "terms of service" to which you refer.

Management's Discussion and Analysis of Financial Condition and Results of Operations of Bitcoin Depot, page 233

31. We note your disclosure that you use a sophisticated cryptocurrency replenishment process to reduce your exposure to volatility in cryptocurrency prices and maintain a relatively low balance of cryptocurrency at any given time. Please tell us, and revise your next amendment, to provide a clear and concise discussion of the working capital requirements needed to enter into the required buying and selling of digital assets inventories necessary to support the customer requested order fulfillment activities received through both the ATM and BDCheckpoint transactions.
32. In your reconciliation for 'Adjusted Gross Profit,' we noted that you reconcile from 'Adjusted Gross Profit,' the Non-GAAP indicator, to 'Gross Profit,' the GAAP measure. This represents a prominence issue. Please revise your next amendment to reconcile from the GAAP measure to the Non-GAAP indicator. Refer to Question 102.10 in the SEC's Non-GAAP Financial Measures Compliance & Disclosure Interpretations.
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 - Whether the cryptocurrency prices include markups;
 - Whether pricing differs between the customer's use of a Bitcoin Depot BTM or the BDCheckout product;
 - Differences in the pricing components of trades for user purchase versus user sales transactions; and
 - How your markups differ between digital assets and your other transactions.
35. If material, please revise to disclose the markups recognized in each period presented, and whether your markups are dependent upon the type of crypto asset purchased or sold.

Our Business Model, page 233

36. Please disaggregate and quantify your transaction volume by year for the periods presented.

Lewis Silberman
GSR II Meteora Acquisition Corp.
November 8, 2022
Page 8

Key Factors Affecting Our Performance, page 234

37. We note your statement that your "business is dependent on the broader use and adoption of cryptocurrencies, which can to an extent be impacted by the spot price of the cryptocurrencies [you] sell (including Bitcoin, Litecoin, and Ethereum)." Please confirm whether you sell crypto assets other than Bitcoin, Litecoin and Ethereum. Please also quantify the transaction volume for each of the crypto assets in which you transact for the periods presented.

Key Business Metrics, page 235

38. To the extent available, please provide a discussion of a metric such as average monthly transaction volume per kiosk to provide a sense of per-kiosk profitability, and provide a discussion of trends.

Components of Results of Operations, page 237

39. Please revise to discuss the purchase activities of crypto assets for each of the periods presented by asset type and discuss the working capital required to exercise these activities.

Summary of Critical Accounting Policies, page 244

40. We note that your statement that "We determine the fair value of our Bitcoin, Litecoin and Ethereum on a nonrecurring basis in accordance with ASC 820, Fair Value Measurement, based on quoted (unadjusted) prices on the Coinbase exchange, the active exchange that we have determined is our principal market (Level 1 inputs)." Please confirm whether Bitcoin Depot transacts with other exchanges, and whether you have any formal arrangements with Coinbase or any other exchanges, or any liquidity providers such as Cumberland DRW, including the material terms of such arrangements regarding order flow or other terms that could impact pricing for users.

Unaudited Interim Financial Statements of GSR II Meteora Acquisition Corp.

Notes to Financial Statements

Note 7. Redeemable Class A Common Stock and Stockholders' Equity, page F-35

41. Please provide us with your analysis under ASC 815-40 to support your accounting treatment for the Private Warrants as equity.

Lewis Silberman
GSR II Meteora Acquisition Corp.
November 8, 2022
Page 9

Lux Vending, LL (DBA Bitcoin Depot) Consolidated Financial Statements
Consolidated Statements of Cash Flows For The Years Ended December 31, 2021 and 2020,
page F-43

42. We note you had purchases of services in digital assets of \$2.4 million, \$6.1 million, and \$3.5 million in 2022, 2021, and 2020, respectively. Please provide a thorough description of the nature, type, and substance of expenses paid to vendors through the issuance of digital assets.

Notes to Consolidated Financial Statements December 31, 2021 and 2020

Summary of Significant Accounting Policies

(e) Digital Assets, page F-46

43. We note your disclosure that you perform impairment testing on digital assets on an annual basis, or more frequently, when events or changes in circumstances occur indicating that it is more likely than not that the indefinite-lived asset is impaired. Please tell us, and revise your next amendment, to disclose in greater detail the frequency of impairment testing in the periods presented. If impairment testing was done annually in the periods presented, tell us how that impairment testing period is appropriate given the nature price changes in digital assets.
44. We note your disclosure that your digital assets are comprised "primarily" of Bitcoin, Litecoin, and Ethereum. Please revise your next amendment to disclose, including quantitatively, if you hold or transacted in any other digital assets other than the three listed in the periods presented.
45. Please reconsider the appropriateness of your statement that there is no official guidance for the accounting for digital assets. We observe that the FASB codification is the source of authoritative generally accepted accounting principles and that there is codification guidance whose scope applies to your transactions.
46. We note that you hold digital assets for two purposes: (1) to sell to customers in exchange for cash, and (2) for investment purposes. Please provide the following:
- Revenues and cost of revenues for digital assets held for sale to customers in exchange for cash and held for investment purposes; and
 - A rollforward of digital assets held for sale to customers in exchange for cash and held for investment purposes by each specific type of digital asset (BTC, LTC, ETH) in the periods presented.
47. Please tell us the accounting literature followed when making the determination that the indefinite-lived intangible assets would be recorded on your consolidated balance sheet on a first-in, first-out ("FIFO") basis. In addition, tell us any alternative methodologies you considered and why you believe FIFO is a more appropriate measurement methodology.
48. We note your disclosure on page F-46 that you, "in limited cases, allow customers to sell these types of digital assets." Please clarify this disclosure, specifically addressing if you

Lewis Silberman
GSR II Meteora Acquisition Corp.
November 8, 2022
Page 10

purchase digital assets from customers through your ATMs or through the BDCheckout product.

(i) Revenue Recognition, page F-48

49. We note you launched BDCheckout in the second quarter of 2022 and have 8,395 locations at June 30, 2022. Please revise your next amendment to specifically discuss your revenue recognition policy for BDCheckout revenues.
50. We note you acquired BitAccess in July 2021. Please revise your next amendment to describe in greater detail your revenue recognition policies for BitAccess hardware and software revenues.
51. Please tell us what constitutes the 'OTC and other revenue' in the periods presented and your revenue recognition policy for these revenues.
52. We note your disclosure on pages F-49 and F-77 that revenues from software services is settled in digital assets. Please tell us the following for these transactions:
 - when ownership or control is determined to have transferred;
 - how the price of the digital asset is determined;
 - the types of digital assets received in these transactions;
 - how the Company uses these digital assets once received;
 - use or reliance on third parties at any stage of the process; and
 - whether the Company acts as a custodian or holds any digital assets off balance sheet at any point in the process.
53. We note your disclosures regarding the Company's policy for providing a mark-up. Please tell us, and revise your amendment, to discuss the following:
 - Disclose the mark-up revenue recognized in the periods presented;
 - Tell us if the mark-up is dependent on the type of digital asset sold;
 - Disclose the average mark-up by digital asset in the periods presented; and
 - Tell us if the Company has sold digital assets at a loss due to price volatility exceeding the amount of the mark-up. To the extent that this has occurred, tell us your consideration of recognizing an impairment charge prior to the sale occurring.
54. Please tell us, and revise your next amendment, to discuss how the prices utilized in digital asset transactions are determined. Indicate if the process for determining the prices utilized are different for ATM or BDCheckout transactions.

(j) Cost of Revenue, page F-49

55. Please revise to disclose, in tabular format, a breakout of the cost of revenue line item by specific cost type (i.e. cost of digital assets, fees paid to obtain digital assets, etc.) for the periods presented. Please discuss any material changes in specific costs items in MD&A.
56. Please tell us how you concluded that it is appropriate to include the gain on sales of digital assets held for investment in cost of revenue. Please reference the GAAP authoritative literature you used to make this determination.

Lewis Silberman
GSR II Meteora Acquisition Corp.
November 8, 2022
Page 11

(n) Fair Value of Financial Instruments, page F-51

57. Please revise your next amendment to provide all of the disclosures in ASC 820-10-50-2. See example disclosure in ASC 820-10-55-100 through 104.

Note 5. Restatement, page F-54

58. Please revise your next amendment to include additional details related to correction adjustments (a), (b), (c), and (d). Specifically, include more information as to what each error relates to, how each error was determined, and the specific details related to how the correction amounts were determined that lead to the total as adjusted amount.

Note 7. Digital Assets, page F-58

59. Please revise to expand your rollforward of digital assets to provide by digital asset type (BIT, LTC, ETH).

We remind you that the company and its management are responsible for the accuracy and adequacy of their disclosures, notwithstanding any review, comments, action or absence of action by the staff.

You may contact David Irving at 202-551-3321 or Bonnie Baynes at 202-551-4924 if you have questions regarding comments on the financial statements and related matters. Please contact Christopher Wall at 202-551-4162 or J. Nolan McWilliams, Acting Legal Branch Chief, at 202-551-3217 with any other questions.

Sincerely,

Division of Corporation Finance
Office of Finance

To: doug@socialleverage.com[doug@socialleverage.com]
From: CF Office of Crypto Assets
Sent: 2023-02-15T19:24:39Z
Subject: SEC Comment Letter: Social Leverage Acquisition Corp I CORRESP
Received: 2023-02-15T19:24:39Z
[Social Leverage Acquisition Corp I CORRESP Letter.pdf](#)

Do not respond to this email address since we do not monitor it for incoming emails.

The Securities and Exchange Commission’s Division of Corporation Finance has attached to this email a letter relating to an SEC filing.

If you have any questions regarding this letter, please contact one of the staff members identified in it.

Division of Corporation Finance
U.S. Securities & Exchange Commission
100 F Street, NE
Washington, D.C. 20549
www.sec.gov



DIVISION OF
CORPORATION FINANCE

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

February 15, 2023

Howard Lindzon
Chief Executive Officer and Director
Social Leverage Acquisition Corp I
8390 E. Via De Ventura Suite F110-207
Scottsdale, AZ 85258

Re: Social Leverage Acquisition Corp I
Amendment No 2. to Preliminary Proxy Statement on Schedule 14A
Filed January 20, 2023
File No. 001-40059

Dear Howard Lindzon:

We have reviewed your filing and have the following comments. In some of our comments, we may ask you to provide us with information so we may better understand your disclosure.

Please respond to these comments within ten business days by providing the requested information or advise us as soon as possible when you will respond. If you do not believe our comments apply to your facts and circumstances, please tell us why in your response.

After reviewing your response to these comments, we may have additional comments. Unless we note otherwise, our references to prior comments are to comments in our December 19, 2022 letter.

Amendment No. 2 to the Preliminary Proxy Statement on Schedule 14A

General

1. We note your response to prior comment 1 that you do not anticipate that the Committee on Foreign Investment in the United States (CFIUS) will review this transaction. Please expand your risk factor disclosure to address the uncertainty of such assessment or anticipation. Also please disclose the consequences of making an incorrect assessment or if your anticipation turns out to be incorrect.
2. Please revise throughout as appropriate to clearly differentiate between W3BCLOUD's historical business operations and those aspects of your business plan that are aspirational. As part of your disclosure, include a discussion regarding known trends related to the profitability of your historical operations prior to the Ethereum merge compared to your current and planned business operations moving forward, and how those

Howard Lindzon
Social Leverage Acquisition Corp I
February 15, 2023
Page 2

business operations may differ in terms of revenue generation and technical operation.

Summary of the Proxy Statement, page 29

3. We note your revised disclosure in response to prior comment 5 that you have not analyzed whether the crypto assets you receive are securities and have not finalized a process for making this determination. Please revise your summary section to disclose the same, as previously requested.

Summary Unaudited Pro Forma Condensed Combined Financial Information, page 46

4. On page 47, you refer twice to W3BCLOUD Limited Partners. The organization chart on page 33 and the audited financial statements on page F-46 both show W3BCLOUD Partners Limited. If this was an error, please revise. Otherwise please explain to us the relationship of the entity.

Risk Factors

Digital assets that we hold may be subject to loss, theft, or restriction on access, page 57

5. We note your revised disclosure in response to prior comment 9 that you "have decided to retain one of [sic] more banks or trust companies, to hold our long-term digital assets as custodians." Please describe in greater detail any plans or arrangements you have made in this regard and the material terms thereof.

Our revenue for storage and compute infrastructure services relies heavily on payment..., page 59

6. We note your revised disclosure on page 59 in response to prior comment 12 that your Ethereum pool operator does not presently maintain insurance for loss or theft of digital assets. Please further revise this risk factor to clearly state whether any of your pool operators presently maintain any such insurance.

There is no assurance that we will achieve profitability..., page 70

7. Please reconcile the amount of net income referenced in your risk factor of \$14.6 million for the nine months ended September 30, 2022 to page F-80. Please revise or advise accordingly.

Selected Historical Financial Information of SLAC

Balance Sheet Data, page 146

8. Please reconcile the amount of current assets reflected in your Balance Sheet date of \$0 as of December 31, 2021 to your balance sheet on page F-3 with a current assets balance of \$719,918. Please revise or advise accordingly.

Information About the Company

Our Business, page 153

Howard Lindzon
Social Leverage Acquisition Corp I
February 15, 2023
Page 3

9. Please reconcile the amounts on page 154 for net income and EBITDA for the nine months ended September 30, 2022 to pages 187 and F-80. Please revise or advise accordingly.
10. We note your response to prior prior comment 18. We further note your disclosure that the "expected daily profit for ETC mining to drop from approximately \$24 USD/day per GHash to \$2.5 USD/day." To the extent material to an understanding of your business, please revise to provide a comparison of the expected daily profit for ETH mining prior to the merge with the current expected profitability of ETC mining. If it is not material to an understanding of your business, please revise accordingly.

Staking, page 157

11. Please revise to provide a more complete discussion regarding your current and planned staking activities, including whether you are currently staking any of your crypto assets or plan to do so. In addition, to the extent you intend to offer staking services to customers or businesses, provide additional disclosure regarding how such services will operate and generate revenue. Finally, consider including a discussion regarding recent regulatory developments related to providing staking-as-a-service to customers.

Data Center Facilities, page 160

12. We note your revised disclosure in response to prior comment 26 that your "blended average cost of electricity per Kwh was \$0.065 in September 2022." Please revise to clarify what you mean by the phrase "blended average." Also please revise to provide disclosure for 2022. In this regard, we note that you have provided disclosure for the month of September 2022.
13. Please revise to disclose the full name of Zoomhash and clarify what type of entity Zoomhash is.

W3BCLOUD Management's Discussion and Analysis of Financial Condition and Results of Operations

Key Performance Indicators, page 178

14. Please revise your footnotes to show how you calculated revenue per GPU and revenue per Tebibyte for each period presented in the table. Include total GPUs and Tebibyte's used in the calculations.

Results of Operations, page 181

15. Please reconcile the amount of total operating expenses for the nine months ended September 30, 2022 to page F-80. Please revise, or advise accordingly.

Critical Accounting Estimates, page 192

16. Please tell us, and revise your next amendment as appropriate, for the following related to

Howard Lindzon
Social Leverage Acquisition Corp I
February 15, 2023
Page 4

your impairment testing for property, plant, and equipment:

- The method or methods for determining fair value (whether based on a quoted market price, prices for similar assets, or another valuation technique) under ASC 360-10-50-2c;
- Specifics as to how you determined the impairment loss of \$16.4 million in the three months ending September 30, 2022 related to the "Merge" under ASC 360-10-35;
- A rollforward of your property, plant and equipment for the nine months ended September 30, 2022; and
- Why you did not add a discussion of your accounting estimates in critical accounting estimates.

Certain Projected Financial Information of the Company, page 208

17. Refer to your revised disclosure in the penultimate bullet on page 210 in response to prior comment 32. You disclose that following the Ethereum Merge, you no longer support Ethereum POW and intend to derive compute revenues from certain alternative compute revenue streams referenced in your disclosure. Please further revise to provide additional details and support for your assumption that profitability from such revenue streams in 2023 will equal 80% pre-merge ETH profitability, as stated in your disclosure.

Index to Consolidated Financial Information, page F-1

18. Please revise your reference to the unaudited condensed consolidation financial statements beginning on page F-79 to refer to the proper company named in those statements, W3BCLOUD Holdings, Inc. and Subsidiaries.

Financial Statements of W3BCLOUD Holdings, Inc. For the Periods Ended September 30, 2022 and December 31, 2021

Consolidated Statement of Cash Flows, page F-51

19. We note your responses to prior comments 33 and 40. Please address the following:
- You disclose realized gains on the sale of digital assets of \$3.3 million and proceeds from sale of digital assets of \$1.6 million. You also stated that your strategy has been predominately to hold digital assets you earn or acquire for extended periods except for when cash is needed and that you account for gains and losses in accordance with the first-in-first-out (FIFO) method. Tell us and revise your disclosures accordingly, how you determined realized gains on the sale of digital assets of \$3.3 million which is greater than the amount of proceeds received from the sales.
 - In your digital asset rollforwards on pages F-64 and F-98 you reflect the proceeds from the sale of digital assets as a reduction and gains from the sale of digital assets as increases in your digital asset holdings. Please tell us and revise your disclosures accordingly, why you have not reflected the carrying value of digital assets upon sale as a reduction and the fair value of digital assets upon acquisition as an increase to your digital asset holdings.

Howard Lindzon
Social Leverage Acquisition Corp I
February 15, 2023
Page 5

- Tell us how you recognized the disposal of digital assets and related the acquisition of USDC in conjunction with your repayment on USDC borrowings, including your consideration of ASC 610-20-32-3 of derecognition upon disposal. Revise your disclosures as necessary.
- Revise your supplemental cash flow disclosures to include all non-cash digital asset activity, i.e. settlement of interest, purchase, sales, borrowings, settlements, and proceeds of digital assets.
- Revise related disclosures for the period ending September 30, 2022 as necessary.

Financial Statements of W3BCLOUD Holdings, Inc. For the Years Ended December 31, 2021 and 2020

Note 3. Summary of Significant Accounting Policies

Digital Assets, page F-55

20. We note your response to prior comment 34. Please address the following:
- Tell us if you group or co-mingle multiple units of digital assets for purposes of assessing impairment, or whether you assess each unit (or fractional unit) of a crypto asset when you assess for impairment;
 - You disclose in the same paragraph on page F-55 that your digital assets are, "assessed for impairment annually, or more frequently, when events or changes in circumstances occur indicating that it is more likely than not that the indefinite-lived asset is impaired," and also, "assess digital assets for impairment on a monthly basis, impairing the asset to the lowest intraday value in the month of review." Please reconcile and revise as necessary; and
 - You disclose on page F-56 that you use the FIFO method and a daily weighted average transaction price to calculate the cost basis of your digital assets in accounting for gains and losses on sales whereas in your response you state that when a digital asset is disposed of the realized gain/loss is the proceeds minus the carrying value (which is cost basis minus impairment, if any) Please reconcile and revise as necessary.

Revenue Recognition, page F-58

21. We note your response to prior comments 36, 37 and 38. Please address the following:
- You disclose in your response to comment 36, that if W3BCLOUD stopped providing compute resources to a mining pool it would be entitled to its proportional share of any rewards such mining pool earned through that point of time. However, in your response to comment 37, you state that The PPLNS payment structure works by identifying each miner's contribution between *successfully* mined blocks. When a new block is mined by a pool a pool operator looks back in time to when the prior block was mined, identifies each miner's compute contribution over that time period (for miners active when the new block was mined) and that if a miner drops out of a pool in the middle of this time period they will receive no reward given this calculation structure. Please reconcile these statements and revise your Compute

Howard Lindzon
Social Leverage Acquisition Corp I
February 15, 2023
Page 6

- Operations revenue recognition policy on page F-59 as necessary.
- Please tell us and enhance your Compute Operations revenue recognition disclosure on page F-59 how you considered the requirement of successfully adding to the next block in your determination that your enforceable right to compensation begins once you start providing computing power to the pool operator.
- Enhance your Compute Operations revenue recognition disclosure on page F-59 to disclose each of the payment structures/formulas, including components (i.e. block reward and transaction fee) underlying the transaction price based on the agreement terms for the periods presented, including if and how you are rewarded for unsuccessful compute contributions. Also discuss your determination to account for transaction revenue as constrained variable consideration upon receipt from the pool operator and not contract inception as required by ASC 606-10-32-21 for noncash consideration.
- Disclose in your Compute Operations revenue recognition policy on page F-59 when and how often you satisfy your performance obligations based on the terms of the agreement with the mining pool operator in relation to when you recognize revenue versus when you receive your total transaction fee and your basis thereof.

Note 2. Liquidity and Going Concern, page F-84

22. We note that on page F-52, in your audited annual financial statements, you disclosed that you believe your current cash on hand, available debt financing, including potential sales of current digital assets and expected earnings from operations will be sufficient to meet your operating and capital requirements for at least the next twelve months from the date those financial statements were issued. On page F-84, in the subsequent interim financial statements, you disclose that there is substantial doubt about your ability to continue as a going concern. We do not see any discussion in your disclosure that identifies any significant changes between periods. Please tell us why there was not substantial doubt about your ability to continue as a going concern when you issued the audited annual financial statements. Explain how you applied ASC 205-40-50 in both periods.
23. Further, provide all of the disclosures required by ASC 205-40-50-13 including a statement indicating that there is substantial doubt about your ability to continue as a going concern within one year after the date that the financial statements are issued and disclose information that enables users of the financial statements to understand all of the following:
 - Principal conditions or events that raise substantial doubt about the entity's ability to continue as a going concern;
 - Management's evaluation of the significance of those conditions or events in relation to the entity's ability to meet its obligations; and
 - Management's plans that are intended to mitigate the conditions or events that raise substantial doubt about the entity's ability to continue as a going concern.

Note 11. Net Income (Loss) Per Share, page F-108

Howard Lindzon
Social Leverage Acquisition Corp I
February 15, 2023
Page 7

24. Please tell us why the net income adjustment for the noncontrolling interest is \$1,671,000 in the calculation of diluted net income per share for the nine months ended September 30, 2022, and how this differs from \$54,000 used to calculate basic earnings per share. Revise your disclosure as necessary to explain.

We remind you that the company and its management are responsible for the accuracy and adequacy of their disclosures, notwithstanding any review, comments, action or absence of action by the staff.

You may contact David Irving at (202) 551-3321 or Michelle Miller at (202) 551-3368 if you have questions regarding comments on the financial statements and related matters. Please contact David Lin at (202) 551-3552 or Matthew Derby at (202) 551-3334 with any other questions.

Sincerely,

Division of Corporation Finance
Office of Crypto Assets

To: carl.marcellino@ropesgray.com[carl.marcellino@ropesgray.com]

From: CF Office of Crypto Assets

Sent: 2023-02-15T19:24:41Z

Subject: SEC Comment Letter: Social Leverage Acquisition Corp I CORRESP

Received: 2023-02-15T19:24:41Z

[Social Leverage Acquisition Corp I CORRESP Letter.pdf](#)

Do not respond to this email address since we do not monitor it for incoming emails.

The Securities and Exchange Commission’s Division of Corporation Finance has attached to this email a letter relating to an SEC filing.

If you have any questions regarding this letter, please contact one of the staff members identified in it.

Division of Corporation Finance
U.S. Securities & Exchange Commission
100 F Street, NE
Washington, D.C. 20549
www.sec.gov



DIVISION OF
CORPORATION FINANCE

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

February 15, 2023

Howard Lindzon
Chief Executive Officer and Director
Social Leverage Acquisition Corp I
8390 E. Via De Ventura Suite F110-207
Scottsdale, AZ 85258

Re: Social Leverage Acquisition Corp I
Amendment No 2. to Preliminary Proxy Statement on Schedule 14A
Filed January 20, 2023
File No. 001-40059

Dear Howard Lindzon:

We have reviewed your filing and have the following comments. In some of our comments, we may ask you to provide us with information so we may better understand your disclosure.

Please respond to these comments within ten business days by providing the requested information or advise us as soon as possible when you will respond. If you do not believe our comments apply to your facts and circumstances, please tell us why in your response.

After reviewing your response to these comments, we may have additional comments. Unless we note otherwise, our references to prior comments are to comments in our December 19, 2022 letter.

Amendment No. 2 to the Preliminary Proxy Statement on Schedule 14A

General

1. We note your response to prior comment 1 that you do not anticipate that the Committee on Foreign Investment in the United States (CFIUS) will review this transaction. Please expand your risk factor disclosure to address the uncertainty of such assessment or anticipation. Also please disclose the consequences of making an incorrect assessment or if your anticipation turns out to be incorrect.
2. Please revise throughout as appropriate to clearly differentiate between W3BCLOUD's historical business operations and those aspects of your business plan that are aspirational. As part of your disclosure, include a discussion regarding known trends related to the profitability of your historical operations prior to the Ethereum merge compared to your current and planned business operations moving forward, and how those

Howard Lindzon
Social Leverage Acquisition Corp I
February 15, 2023
Page 2

business operations may differ in terms of revenue generation and technical operation.

Summary of the Proxy Statement, page 29

3. We note your revised disclosure in response to prior comment 5 that you have not analyzed whether the crypto assets you receive are securities and have not finalized a process for making this determination. Please revise your summary section to disclose the same, as previously requested.

Summary Unaudited Pro Forma Condensed Combined Financial Information, page 46

4. On page 47, you refer twice to W3BCLOUD Limited Partners. The organization chart on page 33 and the audited financial statements on page F-46 both show W3BCLOUD Partners Limited. If this was an error, please revise. Otherwise please explain to us the relationship of the entity.

Risk Factors

Digital assets that we hold may be subject to loss, theft, or restriction on access, page 57

5. We note your revised disclosure in response to prior comment 9 that you "have decided to retain one of [sic] more banks or trust companies, to hold our long-term digital assets as custodians." Please describe in greater detail any plans or arrangements you have made in this regard and the material terms thereof.

Our revenue for storage and compute infrastructure services relies heavily on payment..., page 59

6. We note your revised disclosure on page 59 in response to prior comment 12 that your Ethereum pool operator does not presently maintain insurance for loss or theft of digital assets. Please further revise this risk factor to clearly state whether any of your pool operators presently maintain any such insurance.

There is no assurance that we will achieve profitability..., page 70

7. Please reconcile the amount of net income referenced in your risk factor of \$14.6 million for the nine months ended September 30, 2022 to page F-80. Please revise or advise accordingly.

Selected Historical Financial Information of SLAC

Balance Sheet Data, page 146

8. Please reconcile the amount of current assets reflected in your Balance Sheet date of \$0 as of December 31, 2021 to your balance sheet on page F-3 with a current assets balance of \$719,918. Please revise or advise accordingly.

Information About the Company

Our Business, page 153

Howard Lindzon
Social Leverage Acquisition Corp I
February 15, 2023
Page 3

9. Please reconcile the amounts on page 154 for net income and EBITDA for the nine months ended September 30, 2022 to pages 187 and F-80. Please revise or advise accordingly.
10. We note your response to prior prior comment 18. We further note your disclosure that the "expected daily profit for ETC mining to drop from approximately \$24 USD/day per GHash to \$2.5 USD/day." To the extent material to an understanding of your business, please revise to provide a comparison of the expected daily profit for ETH mining prior to the merge with the current expected profitability of ETC mining. If it is not material to an understanding of your business, please revise accordingly.

Staking, page 157

11. Please revise to provide a more complete discussion regarding your current and planned staking activities, including whether you are currently staking any of your crypto assets or plan to do so. In addition, to the extent you intend to offer staking services to customers or businesses, provide additional disclosure regarding how such services will operate and generate revenue. Finally, consider including a discussion regarding recent regulatory developments related to providing staking-as-a-service to customers.

Data Center Facilities, page 160

12. We note your revised disclosure in response to prior comment 26 that your "blended average cost of electricity per Kwh was \$0.065 in September 2022." Please revise to clarify what you mean by the phrase "blended average." Also please revise to provide disclosure for 2022. In this regard, we note that you have provided disclosure for the month of September 2022.
13. Please revise to disclose the full name of Zoomhash and clarify what type of entity Zoomhash is.

W3BCLOUD Management's Discussion and Analysis of Financial Condition and Results of Operations

Key Performance Indicators, page 178

14. Please revise your footnotes to show how you calculated revenue per GPU and revenue per Tebibyte for each period presented in the table. Include total GPUs and Tebibyte's used in the calculations.

Results of Operations, page 181

15. Please reconcile the amount of total operating expenses for the nine months ended September 30, 2022 to page F-80. Please revise, or advise accordingly.

Critical Accounting Estimates, page 192

16. Please tell us, and revise your next amendment as appropriate, for the following related to

Howard Lindzon
Social Leverage Acquisition Corp I
February 15, 2023
Page 4

your impairment testing for property, plant, and equipment:

- The method or methods for determining fair value (whether based on a quoted market price, prices for similar assets, or another valuation technique) under ASC 360-10-50-2c;
- Specifics as to how you determined the impairment loss of \$16.4 million in the three months ending September 30, 2022 related to the "Merge" under ASC 360-10-35;
- A rollforward of your property, plant and equipment for the nine months ended September 30, 2022; and
- Why you did not add a discussion of your accounting estimates in critical accounting estimates.

Certain Projected Financial Information of the Company, page 208

17. Refer to your revised disclosure in the penultimate bullet on page 210 in response to prior comment 32. You disclose that following the Ethereum Merge, you no longer support Ethereum POW and intend to derive compute revenues from certain alternative compute revenue streams referenced in your disclosure. Please further revise to provide additional details and support for your assumption that profitability from such revenue streams in 2023 will equal 80% pre-merge ETH profitability, as stated in your disclosure.

Index to Consolidated Financial Information, page F-1

18. Please revise your reference to the unaudited condensed consolidation financial statements beginning on page F-79 to refer to the proper company named in those statements, W3BCLOUD Holdings, Inc. and Subsidiaries.

Financial Statements of W3BCLOUD Holdings, Inc. For the Periods Ended September 30, 2022 and December 31, 2021

Consolidated Statement of Cash Flows, page F-51

19. We note your responses to prior comments 33 and 40. Please address the following:
- You disclose realized gains on the sale of digital assets of \$3.3 million and proceeds from sale of digital assets of \$1.6 million. You also stated that your strategy has been predominately to hold digital assets you earn or acquire for extended periods except for when cash is needed and that you account for gains and losses in accordance with the first-in-first-out (FIFO) method. Tell us and revise your disclosures accordingly, how you determined realized gains on the sale of digital assets of \$3.3 million which is greater than the amount of proceeds received from the sales.
 - In your digital asset rollforwards on pages F-64 and F-98 you reflect the proceeds from the sale of digital assets as a reduction and gains from the sale of digital assets as increases in your digital asset holdings. Please tell us and revise your disclosures accordingly, why you have not reflected the carrying value of digital assets upon sale as a reduction and the fair value of digital assets upon acquisition as an increase to your digital asset holdings.

Howard Lindzon
Social Leverage Acquisition Corp I
February 15, 2023
Page 5

- Tell us how you recognized the disposal of digital assets and related the acquisition of USDC in conjunction with your repayment on USDC borrowings, including your consideration of ASC 610-20-32-3 of derecognition upon disposal. Revise your disclosures as necessary.
- Revise your supplemental cash flow disclosures to include all non-cash digital asset activity, i.e. settlement of interest, purchase, sales, borrowings, settlements, and proceeds of digital assets.
- Revise related disclosures for the period ending September 30, 2022 as necessary.

Financial Statements of W3BCLOUD Holdings, Inc. For the Years Ended December 31, 2021 and 2020

Note 3. Summary of Significant Accounting Policies

Digital Assets, page F-55

20. We note your response to prior comment 34. Please address the following:
- Tell us if you group or co-mingle multiple units of digital assets for purposes of assessing impairment, or whether you assess each unit (or fractional unit) of a crypto asset when you assess for impairment;
 - You disclose in the same paragraph on page F-55 that your digital assets are, "assessed for impairment annually, or more frequently, when events or changes in circumstances occur indicating that it is more likely than not that the indefinite-lived asset is impaired," and also, "assess digital assets for impairment on a monthly basis, impairing the asset to the lowest intraday value in the month of review." Please reconcile and revise as necessary; and
 - You disclose on page F-56 that you use the FIFO method and a daily weighted average transaction price to calculate the cost basis of your digital assets in accounting for gains and losses on sales whereas in your response you state that when a digital asset is disposed of the realized gain/loss is the proceeds minus the carrying value (which is cost basis minus impairment, if any) Please reconcile and revise as necessary.

Revenue Recognition, page F-58

21. We note your response to prior comments 36, 37 and 38. Please address the following:
- You disclose in your response to comment 36, that if W3BCLOUD stopped providing compute resources to a mining pool it would be entitled to its proportional share of any rewards such mining pool earned through that point of time. However, in your response to comment 37, you state that The PPLNS payment structure works by identifying each miner's contribution between *successfully* mined blocks. When a new block is mined by a pool a pool operator looks back in time to when the prior block was mined, identifies each miner's compute contribution over that time period (for miners active when the new block was mined) and that if a miner drops out of a pool in the middle of this time period they will receive no reward given this calculation structure. Please reconcile these statements and revise your Compute

Howard Lindzon
Social Leverage Acquisition Corp I
February 15, 2023
Page 6

- Operations revenue recognition policy on page F-59 as necessary.
- Please tell us and enhance your Compute Operations revenue recognition disclosure on page F-59 how you considered the requirement of successfully adding to the next block in your determination that your enforceable right to compensation begins once you start providing computing power to the pool operator.
- Enhance your Compute Operations revenue recognition disclosure on page F-59 to disclose each of the payment structures/formulas, including components (i.e. block reward and transaction fee) underlying the transaction price based on the agreement terms for the periods presented, including if and how you are rewarded for unsuccessful compute contributions. Also discuss your determination to account for transaction revenue as constrained variable consideration upon receipt from the pool operator and not contract inception as required by ASC 606-10-32-21 for noncash consideration.
- Disclose in your Compute Operations revenue recognition policy on page F-59 when and how often you satisfy your performance obligations based on the terms of the agreement with the mining pool operator in relation to when you recognize revenue versus when you receive your total transaction fee and your basis thereof.

Note 2. Liquidity and Going Concern, page F-84

22. We note that on page F-52, in your audited annual financial statements, you disclosed that you believe your current cash on hand, available debt financing, including potential sales of current digital assets and expected earnings from operations will be sufficient to meet your operating and capital requirements for at least the next twelve months from the date those financial statements were issued. On page F-84, in the subsequent interim financial statements, you disclose that there is substantial doubt about your ability to continue as a going concern. We do not see any discussion in your disclosure that identifies any significant changes between periods. Please tell us why there was not substantial doubt about your ability to continue as a going concern when you issued the audited annual financial statements. Explain how you applied ASC 205-40-50 in both periods.
23. Further, provide all of the disclosures required by ASC 205-40-50-13 including a statement indicating that there is substantial doubt about your ability to continue as a going concern within one year after the date that the financial statements are issued and disclose information that enables users of the financial statements to understand all of the following:
 - Principal conditions or events that raise substantial doubt about the entity's ability to continue as a going concern;
 - Management's evaluation of the significance of those conditions or events in relation to the entity's ability to meet its obligations; and
 - Management's plans that are intended to mitigate the conditions or events that raise substantial doubt about the entity's ability to continue as a going concern.

Note 11. Net Income (Loss) Per Share, page F-108

Howard Lindzon
Social Leverage Acquisition Corp I
February 15, 2023
Page 7

24. Please tell us why the net income adjustment for the noncontrolling interest is \$1,671,000 in the calculation of diluted net income per share for the nine months ended September 30, 2022, and how this differs from \$54,000 used to calculate basic earnings per share. Revise your disclosure as necessary to explain.

We remind you that the company and its management are responsible for the accuracy and adequacy of their disclosures, notwithstanding any review, comments, action or absence of action by the staff.

You may contact David Irving at (202) 551-3321 or Michelle Miller at (202) 551-3368 if you have questions regarding comments on the financial statements and related matters. Please contact David Lin at (202) 551-3552 or Matthew Derby at (202) 551-3334 with any other questions.

Sincerely,

Division of Corporation Finance
Office of Crypto Assets

To: rjz@haddanzenfel.com[rjz@haddanzenfel.com]
From: CF Office of Crypto Assets
Sent: 2023-05-03T16:55:24Z
Subject: SEC Comment Letter: Global-Smart.Tech Inc. S-1/A
Received: 2023-05-03T16:55:24Z
[Global-Smart.Tech Inc. S-1A Letter.pdf](#)

Do not respond to this email address since we do not monitor it for incoming emails.

The Securities and Exchange Commission’s Division of Corporation Finance has attached to this email a letter relating to an SEC filing.

If you have any questions regarding this letter, please contact one of the staff members identified in it.

Division of Corporation Finance
U.S. Securities & Exchange Commission
100 F Street, NE
Washington, D.C. 20549
www.sec.gov



DIVISION OF
CORPORATION FINANCE

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

May 3, 2023

Yehor Rodin
President
Global-Smart.Tech Inc.
Kava b.b.
85320, Tivat, Montenegro

**Re: Global-Smart.Tech
Amendment No. 1 to Registration Statement on Form S-1
Filed March 31, 2023
File No. 333-267740**

Dear Yehor Rodin:

We have reviewed your amended registration statement and have the following comments. In some of our comments, we may ask you to provide us with information so we may better understand your disclosure.

Please respond to this letter by amending your registration statement and providing the requested information. If you do not believe our comments apply to your facts and circumstances or do not believe an amendment is appropriate, please tell us why in your response.

After reviewing any amendment to your registration statement and the information you provide in response to these comments, we may have additional comments. Unless we note otherwise, our references to prior comments are to comments in our November 2, 2022 letter.

Pre-effective amendment No. 1 to Form S-1 filed March 31, 2023

General

1. Please refer to comment 1. We note that you have revised the financial statement index on page 80 such that the notes to the annual financial statements begin on page F-6 before continuing on page 87, and that the November 30, 2022 financial statements begin on a second page F-1 with notes beginning on page 95. Please revise your page numbers to be sequential and follow a consistent pattern throughout the filing.
2. Provide disclosure of any significant crypto asset market developments material to understanding or assessing your business, financial condition and results of operations including any material impact from the price volatility of crypto assets.

Yehor Rodin
Global-Smart.Tech Inc.
May 3, 2023
Page 2

Cover Page

3. We note your response to comments 2 and 3. Please revise your Cover Page to also include the disclosures that you included elsewhere in your registration statement in response to these comments.

Overview, page 10

4. We note your response to comment 5. Please move the Glossary of Terms and Abbreviations section to the beginning of your registration statement.
5. We note your response to comment 6 and reissue it in part. Please identify, by name, all of the crypto assets you intend to mine. If true, revise this section to disclose that you have no policy regarding when or how you will determine to sell your crypto assets. Please revise your risk factors section to include a discussion of the risks related to this lack of policy. In addition, please provide more detail as to what the term "reasonable time" means in this section, including who makes this determination and how it is determined what a "reasonable time" is.
6. Please revise to describe, in detail, the process for how a customer will be able to transfer their "crypto earnings in digital wallets of their preference." Please revise your risk factors section to include a discussion of the risks related to this action as well.

Risk Factors, page 15

7. We note your response to comment 8 and reissue our comment. Please place this section in front of the The Offering section. Refer to Item 105(b) of Regulation S-K.
8. To the extent material, discuss any reputational harm you may face in light of the recent disruption in the crypto asset markets. For example, discuss how market conditions have affected how your business is perceived by customers, counterparties, and regulators, and whether there is a material impact on your operations or financial condition.
9. We note that you are located in Montenegro. Describe any material risks you face from unauthorized or impermissible customer access to your products and services outside of Montenegro. Describe any steps you take to restrict access of U.S. persons to your products and services and any related material risks.
10. Describe any material risks to your business from the possibility of regulatory developments related to crypto assets and crypto asset markets. Identify material pending crypto legislation or regulation and describe any material effects it may have on your business, financial condition, and results of operations.
11. Describe any material risks you face related to the assertion of jurisdiction by U.S. and foreign regulators and other government entities over crypto assets and crypto asset markets.

Yehor Rodin
Global-Smart.Tech Inc.
May 3, 2023
Page 3

12. Describe any material risks related to safeguarding your, your affiliates', or your customers' crypto assets. Describe any material risks to your business and financial condition if your policies and procedures surrounding the safeguarding of crypto assets, conflicts of interest, or comingling of assets are not effective.
13. To the extent material, describe any gaps your board or management have identified with respect to risk management processes and policies in light of current crypto asset market conditions as well as any changes they have made to address those gaps.
14. Describe any material financing, liquidity, or other risks you face related to the impact that the current crypto asset market disruption has had, directly or indirectly, on the value of the crypto assets you use as collateral or the value of your crypto assets used by others as collateral.
15. To the extent material, describe any of the following risks due to disruptions in the crypto asset markets:
 - Risk of loss of customer demand for your products and services.
 - Financing risk, including equity and debt financing.
 - Risk of increased losses or impairments in your investments or other assets.
 - Risks of legal proceedings and government investigations, pending or known to be threatened, in the United States or in other jurisdictions against you or your affiliates.
 - Risks from price declines or price volatility of crypto assets.

We have a business plan which is dependent on the price of Bitcoin, Ether and/or other crypto-assets, page 18

16. We note your response to comment 14 and reissue our comment in part. Please provide support for your assertion that, "based on the current trend in crypto-asset mining, we do not anticipate any losses from our crypto asset mining operations in the nearest future."
17. We note your responses to comments 13 and 23. Please provide more details in your Summary, Risk Factors, and Description of Business section to better describe how you have taken into consideration the Ethereum merge with respect to your business model and how that has led you to decide to develop a platform to determine the most profitable coins at a specific point of time for mining. Please include a table in your registration statement that includes a list of all of the coins you currently intend to market at this time. Also include a description of the policies and procedures you will follow when deciding whether to add or subtract a coin from the list of coins that you seek to mine. Finally, include a discussion regarding the current profitability of proof-of-work mining.

Our future success will depend upon the value of Bitcoin, Ether and other crypto-assets..., page 22

18. Please revise your disclosure that you will measure your crypto assets at fair value every quarter, with realized and unrealized changes reflected in your income statement, to agree

Yehor Rodin
Global-Smart.Tech Inc.
May 3, 2023
Page 4

to your accounting policy disclosure for Digital Assets under note 3 to the November 30, 2022 financial statements on page 96.

Crypto-assets' status as a "security," a "commodity," or a "financial instrument" in any relevant jurisdiction.... page 35

19. We note the statements on page 35 that the legal test for determining whether a particular crypto asset is a security "evolves over time" and that the "SEC's views in this area have evolved over time and it is difficult to predict the direction or timing of any continuing evolution." Please remove these statements as the legal tests are well-established by U.S. Supreme Court case law and the Commission and staff have issued reports, orders, and statements that provide guidance on when a crypto asset may be a security for purposes of the U.S. federal securities laws.

Emerging Growth Company Status, page 45

20. Please remove the statement in the final bullet on page 45 that only two years of financial data would be required in future filings as long as you remain an emerging growth company. Please refer to comment 18.

Common Stock, page 55

21. We note your disclosure referring to the applicable statutes of the State of Nevada for a more complete description of the rights and liabilities of holders of your securities. It appears that you would be governed by Wyoming law rather than Nevada. Please revise this section as appropriate.

Description of Business, page 58

22. Please revise your disclosure to remove promotional language throughout this section and provide support for your assertions. For instance, as non-exclusive examples we note your disclosure that "Our key strength is developing artificial intelligence which will ensure proper monitoring of crypto-assets at the world's cryptocurrency exchanges in real-time..." and "with our innovative strategic developments and commercial relationships, we aim to efficiently maximize our operational advantages." However, we note that you do not appear to have commenced operations. In addition, provide balancing language throughout regarding the uncertainty surrounding the profitability of proof-of-work crypto asset mining.
23. We note that you intend to develop software that will automatically switch to mining the most profitable crypto assets at a given point in time. Please revise to disclose whether you have a policy for determining whether any of the crypto assets you intend to be able to mine could be considered securities under U.S. federal securities laws.
24. Please revise throughout to more clearly explain your business plan and planned revenue streams. As part of your disclosure, include a more complete discussion regarding the

Yehor Rodin
Global-Smart.Tech Inc.
May 3, 2023
Page 5

following:

- whether you intend to offer support for consensus mechanisms other than proof-of-work; and
- how your customer mining operations will operate, including how you intend to earn revenue, how such contractual agreements will be structured, and your process for onboarding new customers.

Mining Operations, page 62

25. We note your response to comment 24. We further note your discussion regarding the hash power of your hardware. Please revise your disclosure to clarify which blockchain you are assuming you will be mining to achieve those hash rates. For example, it is unclear whether your purported 315 GH/s is based on mining Ethereum pre-merge, or if it is a different protocol.
26. We note that you entered into a purchase agreement with Arvutikeskus OÜ. Please revise your disclosure to discuss the material terms of the agreement, including delivery timeframes and termination provisions.
27. We note your disclosure that “[w]e plan to sell our mining power to our clients and use free power to mine cryptocurrency in the company's interests.” Please revise to explain in greater detail what selling “mining power” entails and what “free power” means in this context.
28. We note your disclosure throughout indicating that your business plan is predicated on mining the most profitable crypto assets. Please revise to discuss the current profitability for each of the coins you intend to mine and include a breakeven analysis that compares your cost to mine a particular crypto asset with the value of that asset.

Legal Proceedings, page 65

29. We note your risk factor disclosure on page 24 stating “We are involved in litigation, claims, and litigation arising in connection with our business activities, including disputes with hardware and software suppliers.” Please revise this section to provide a materially complete discussion of any legal proceedings you are a party to.

Management's Discussion and Analysis of Financial Condition and Results of Operations

Results of Operations

Investing Expenses, page 67

30. Please move the discussion of cash flows from investing activities from your Results of Operations disclosure to the Liquidity and Capital Resources disclosure on page 69.

Yehor Rodin
Global-Smart.Tech Inc.
May 3, 2023
Page 6

Notes to the Financial Statements

3. Summary of Significant Accounting Policies

Foreign Currency, page 95

31. Please refer to comment 30. Please address the following:
- Tell us why your functional currency is the U.S. dollar and not the E.U. euro when you disclose on page 11 that your operations are in Montenegro and on page 67 that all your mining equipment is located there.
 - Tell us why you appear to have changed the classification of your foreign exchange activity through May 31, 2022 presented in your interim financial statements without revising your fiscal year financial statements. In this regard, we note that the equity section of your May 31, 2022 balance sheet presented with your interim financial statements is different from that in your audited May 31, 2022 balance sheet. Revise your audited and interim financial statements to consistently present your foreign exchange activity and remove the unaudited label from the May 31, 2022 balance sheet included with your interim financial statements.
 - Revise your policy disclosure to differentiate between foreign currency transaction gains and losses and translation gains and losses.

Digital Assets, page 96

32. Please revise this policy note added in response to comment 28 to clarify that you assess impairment of indefinite-lived intangible digital assets whenever carrying value exceeds fair value. If you instead assess impairment only on a regular basis (for example at 8:00 PM every day) tell us your consideration of the guidance in ASC 350-30-35-18Bc and 35-18Be.

Revenue Recognition, page 97

33. Refer to your response to comment 29 and your added revenue recognition policy disclosure. Please address the following:
- As you disclose here the "leasing of computing power" and in Note 1 the "services of renting mining capacity," provide us a complete analysis explaining why accounting under ASC 842 as a lessor is not required. In your response specifically tell us whether you or your customer identify the digital assets to be mined.
 - You disclose that newly generated coins earned by a crypto asset miner are generally recognized as revenue. Tell us whether this relates to coins earned by your customers or to your own mining activities, and whether/how your accounting policy would be different for coins mined on behalf of customers and coins earned from your own activities. Confirm for us whether the \$14 of revenue recognized during the six months ended November 30, 2022 relates to your own mining activities, the mining activities of your customers, or from mining services provided for your customers.
 - Provide us a complete accounting analysis substantiating your revenue recognition under ASC 606 separately differentiating between mining on behalf of others

Yehor Rodin
Global-Smart.Tech Inc.
May 3, 2023
Page 7

(assuming that ASC 842 does not apply) and mining on your own behalf. In your response, where appropriate, reference for us the authoritative literature you rely upon to support your accounting and specifically address the following:

- As it relates to step 1 in ASC 606:
 - Tell us what digital assets you mine on your own behalf and provide us an explanation how those assets are mined and what rewards and/or transaction fees are earned.
 - Provide us a representative sample contract for your leasing of computing power and cross reference your analysis to the specific provisions of that contract.
 - Tell us whether there are any penalties for contract termination by either party and explain when a contract begins and describe its duration for accounting purposes.
- As it relates to step 2 in ASC 606, tell us your performance obligation(s) and how they were determined.
- As it relates to step 3 in ASC 606:
 - Identify the consideration specified in the contract, how the amount of consideration is determined and explain how you apply the variable consideration constraint in ASC 606-10-32-11 through 32-13.
 - For your leasing of computing power tell us whether you are paid a fee by your customer regardless if rewards and transaction fees are received for the successful writing of a block on the blockchain. If not, tell us whether your fee is based on the amount of the mining reward plus any transactions fees.
 - Tell us the payment terms for the consideration in your contracts.
- As it relates to step 4 in ASC 606, to the extent you have multiple performance obligations tell us how you allocate transaction price to those performance obligations.
- As it relates to step 5 in ASC 606:
 - Tell us whether each performance obligation identified in the preceding bullets is recognized at a point in time or over time and explain why.
 - As it relates to your leasing of computing power, tell us why it is appropriate to recognize revenue "upfront at the time the computing process becomes available to the customer" as disclosed in the first paragraph of your policy note when it appears that your customers expect your computing power to be provided over the duration of your contract.
- For your leasing of computing power specifically tell us how any mined digital assets are conveyed to your customers. Tell us whether and, if so, how they are conveyed directly to your customer.
- To the extent you receive digital assets as consideration, disclose your policy for recording any receivables denominated in underlying digital assets until received and separately reference for us the authoritative literature you rely upon to support your accounting.

Yehor Rodin
Global-Smart.Tech Inc.
May 3, 2023
Page 8

Statement of Changes in Stockholders' Equity (Deficit)
For Three and Six Months Ended November 31, 2022, page F-3

34. Please revise your presentation of the changes in stockholders' equity for the six month period ended November 30, 2022 to begin with your fiscal year-end of May 31, 2022.

You may contact Rolf Sundwall at (202) 551-3105 or Mark Brunhofer at (202) 551-3638 if you have questions regarding comments on the financial statements and related matters. Please contact Eric Envall at (202) 551-3234 or Mathew Derby at (202) 551-3334 with any other questions.

Sincerely,

Division of Corporation Finance
Office of Crypto Assets

To: office@global-smart.tech[office@global-smart.tech]
From: CF Office of Crypto Assets
Sent: 2023-05-03T16:55:07Z
Subject: SEC Comment Letter: Global-Smart.Tech Inc. S-1/A
Received: 2023-05-03T16:55:07Z
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Division of Corporation Finance
U.S. Securities & Exchange Commission
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Washington, D.C. 20549
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DIVISION OF
CORPORATION FINANCE

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

May 3, 2023

Yehor Rodin
President
Global-Smart.Tech Inc.
Kava b.b.
85320, Tivat, Montenegro

**Re: Global-Smart.Tech
Amendment No. 1 to Registration Statement on Form S-1
Filed March 31, 2023
File No. 333-267740**

Dear Yehor Rodin:

We have reviewed your amended registration statement and have the following comments. In some of our comments, we may ask you to provide us with information so we may better understand your disclosure.

Please respond to this letter by amending your registration statement and providing the requested information. If you do not believe our comments apply to your facts and circumstances or do not believe an amendment is appropriate, please tell us why in your response.

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Pre-effective amendment No. 1 to Form S-1 filed March 31, 2023

General

1. Please refer to comment 1. We note that you have revised the financial statement index on page 80 such that the notes to the annual financial statements begin on page F-6 before continuing on page 87, and that the November 30, 2022 financial statements begin on a second page F-1 with notes beginning on page 95. Please revise your page numbers to be sequential and follow a consistent pattern throughout the filing.
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Yehor Rodin
Global-Smart.Tech Inc.
May 3, 2023
Page 2

Cover Page

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Overview, page 10

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Yehor Rodin
Global-Smart.Tech Inc.
May 3, 2023
Page 3

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We have a business plan which is dependent on the price of Bitcoin, Ether and/or other crypto-assets, page 18

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Our future success will depend upon the value of Bitcoin, Ether and other crypto-assets..., page 22

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Yehor Rodin
Global-Smart.Tech Inc.
May 3, 2023
Page 4

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Description of Business, page 58

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Yehor Rodin
Global-Smart.Tech Inc.
May 3, 2023
Page 5

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- how your customer mining operations will operate, including how you intend to earn revenue, how such contractual agreements will be structured, and your process for onboarding new customers.

Mining Operations, page 62

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28. We note your disclosure throughout indicating that your business plan is predicated on mining the most profitable crypto assets. Please revise to discuss the current profitability for each of the coins you intend to mine and include a breakeven analysis that compares your cost to mine a particular crypto asset with the value of that asset.

Legal Proceedings, page 65

29. We note your risk factor disclosure on page 24 stating “We are involved in litigation, claims, and litigation arising in connection with our business activities, including disputes with hardware and software suppliers.” Please revise this section to provide a materially complete discussion of any legal proceedings you are a party to.

Management's Discussion and Analysis of Financial Condition and Results of Operations

Results of Operations

Investing Expenses, page 67

30. Please move the discussion of cash flows from investing activities from your Results of Operations disclosure to the Liquidity and Capital Resources disclosure on page 69.

Yehor Rodin
Global-Smart.Tech Inc.
May 3, 2023
Page 6

Notes to the Financial Statements

3. Summary of Significant Accounting Policies

Foreign Currency, page 95

31. Please refer to comment 30. Please address the following:
- Tell us why your functional currency is the U.S. dollar and not the E.U. euro when you disclose on page 11 that your operations are in Montenegro and on page 67 that all your mining equipment is located there.
 - Tell us why you appear to have changed the classification of your foreign exchange activity through May 31, 2022 presented in your interim financial statements without revising your fiscal year financial statements. In this regard, we note that the equity section of your May 31, 2022 balance sheet presented with your interim financial statements is different from that in your audited May 31, 2022 balance sheet. Revise your audited and interim financial statements to consistently present your foreign exchange activity and remove the unaudited label from the May 31, 2022 balance sheet included with your interim financial statements.
 - Revise your policy disclosure to differentiate between foreign currency transaction gains and losses and translation gains and losses.

Digital Assets, page 96

32. Please revise this policy note added in response to comment 28 to clarify that you assess impairment of indefinite-lived intangible digital assets whenever carrying value exceeds fair value. If you instead assess impairment only on a regular basis (for example at 8:00 PM every day) tell us your consideration of the guidance in ASC 350-30-35-18Bc and 35-18Be.

Revenue Recognition, page 97

33. Refer to your response to comment 29 and your added revenue recognition policy disclosure. Please address the following:
- As you disclose here the "leasing of computing power" and in Note 1 the "services of renting mining capacity," provide us a complete analysis explaining why accounting under ASC 842 as a lessor is not required. In your response specifically tell us whether you or your customer identify the digital assets to be mined.
 - You disclose that newly generated coins earned by a crypto asset miner are generally recognized as revenue. Tell us whether this relates to coins earned by your customers or to your own mining activities, and whether/how your accounting policy would be different for coins mined on behalf of customers and coins earned from your own activities. Confirm for us whether the \$14 of revenue recognized during the six months ended November 30, 2022 relates to your own mining activities, the mining activities of your customers, or from mining services provided for your customers.
 - Provide us a complete accounting analysis substantiating your revenue recognition under ASC 606 separately differentiating between mining on behalf of others

Yehor Rodin
Global-Smart.Tech Inc.
May 3, 2023
Page 7

(assuming that ASC 842 does not apply) and mining on your own behalf. In your response, where appropriate, reference for us the authoritative literature you rely upon to support your accounting and specifically address the following:

- As it relates to step 1 in ASC 606:
 - Tell us what digital assets you mine on your own behalf and provide us an explanation how those assets are mined and what rewards and/or transaction fees are earned.
 - Provide us a representative sample contract for your leasing of computing power and cross reference your analysis to the specific provisions of that contract.
 - Tell us whether there are any penalties for contract termination by either party and explain when a contract begins and describe its duration for accounting purposes.
- As it relates to step 2 in ASC 606, tell us your performance obligation(s) and how they were determined.
- As it relates to step 3 in ASC 606:
 - Identify the consideration specified in the contract, how the amount of consideration is determined and explain how you apply the variable consideration constraint in ASC 606-10-32-11 through 32-13.
 - For your leasing of computing power tell us whether you are paid a fee by your customer regardless if rewards and transaction fees are received for the successful writing of a block on the blockchain. If not, tell us whether your fee is based on the amount of the mining reward plus any transactions fees.
 - Tell us the payment terms for the consideration in your contracts.
- As it relates to step 4 in ASC 606, to the extent you have multiple performance obligations tell us how you allocate transaction price to those performance obligations.
- As it relates to step 5 in ASC 606:
 - Tell us whether each performance obligation identified in the preceding bullets is recognized at a point in time or over time and explain why.
 - As it relates to your leasing of computing power, tell us why it is appropriate to recognize revenue "upfront at the time the computing process becomes available to the customer" as disclosed in the first paragraph of your policy note when it appears that your customers expect your computing power to be provided over the duration of your contract.
- For your leasing of computing power specifically tell us how any mined digital assets are conveyed to your customers. Tell us whether and, if so, how they are conveyed directly to your customer.
- To the extent you receive digital assets as consideration, disclose your policy for recording any receivables denominated in underlying digital assets until received and separately reference for us the authoritative literature you rely upon to support your accounting.

Yehor Rodin
Global-Smart.Tech Inc.
May 3, 2023
Page 8

Statement of Changes in Stockholders' Equity (Deficit)
For Three and Six Months Ended November 31, 2022, page F-3

34. Please revise your presentation of the changes in stockholders' equity for the six month period ended November 30, 2022 to begin with your fiscal year-end of May 31, 2022.

You may contact Rolf Sundwall at (202) 551-3105 or Mark Brunhofer at (202) 551-3638 if you have questions regarding comments on the financial statements and related matters. Please contact Eric Envall at (202) 551-3234 or Mathew Derby at (202) 551-3334 with any other questions.

Sincerely,

Division of Corporation Finance
Office of Crypto Assets

To: doug@socialleverage.com[doug@socialleverage.com]
From: CF Office of Crypto Assets
Sent: 2023-06-01T13:47:05Z
Subject: SEC Comment Letter: Social Leverage Acquisition Corp I CORRESP
Received: 2023-06-01T13:47:05Z
[Social Leverage Acquisition Corp I CORRESP Letter.pdf](#)

Do not respond to this email address since we do not monitor it for incoming emails.

The Securities and Exchange Commission’s Division of Corporation Finance has attached to this email a letter relating to an SEC filing.

If you have any questions regarding this letter, please contact one of the staff members identified in it.

Division of Corporation Finance
U.S. Securities & Exchange Commission
100 F Street, NE
Washington, D.C. 20549
www.sec.gov



DIVISION OF
CORPORATION FINANCE

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

June 1, 2023

Howard Lindzon
Chief Executive Officer and Director
Social Leverage Acquisition Corp I
8390 E. Via De Ventura Suite F110-207
Scottsdale, AZ 85258

Re: Social Leverage Acquisition Corp I
Amendment No 3. to Preliminary Proxy Statement on Schedule 14A
Filed April 7, 2023
File No. 001-40059

Dear Howard Lindzon:

We have reviewed your filing and have the following comments. In some of our comments, we may ask you to provide us with information so we may better understand your disclosure.

Please respond to these comments within ten business days by providing the requested information or advise us as soon as possible when you will respond. If you do not believe our comments apply to your facts and circumstances, please tell us why in your response.

After reviewing your response to these comments, we may have additional comments. Unless we note otherwise, our references to prior comments are to comments in our February 15, 2023 letter.

Amendment No. 3 to Preliminary Proxy Statement on Schedule 14A

General

1. Please revise your next amendment to adjust your disclosures throughout the document of non-redeemed shares of SLAC common stock to address the significant redemptions during Q4 '22, and disclose redemption in 2023 up through a date reasonably close to the filing of your next amendment. Specifically, address the "no redemption" scenarios to update for the 32,847,714 shares of Class A common stock redeemed in December 2022.
2. We note your disclosure that Barclays and BofA (each a "Firm" and collectively the "Firms") have resigned from any role in connection with the Business Combination. Please address the following issues:
 - Supplementally provide us with the engagement letters, if any, entered into by SLAC or W3BCLOUD with each Firm. Disclose any ongoing obligations of the companies

Howard Lindzon
Social Leverage Acquisition Corp I
June 1, 2023
Page 2

pursuant to the engagement letter that will survive the termination of the engagement, such as indemnification provisions, and discuss the impacts of those obligations on the companies in the proxy statement.

- Provide us with any correspondence between each Firm and SLAC and/or W3BCLOUD relating to such Firm's resignation, including, without limitation, the resignation letter from Barclays that SLAC received on January 18, 2023, as disclosed on page 154.

Please note that the comments in this letter apply to BofA and its subsidiaries and affiliates in any capacity.

3. Disclose in the forepart of the filing that the Firms claim no remaining role in the Business Combination and have affirmatively disclaimed any responsibility for any of the disclosure in the proxy statement.
4. Discuss the potential impact on the Business Combination related to the resignation of the Firms, including, but not limited to, any impact on the PIPE Investment. For example, if either Firm would have played a role in the closing, please revise to identify the party who will be filling any such role.
5. Please tell us whether either Firm was involved in preparing any disclosure that is included in the proxy statement, or material underlying disclosure therein, including, without limitation, the disclosure regarding the summary of the financial analyses prepared by W3BCLOUD's management and reviewed by the SLAC Board or the projected financial information of W3BCLOUD. If so, clarify their involvement, whether they have retracted any work product associated with the transaction, and the risk of such withdrawal and reliance on their expertise. If either Firm was involved in preparing disclosure, please revise the risk factor on page 99 to describe its role in connection with the preparation of the proxy statement and the valuation of W3BCLOUD and disclose that it disclaims any liability in connection with such disclosure included in the proxy statement. Please also disclose the rationale for continuing to rely on information disclaimed by the professional organization associated with or responsible for such information, if applicable.
6. Please clarify whether either Firm had any role in the identification or evaluation of business combination targets. Please disclose whether either Firm assisted in the preparation or review of any materials reviewed by SLAC's board of directors or management as part of its services to SLAC and whether it has withdrawn its association with those materials and notified SLAC of such disassociation. For context, include that there are similar circumstances in which a financial institution is named and that each Firm's resignation indicates it is not willing to have the liability associated with such work in this transaction.
7. You state at pages 99 and 249 that neither SLAC nor W3BCLOUD are aware that either Firm's resignation was the result of any dispute or disagreement with SLAC or

Howard Lindzon
Social Leverage Acquisition Corp I
June 1, 2023
Page 3

W3BCLOUD, including any disagreement relating to the disclosure in your proxy statement. Please tell us whether you are aware of any disagreements with either Firm regarding the disclosure in your proxy statement, regardless of whether such disagreement had resulted in either Firm's resignation.

8. Please provide us with a letter from each Firm stating whether it agrees with the statements made in your proxy statement related to its resignation and, if not, stating the respects in which it does not agree. Please revise your disclosure accordingly to reflect that you have discussed the disclosure with such Firm and it either agrees or does not agree with the conclusions and the risks associated with such outcome. If either Firm does not respond, please revise your disclosure to indicate you have asked and not received a response and disclose the risks to investors. Additionally, please indicate that such Firm withdrew from its respective role(s) in your transaction (e.g., as underwriter, financial advisor, co-placement agent, etc.) and waived its deferred underwriting commissions and/or forfeited its fees, as applicable, and that such Firm refused to discuss the reasons for its resignation and waiver of deferred underwriting commissions and/or forfeiture of fees, as applicable, with management. The disclosure should clarify whether each Firm performed substantially all the work to earn its fees, as applicable.
9. We note that you currently hold and generate revenue earning Filecoin (FIL) rewards by utilizing your storage infrastructure to support the network. We are of the view that FIL meets the definition of a security under Section 2(a)(1) of the Securities Act of 1933, Section 3(a)(10) of the Securities Exchange Act of 1934, and Section 2(a)(36) of the Investment Company Act of 1940. Please revise your disclosure where appropriate to provide a detailed discussion regarding the impact this may have on your business, financial condition and results of operations.

Risk Factors

Digital assets that we hold may be subject to loss, theft, or restriction on access..., page 59

10. We note your response and revised disclosures to prior comment 5. You previously disclosed that you hold your long-term digital assets in trading accounts with Kraken Bank, a special purpose depository institution regulated by the State of Wyoming. However, your disclosure here and on page 74 now reference only your digital asset deposit accounts with Payward, Inc. dba Kraken. Please supplementally explain the change from your previous disclosures. Specifically, please clarify in your response whether you have digital asset deposit accounts with a special purpose depository institution regulated by the State of Wyoming, as previously disclosed. If not, please clarify the applicable regulatory structure. We may have further comments based upon your response and any revised disclosures.

If a digital asset is deemed to be a "security" or a "regulated financial instrument" in any relevant jurisdiction..., page 84

11. We note the statements in this risk factor that:

Howard Lindzon
Social Leverage Acquisition Corp I
June 1, 2023
Page 4

- The Commission's views regarding whether a particular crypto asset falls within the definition of a "security" under the U.S. federal securities laws have "evolved over time, and it is difficult to predict the direction or timing of any continuing evolution;" and
- "Furthermore, it is also possible that a change in the governing administration or the appointment of new SEC commissioners could substantially impact the views of the SEC and its staff."

Please remove these statements as the legal tests are well-established by U.S. Supreme Court case law and the Commission and staff have issued reports, orders, and statements that provide guidance on when a crypto asset may be a security for purposes of the U.S. federal securities laws.

12. We note your disclosure here and on page 173 that the conclusions you may draw regarding whether a particular crypto asset is a security is a risk-based assessment. However, we also note that you have not yet finalized a process for making such determinations. Please revise to remove any implication that you have implemented a risk-based approach to such determinations.
13. With regards to your discussion about a policy for determining whether crypto assets are securities, please create a separately captioned risk factor addressing the fact that you have not finalized a policy for determining whether crypto assets held are securities, and include specific risks that the company would face if the crypto assets you transact in were deemed to be securities under the federal securities laws.

Barclays and BofA have resigned from any role in connection with the Business Combination..., page 99

14. We note your risk factor disclosure on page 99 that "[n]either Barclays nor BofA provided a reason for their resignations and neither SLAC nor the Company will speculate as to the motivations for the resignations." If there was no dialogue and/or you did not seek out the reasons why each Firm was resigning or unable to complete its respective engagement, please indicate so in your proxy statement.
15. We note your disclosure in the first paragraph of this risk factor that BofA acted as representative of the several underwriters in SLAC's IPO and did not have any role with respect to the Business Combination. However, in the second paragraph you disclose that "BofA claims no remaining role in the Business Combination." Please reconcile this apparent inconsistency or otherwise advise.
16. We note your disclosure in the third paragraph of this risk factor that the withdrawals "may indicate" that the Firms do not want to be associated with the disclosure in the proxy statement or the underlying business analysis related to this transaction. Please revise your disclosure here and elsewhere, as applicable, to remove the phrase "may indicate" and to highlight for investors that the Firms' withdrawals indicate that they do not want to be associated with the disclosure or underlying business analysis related to the

Howard Lindzon
Social Leverage Acquisition Corp I
June 1, 2023
Page 5

transaction. In this regard, we note, without limitation, your disclosure in the second paragraph of this risk factor that each of the Firms "has disclaimed any responsibility for any portion of this proxy statement."

17. Please revise this risk factor to clarify that each Firm was to be compensated, in part, on a deferred basis for its underwriting services that have already been rendered in connection with the SLAC IPO, and therefore is gratuitously waiving the right to be compensated. Clarify the unusual nature of such a fee waiver and the impact of it on the evaluation of the Business Combination.

SLAC Management's Discussion and Analysis of Financial Condition and Results of Operations Underwriting Agreement, page 154

18. We understand that each Firm, as an underwriter in the SLAC IPO, intends to waive the deferred underwriting commissions that would otherwise be due to it upon the closing of the Business Combination. Please disclose how this waiver was obtained, why the waiver was agreed to, and whether each Firm provided you with any reasons for the fee waiver. If there was no dialogue and you did not seek out the reasons why each Firm was waiving deferred fees, despite already completing its services, please indicate so in your proxy statement. Also please clarify SLAC's current relationship with each Firm. Finally, update your pro forma financial information and relevant disclosure referring to the payment of deferred underwriting commissions to disclose how these amounts were settled and will be reflected in the financial statements."
19. You disclose that Barclays waived its right to receive an aggregate of \$13.1 million in fees, consisting of 2% of gross proceeds for its role as co-placement agent, \$3.5 million for its role as financial advisor, a discretionary fee of up to \$3.0 million and \$6.6 million of deferred underwriting fees accrued from its participation in SLAC's IPO. However, it is unclear whether the aggregate amount of \$13.1 million includes the fees that Barclays would have received for its role as co-placement agent, consisting of 2% of gross proceeds, as you disclose. Please revise to clarify or advise.

Data Center Facilities, page 164

20. We note your revised disclosure on page 165 in response to prior comment 12 that by the end of December 2022, your weighted average cost of electricity per kWh was \$0.036. Please revise to describe in greater detail how you determined or calculated such weighted average cost.

Howard Lindzon
Social Leverage Acquisition Corp I
June 1, 2023
Page 6

W3BCloud Management Discussion and Analysis of Financial Condition and Results of Operations
Results of Operations, page 186

21. You disclose that while the profitability of ETH mining on September 15, 2022 was \$0.0249 / Mhs / Day, between September 16, 2022 and December 31, 2022 the average profitability of ETC mining was \$0.0025 / Mhs / Day, representing a 90% decline in mining rewards. Please disaggregate revenues for the periods presented to distinguish between ETH and ETC to clarify the impact of the "Merge", including on future operation trends. Refer to Item 303(b)(2) of Regulation S-K.

Quantitative and Qualitative Disclosure about Market Risk, page 197

22. You disclose that while the profitability of ETH mining on September 15, 2022 was \$0.0249 / Mhs / Day, between September 16, 2022 and December 31, 2022 the average profitability of ETC mining was \$0.0025 / Mhs / Day, representing a 90% decline in mining rewards. You also disclose in your sensitivity analysis that a hypothetical change of 70% decrease in ETH price could decrease earnings approximately \$1 million and result in impairment of approximately \$.4 million. Considering the actual significant impact to your 2022 revenues and resulting impairments from market risks in your crypto mining operations, please revise your market risk disclosures to reflect reasonably possible near-term market risk changes inherent to your crypto mining operations. Refer to instruction 3.A. of Item 305(a)(1)(ii) of Regulation S-K.

The Business Combination and the Business Combination Agreement
Certain Projected Financial Information of the Company, page 211

23. We note your disclosure that "[t]he historical data demonstrated that the average relative revenue generation of ETC compared to ETH POW was approximately 80% over a greater than three-year period (2019 to July 2022)" and that was the basis for your belief that the assumptions for future compute revenue post-Ethereum merge were reasonable. Please revise to prominently disclose that although the underlying assumptions were based on a reasonable belief at the time, recent profitability for ETC mining is substantially lower than initially projected, quantify your disclosure, and provide balancing language in this section, and elsewhere as appropriate.

W3BCLOUD Holdings Inc. and Subsidiaries Audited Consolidated Financial Statements
Consolidated Statements of Cash Flows, page F-32

24. Please revise your next amendment to correctly show your impairment of digital assets for the year ended December 31, 2021 of \$23,162 on the appropriate line item, and not on the line item for impairment of property and equipment, net.

Howard Lindzon
Social Leverage Acquisition Corp I
June 1, 2023
Page 7

Notes to Consolidated Financial Statements

Note 3. Summary of Significant Accounting Policies

Revenue Recognition, page F-42

25. We note your response to prior comment 21. Please address the following:
- Under ASC 606-10-32-21, you are required to measure the estimated fair value of the noncash consideration at contract inception (that is, the date at which the criteria in ASC 606-10-25-1 are met). Your disclosure that you measure the consideration at fair value when the digital asset rewards are deposited into the Group's wallet, which is daily, and does not appear to comply;
 - Your response, and additional disclosure on page F-43, did not explain how you were able to determine that your policy is not materially different than the fair value at contract inception. Please provide quantitative information supporting this claim;
 - Explain to us at what point in time contract inception occurs and explain how you made the determination with appropriate reference to ASC 606; and
 - You disclose that you exchange the consideration you earn for revenue transactions into ETH. Explain to us in sufficient detail how you account for these exchanges (including how this impacts your revenue recognition) and where you disclose these exchange transactions.
26. Due to the significant impact of the "merge" on your crypto mining operations, please further disaggregate revenues for the periods presented to distinguish between ETH and ETC. Refer to ASC 606-10-50-5.

We remind you that the company and its management are responsible for the accuracy and adequacy of their disclosures, notwithstanding any review, comments, action or absence of action by the staff.

You may contact David Irving at (202) 551-3321 or Michelle Miller at (202) 551-3368 if you have questions regarding comments on the financial statements and related matters. Please contact David Lin at (202) 551-3552 or Matthew Derby at (202) 551-3334 with any other questions.

Sincerely,

Division of Corporation Finance
Office of Crypto Assets

To: carl.marcellino@ropesgray.com[carl.marcellino@ropesgray.com]

From: CF Office of Crypto Assets

Sent: 2023-06-01T13:47:16Z

Subject: SEC Comment Letter: Social Leverage Acquisition Corp I CORRESP

Received: 2023-06-01T13:47:16Z

[Social Leverage Acquisition Corp I CORRESP Letter.pdf](#)

Do not respond to this email address since we do not monitor it for incoming emails.

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If you have any questions regarding this letter, please contact one of the staff members identified in it.

Division of Corporation Finance
U.S. Securities & Exchange Commission
100 F Street, NE
Washington, D.C. 20549
www.sec.gov



DIVISION OF
CORPORATION FINANCE

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

June 1, 2023

Howard Lindzon
Chief Executive Officer and Director
Social Leverage Acquisition Corp I
8390 E. Via De Ventura Suite F110-207
Scottsdale, AZ 85258

Re: Social Leverage Acquisition Corp I
Amendment No 3. to Preliminary Proxy Statement on Schedule 14A
Filed April 7, 2023
File No. 001-40059

Dear Howard Lindzon:

We have reviewed your filing and have the following comments. In some of our comments, we may ask you to provide us with information so we may better understand your disclosure.

Please respond to these comments within ten business days by providing the requested information or advise us as soon as possible when you will respond. If you do not believe our comments apply to your facts and circumstances, please tell us why in your response.

After reviewing your response to these comments, we may have additional comments. Unless we note otherwise, our references to prior comments are to comments in our February 15, 2023 letter.

Amendment No. 3 to Preliminary Proxy Statement on Schedule 14A

General

1. Please revise your next amendment to adjust your disclosures throughout the document of non-redeemed shares of SLAC common stock to address the significant redemptions during Q4 '22, and disclose redemption in 2023 up through a date reasonably close to the filing of your next amendment. Specifically, address the "no redemption" scenarios to update for the 32,847,714 shares of Class A common stock redeemed in December 2022.
2. We note your disclosure that Barclays and BofA (each a "Firm" and collectively the "Firms") have resigned from any role in connection with the Business Combination. Please address the following issues:
 - Supplementally provide us with the engagement letters, if any, entered into by SLAC or W3BCLOUD with each Firm. Disclose any ongoing obligations of the companies

Howard Lindzon
Social Leverage Acquisition Corp I
June 1, 2023
Page 2

pursuant to the engagement letter that will survive the termination of the engagement, such as indemnification provisions, and discuss the impacts of those obligations on the companies in the proxy statement.

- Provide us with any correspondence between each Firm and SLAC and/or W3BCLOUD relating to such Firm's resignation, including, without limitation, the resignation letter from Barclays that SLAC received on January 18, 2023, as disclosed on page 154.

Please note that the comments in this letter apply to BofA and its subsidiaries and affiliates in any capacity.

3. Disclose in the forepart of the filing that the Firms claim no remaining role in the Business Combination and have affirmatively disclaimed any responsibility for any of the disclosure in the proxy statement.
4. Discuss the potential impact on the Business Combination related to the resignation of the Firms, including, but not limited to, any impact on the PIPE Investment. For example, if either Firm would have played a role in the closing, please revise to identify the party who will be filling any such role.
5. Please tell us whether either Firm was involved in preparing any disclosure that is included in the proxy statement, or material underlying disclosure therein, including, without limitation, the disclosure regarding the summary of the financial analyses prepared by W3BCLOUD's management and reviewed by the SLAC Board or the projected financial information of W3BCLOUD. If so, clarify their involvement, whether they have retracted any work product associated with the transaction, and the risk of such withdrawal and reliance on their expertise. If either Firm was involved in preparing disclosure, please revise the risk factor on page 99 to describe its role in connection with the preparation of the proxy statement and the valuation of W3BCLOUD and disclose that it disclaims any liability in connection with such disclosure included in the proxy statement. Please also disclose the rationale for continuing to rely on information disclaimed by the professional organization associated with or responsible for such information, if applicable.
6. Please clarify whether either Firm had any role in the identification or evaluation of business combination targets. Please disclose whether either Firm assisted in the preparation or review of any materials reviewed by SLAC's board of directors or management as part of its services to SLAC and whether it has withdrawn its association with those materials and notified SLAC of such disassociation. For context, include that there are similar circumstances in which a financial institution is named and that each Firm's resignation indicates it is not willing to have the liability associated with such work in this transaction.
7. You state at pages 99 and 249 that neither SLAC nor W3BCLOUD are aware that either Firm's resignation was the result of any dispute or disagreement with SLAC or

Howard Lindzon
Social Leverage Acquisition Corp I
June 1, 2023
Page 3

W3BCLOUD, including any disagreement relating to the disclosure in your proxy statement. Please tell us whether you are aware of any disagreements with either Firm regarding the disclosure in your proxy statement, regardless of whether such disagreement had resulted in either Firm's resignation.

8. Please provide us with a letter from each Firm stating whether it agrees with the statements made in your proxy statement related to its resignation and, if not, stating the respects in which it does not agree. Please revise your disclosure accordingly to reflect that you have discussed the disclosure with such Firm and it either agrees or does not agree with the conclusions and the risks associated with such outcome. If either Firm does not respond, please revise your disclosure to indicate you have asked and not received a response and disclose the risks to investors. Additionally, please indicate that such Firm withdrew from its respective role(s) in your transaction (e.g., as underwriter, financial advisor, co-placement agent, etc.) and waived its deferred underwriting commissions and/or forfeited its fees, as applicable, and that such Firm refused to discuss the reasons for its resignation and waiver of deferred underwriting commissions and/or forfeiture of fees, as applicable, with management. The disclosure should clarify whether each Firm performed substantially all the work to earn its fees, as applicable.
9. We note that you currently hold and generate revenue earning Filecoin (FIL) rewards by utilizing your storage infrastructure to support the network. We are of the view that FIL meets the definition of a security under Section 2(a)(1) of the Securities Act of 1933, Section 3(a)(10) of the Securities Exchange Act of 1934, and Section 2(a)(36) of the Investment Company Act of 1940. Please revise your disclosure where appropriate to provide a detailed discussion regarding the impact this may have on your business, financial condition and results of operations.

Risk Factors

Digital assets that we hold may be subject to loss, theft, or restriction on access..., page 59

10. We note your response and revised disclosures to prior comment 5. You previously disclosed that you hold your long-term digital assets in trading accounts with Kraken Bank, a special purpose depository institution regulated by the State of Wyoming. However, your disclosure here and on page 74 now reference only your digital asset deposit accounts with Payward, Inc. dba Kraken. Please supplementally explain the change from your previous disclosures. Specifically, please clarify in your response whether you have digital asset deposit accounts with a special purpose depository institution regulated by the State of Wyoming, as previously disclosed. If not, please clarify the applicable regulatory structure. We may have further comments based upon your response and any revised disclosures.

If a digital asset is deemed to be a "security" or a "regulated financial instrument" in any relevant jurisdiction..., page 84

11. We note the statements in this risk factor that:

Howard Lindzon
Social Leverage Acquisition Corp I
June 1, 2023
Page 4

- The Commission's views regarding whether a particular crypto asset falls within the definition of a "security" under the U.S. federal securities laws have "evolved over time, and it is difficult to predict the direction or timing of any continuing evolution;" and
- "Furthermore, it is also possible that a change in the governing administration or the appointment of new SEC commissioners could substantially impact the views of the SEC and its staff."

Please remove these statements as the legal tests are well-established by U.S. Supreme Court case law and the Commission and staff have issued reports, orders, and statements that provide guidance on when a crypto asset may be a security for purposes of the U.S. federal securities laws.

12. We note your disclosure here and on page 173 that the conclusions you may draw regarding whether a particular crypto asset is a security is a risk-based assessment. However, we also note that you have not yet finalized a process for making such determinations. Please revise to remove any implication that you have implemented a risk-based approach to such determinations.
13. With regards to your discussion about a policy for determining whether crypto assets are securities, please create a separately captioned risk factor addressing the fact that you have not finalized a policy for determining whether crypto assets held are securities, and include specific risks that the company would face if the crypto assets you transact in were deemed to be securities under the federal securities laws.

Barclays and BofA have resigned from any role in connection with the Business Combination..., page 99

14. We note your risk factor disclosure on page 99 that "[n]either Barclays nor BofA provided a reason for their resignations and neither SLAC nor the Company will speculate as to the motivations for the resignations." If there was no dialogue and/or you did not seek out the reasons why each Firm was resigning or unable to complete its respective engagement, please indicate so in your proxy statement.
15. We note your disclosure in the first paragraph of this risk factor that BofA acted as representative of the several underwriters in SLAC's IPO and did not have any role with respect to the Business Combination. However, in the second paragraph you disclose that "BofA claims no remaining role in the Business Combination." Please reconcile this apparent inconsistency or otherwise advise.
16. We note your disclosure in the third paragraph of this risk factor that the withdrawals "may indicate" that the Firms do not want to be associated with the disclosure in the proxy statement or the underlying business analysis related to this transaction. Please revise your disclosure here and elsewhere, as applicable, to remove the phrase "may indicate" and to highlight for investors that the Firms' withdrawals indicate that they do not want to be associated with the disclosure or underlying business analysis related to the

Howard Lindzon
Social Leverage Acquisition Corp I
June 1, 2023
Page 5

transaction. In this regard, we note, without limitation, your disclosure in the second paragraph of this risk factor that each of the Firms "has disclaimed any responsibility for any portion of this proxy statement."

17. Please revise this risk factor to clarify that each Firm was to be compensated, in part, on a deferred basis for its underwriting services that have already been rendered in connection with the SLAC IPO, and therefore is gratuitously waiving the right to be compensated. Clarify the unusual nature of such a fee waiver and the impact of it on the evaluation of the Business Combination.

SLAC Management's Discussion and Analysis of Financial Condition and Results of Operations Underwriting Agreement, page 154

18. We understand that each Firm, as an underwriter in the SLAC IPO, intends to waive the deferred underwriting commissions that would otherwise be due to it upon the closing of the Business Combination. Please disclose how this waiver was obtained, why the waiver was agreed to, and whether each Firm provided you with any reasons for the fee waiver. If there was no dialogue and you did not seek out the reasons why each Firm was waiving deferred fees, despite already completing its services, please indicate so in your proxy statement. Also please clarify SLAC's current relationship with each Firm. Finally, update your pro forma financial information and relevant disclosure referring to the payment of deferred underwriting commissions to disclose how these amounts were settled and will be reflected in the financial statements."
19. You disclose that Barclays waived its right to receive an aggregate of \$13.1 million in fees, consisting of 2% of gross proceeds for its role as co-placement agent, \$3.5 million for its role as financial advisor, a discretionary fee of up to \$3.0 million and \$6.6 million of deferred underwriting fees accrued from its participation in SLAC's IPO. However, it is unclear whether the aggregate amount of \$13.1 million includes the fees that Barclays would have received for its role as co-placement agent, consisting of 2% of gross proceeds, as you disclose. Please revise to clarify or advise.

Data Center Facilities, page 164

20. We note your revised disclosure on page 165 in response to prior comment 12 that by the end of December 2022, your weighted average cost of electricity per kWh was \$0.036. Please revise to describe in greater detail how you determined or calculated such weighted average cost.

Howard Lindzon
Social Leverage Acquisition Corp I
June 1, 2023
Page 6

W3BCloud Management Discussion and Analysis of Financial Condition and Results of Operations
Results of Operations, page 186

21. You disclose that while the profitability of ETH mining on September 15, 2022 was \$0.0249 / Mhs / Day, between September 16, 2022 and December 31, 2022 the average profitability of ETC mining was \$0.0025 / Mhs / Day, representing a 90% decline in mining rewards. Please disaggregate revenues for the periods presented to distinguish between ETH and ETC to clarify the impact of the "Merge", including on future operation trends. Refer to Item 303(b)(2) of Regulation S-K.

Quantitative and Qualitative Disclosure about Market Risk, page 197

22. You disclose that while the profitability of ETH mining on September 15, 2022 was \$0.0249 / Mhs / Day, between September 16, 2022 and December 31, 2022 the average profitability of ETC mining was \$0.0025 / Mhs / Day, representing a 90% decline in mining rewards. You also disclose in your sensitivity analysis that a hypothetical change of 70% decrease in ETH price could decrease earnings approximately \$1 million and result in impairment of approximately \$.4 million. Considering the actual significant impact to your 2022 revenues and resulting impairments from market risks in your crypto mining operations, please revise your market risk disclosures to reflect reasonably possible near-term market risk changes inherent to your crypto mining operations. Refer to instruction 3.A. of Item 305(a)(1)(ii) of Regulation S-K.

The Business Combination and the Business Combination Agreement
Certain Projected Financial Information of the Company, page 211

23. We note your disclosure that "[t]he historical data demonstrated that the average relative revenue generation of ETC compared to ETH POW was approximately 80% over a greater than three-year period (2019 to July 2022)" and that was the basis for your belief that the assumptions for future compute revenue post-Ethereum merge were reasonable. Please revise to prominently disclose that although the underlying assumptions were based on a reasonable belief at the time, recent profitability for ETC mining is substantially lower than initially projected, quantify your disclosure, and provide balancing language in this section, and elsewhere as appropriate.

W3BCLOUD Holdings Inc. and Subsidiaries Audited Consolidated Financial Statements
Consolidated Statements of Cash Flows, page F-32

24. Please revise your next amendment to correctly show your impairment of digital assets for the year ended December 31, 2021 of \$23,162 on the appropriate line item, and not on the line item for impairment of property and equipment, net.

Howard Lindzon
Social Leverage Acquisition Corp I
June 1, 2023
Page 7

Notes to Consolidated Financial Statements

Note 3. Summary of Significant Accounting Policies

Revenue Recognition, page F-42

25. We note your response to prior comment 21. Please address the following:
- Under ASC 606-10-32-21, you are required to measure the estimated fair value of the noncash consideration at contract inception (that is, the date at which the criteria in ASC 606-10-25-1 are met). Your disclosure that you measure the consideration at fair value when the digital asset rewards are deposited into the Group's wallet, which is daily, and does not appear to comply;
 - Your response, and additional disclosure on page F-43, did not explain how you were able to determine that your policy is not materially different than the fair value at contract inception. Please provide quantitative information supporting this claim;
 - Explain to us at what point in time contract inception occurs and explain how you made the determination with appropriate reference to ASC 606; and
 - You disclose that you exchange the consideration you earn for revenue transactions into ETH. Explain to us in sufficient detail how you account for these exchanges (including how this impacts your revenue recognition) and where you disclose these exchange transactions.
26. Due to the significant impact of the "merge" on your crypto mining operations, please further disaggregate revenues for the periods presented to distinguish between ETH and ETC. Refer to ASC 606-10-50-5.

We remind you that the company and its management are responsible for the accuracy and adequacy of their disclosures, notwithstanding any review, comments, action or absence of action by the staff.

You may contact David Irving at (202) 551-3321 or Michelle Miller at (202) 551-3368 if you have questions regarding comments on the financial statements and related matters. Please contact David Lin at (202) 551-3552 or Matthew Derby at (202) 551-3334 with any other questions.

Sincerely,

Division of Corporation Finance
Office of Crypto Assets

To: John.Yung@lewisbrisbois.com[John.Yung@lewisbrisbois.com]
From: CF Office of Crypto Assets
Sent: 2023-10-05T11:28:44Z
Subject: SEC Comment Letter: MarsProtocol Inc. CORRESP
Received: 2023-10-05T11:28:44Z
[MarsProtocol Inc. CORRESP Letter.pdf](#)

Do not respond to this email address since we do not monitor it for incoming emails.

The Securities and Exchange Commission's Division of Corporation Finance has attached to this email a letter relating to an SEC filing.

If you have any questions regarding this letter, please contact one of the staff members identified in it.

Division of Corporation Finance
U.S. Securities & Exchange Commission
100 F Street, NE
Washington, D.C. 20549
www.sec.gov



DIVISION OF
CORPORATION FINANCE

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

October 5, 2023

Yucheng Hu
Chief Executive Officer and President
MarsProtocol Inc.
103 Tampines Street 86 #03-06
The Alps Residences
Singapore 528576

**Re: MarsProtocol Inc.
Amendment No. 1 to
Registration Statement on Form F-4
Filed September 11, 2023
File No. 333-271349**

Dear Yucheng Hu:

We have reviewed your amended registration statement and have the following comments.

Please respond to this letter by amending your registration statement and providing the requested information. If you do not believe a comment applies to your facts and circumstances or do not believe an amendment is appropriate, please tell us why in your response.

After reviewing any amendment to your registration statement and the information you provide in response to this letter, we may have additional comments. Unless we note otherwise, any references to prior comments are to comments in our May 24, 2023 letter.

Amendment No. 1 to Form F-4

General

1. Please clarify the distinction, if any, in the terms “crypto currencies,” “digital currencies,” “digital assets,” “digital securities” and “crypto assets.” If there is no distinction, please revise the filing to use a single defined term throughout.
2. We note your responses to comments 8 and 14. We further note your disclosure on page 26 that, “[t]he Company's common stock is currently listed on NYSE American under the symbol “MPU.”” Please reconcile your disclosure throughout to clarify the status of your listing after the Redomicile Merger.

Yucheng Hu
MarsProtocol Inc.
October 5, 2023
Page 2

3. We note your response to comment 4 and your response to comment 39 that as of December 31, 2022, "the Company owned ETH only." We further note your disclosure on page 42 that, "[a]s of December 31, 2022, [you] held approximately \$2.97 million in USDC issued by Circle Internet Financial Public Limited Company and \$0.09 million in USDT issued by Tether Limited Inc." Please revise your disclosure to specifically identify the crypto assets that you hold, as well as those for which you have plans to hold or otherwise transact in.
4. Please revise your disclosure to provide a comprehensive breakeven analysis for your Ethereum staking operations that compares the cost to earn one Ethereum with the market value of one Ethereum. Identify and explain all relevant inputs. Quantitative tabular disclosure may be helpful.

Summary

The Redomicile Merger

Saving Digital Pte. Ltd., page 1

5. Please revise to describe the material terms of your agreements with MarsLand Global Limited for staking services, and for authorization to use the trademark MarsProtocol. Please file those agreements as material contracts or explain why you are not required to do so.

Recent Developments, page 1

6. We note your response to comment 13. We also note your revised disclosure on page 1 that you "intend to use SDP to explore other crypto related business in Singapore" and that you "are currently looking at and evaluating other crypto-related business models outside of the United States that [you] believe may be synergistic with [y]our existing business." Please revise to provide expanded disclosure regarding the "other crypto related business" that you are considering and the "other crypto-related business models" that you are currently looking at and evaluating. In addition, please disclose if you have engaged in any discussions or entered into any agreements with individuals or businesses in this regard.

Risks Relating to Our Business, page 7

7. We note your response to comment 31. Please delete the reference to Tbit on page 7.

Risk Factors, page 10

8. We note your response to comment 61. We further note your disclosure throughout the document that CoinMarketCap is your principal market for valuing your digital assets. Please reconcile with the disclosure on page 18 that the Coinbase exchange is your principal market for Bitcoin as it does not appear that you hold, or trade, Bitcoin in the periods presented. Please revise, or advise otherwise.

Yucheng Hu
MarsProtocol Inc.
October 5, 2023
Page 3

9. We note your response to comment 17 that you are not limited or restricted in offering your services outside of Singapore and in other jurisdictions. Please revise your disclosure to describe any material risks you face from unauthorized or impermissible customer access to your products and services outside of the jurisdictions where you have obtained the required governmental licenses and authorizations. In addition, please revise your disclosure to describe any steps you take to restrict access of U.S. persons to your products and services and any related material risks.
10. We note your response to comment 21. As we are unable to locate responsive disclosure, we reissue our comment. Please revise to describe any material gaps your board or management have identified with respect to risk management processes and policies in light of recent crypto asset market conditions, as well as any changes they have made to address those gaps.

Risks Related to Our Business

The Company plans to continue to explore other opportunities, page 15

11. We note your response to comment 30 and re-issue in part. Please revise to disclose the impact(s) of the discontinuation of the Mano game and the alSpace platform on your business activities. We also note your statement here and elsewhere that you have decided to discontinue the Mano game and the alSpace platform due to business reasons. Please reconcile your disclosures on pages 27, 31, 33, 35, F-3, F-8, F-26, F-45 and F-50 that such discontinuation was due to “regulatory challenges” and enforcement actions brought by the SEC against the promoters of several digital assets.

Because of the recent decline in the cryptocurrency market and other adverse developments, page 17

12. We note your disclosure throughout that you have focused your efforts on solo-staking, which you describe as a process that involves putting up ETH, setting up and running a full Ethereum node, validating transactions on the Ethereum network, and earning rewards for doing so. We also note the statement here that you “also hold and stake a number of crypto assets to generate revenue.” Please revise to describe which other crypto assets you hold and stake, and your planned activities with respect to staking such other crypto assets, including without limitation, such program features, whose crypto assets are being staked, who is eligible to participate, and how the validation process is conducted through the program and by whom.

We are exposed to various risks associated with the failure to safeguard our crypto assets, page 19

13. We note your response to comment 17 that you are not limited or restricted in offering your services outside of Singapore and in other jurisdictions, and that you are voluntarily limiting your crypto-related business in Singapore. Given the possibility that your services may be offered to U.S. persons in the future, please revise to describe in greater

Yucheng Hu
MarsProtocol Inc.
October 5, 2023
Page 4

detail your KYC and AML policies and procedures.

Management's Discussion and Analysis
Corporate Developments, page 27

14. We note your response to comment 65. Please tell us, and revise your next amendment as appropriate, to address the following:
 - Confirm our understanding that you have exited the business of providing staking tools to third parties for staking as a service;
 - Tell us if you have any revenues related to providing staking tools to third parties for staking as a service subsequent to July 1, 2023;
 - Tell us if all revenues included in the line item 'Revenue from provision of staking technology tools' were related to providing staking tools to third parties for staking as a service in the six months ended June 30, 2023, and if not, what the other revenues relate to; and
 - Revise your next amendment to make sure that disclosures related to providing staking tools to third parties for staking as a service are clear that these operations are historical and not ongoing. Refer to pages 2 and 28 specifically for examples of disclosure that appears to cast the staking as a service business in the present and future tense, and not past.
15. We note your disclosure on page 27 that you earned transaction fees of 5.7 ETH on your staked coins in the year ended December 31, 2022. From the rollforward on page 29, it appears you earned 5.7 ETH as a staking reward and 1.0 from provision of staking technology tools in the six months ended June 30, 2023. Please clarify for us the period during which these rewards were earned and revise your disclosure for consistency in your next amendment.
16. We note your response to comment 40 which states that as of December 31, 2022, the Company did not collateralize the crypto assets for any loan, margin, rehypothecation, or other similar activities to which the Company or its affiliates are a party. We reissue our prior comment and request that you respond as of the present date. To the extent material, explain whether, to your knowledge, crypto assets you have issued serve as collateral for any other person's or entity's loan, margin, rehypothecation or similar activity. If so, discuss whether the recent crypto asset market disruption has impacted the value of the underlying collateral and explain any material financing and liquidity risk this raises for your business.
17. We note your response to comment 41 and re-issue in part. Please revise to disclose the method and costs for acquiring the unaccounted for 123 ETH.
18. We note your response to comment 42 that you have ceased providing non-custodial staking tools services, and are only engaged in solo-staking operations. Please reconcile your disclosures on pages 28, F-8, F-35 and F-40 that non-custodial staking services are currently not available to U.S. residents.

Yucheng Hu
MarsProtocol Inc.
October 5, 2023
Page 5

Ethereum Rewards, page 29

19. We note your response to comment 27. Please reconcile your usage of the term “stable cryptocurrencies” here and on page 42.

Results of Operations, page 31

20. We note your response to comment 35. Please revise your next amendment to break out the material components of the expense category 'Professional fees, general administrative and other' for the interim periods - Three Months Ended June 30, 2023 and Six Months Ended June 30, 2023 - like you did for the year ended December 31, 2022 on page 36.
21. We note your response to comment 52. Please revise your next amendment to reflect the black line separating Predecessor and Successor periods properly in your table on page 36 for Professional, general and administrative and other expenses. Currently, the black line is between two Successor periods.

Liquidity and Capital Resources, page 34

22. We note your response to comment 5. Please reconcile your use of the term “highly liquid” here and on page F-41.

Business of the Company

Crypto-Related Business, page 41

23. We note your response to comment 50 and your description of solo staking on page 42. Please revise to provide additional disclosure concerning your solo staking program, including but not limited to:
- How and when staking rewards and revenues are calculated and earned;
 - Whether staked crypto assets can be used or allocated, and if so how; and
 - The nature and quantification of your staking expenses.
24. We note your response to comment 49 that you have ceased providing your non-custodial staking tools services. We note your disclosure that you were engaged in solo-staking and that you provided proof-of-stake technology tools in Singapore for the Ethereum network. Please expand your disclosure here and in the Summary section to specify the technology tools to which you refer.

Custodial Practices, page 42

25. We note your response to comment 7 and re-issue in part. We also note that Matrixport is a “hot custodian,” and your disclosure on page 18 that you “seek to choose a trusted and secure custody service provider to protect [your] digital currency assets.” Please confirm 100% of your crypto asset are held in hot wallets, or if not, discuss what portion of the crypto assets are held in hot wallets and cold wallets. Please also revise to describe the criteria you used in selecting Matrixport as custodian.

Yucheng Hu
MarsProtocol Inc.
October 5, 2023
Page 6

Index to Financial Statements

Audited Financial Statements for the Years Ended December 31, 2022 and 2021, page F-1

26. We acknowledge your responses to comments 55, 56 and 58. Adjustments to reflect GAAP-compliant classifications from noncompliant classifications are the corrections of errors. As a result, please revise your audited financial statements to present the following:
- All the disclosures required by ASC 250-10-50-1 for each of the error corrections made in the referenced comments;
 - Label each impacted balance sheet and statement of operations and comprehensive income (loss) column as "As Restated"; and
 - Have your auditors dual date their opinion for the error corrections.
- This comment also applies to the December 31, 2022 balance sheet presented with your interim financial statements.

Consolidated Statements of Operations and Comprehensive Income (Loss)

Year Ended December 31, 2022, page F-5

27. We note your response to comment 54. Noting that you recorded \$540,000 and \$5,753,900 in operating lease revenue 2021 in the Successor and Predecessor periods, respectively, please tell us why there was no cost of revenue related to the aircraft leasing business.

Notes to Consolidated Financial Statements

Note 2. Summary of Principal Accounting Policies

Stablecoins, page F-11

28. We acknowledge your response to comment 58. Please address the following additional comments:
- Revise your policy disclosure to remove reference to Tether USD as a financial instrument;
 - Revise your policy disclosure to indicate how you account for stablecoins that are financial instruments (i.e., USD Coin); and
 - Separately reference for us the authoritative literature you rely upon to account for USD Coin.

Digital Assets, page F-12

29. We note your response to comment 60. Please tell us the following regarding your digital assets awarded to the Company through your GameFi and solo-staking business and your classification within operating activities on the Consolidated Statements of Cash Flows:
- Your average holding period for the ETH and BNB awarded to you through the GameFi and solo staking businesses;
 - How you ultimately disposed of the ETH and BNB awarded to you, or, if you still hold these crypto assets, how you ultimately plan to use them, or when you plan to

Yucheng Hu
MarsProtocol Inc.
October 5, 2023
Page 7

- dispose them;
 - How you considered the guidance in ASC 230-10-45-11 through 13 and ASC 230-10-45-28.b regarding the classification of productive assets and intangible assets as investing activities given that your crypto assets are classified as intangible assets; and
 - More specifically how your activities from the GameFi and solo staking businesses fit within the guidance you presented in your response pursuant to ASC 230-10-45-16. Simply quoting the guidance without providing your analysis and support as to why it is applicable is not useful.
30. We note your response to comment 61. ASC 820-10-35-5 requires fair value to be determined based on information in the single principal market, or in the absence of a principal market, the single most advantageous market. As previously indicated, as CoinMarketCap aggregates pricing from multiple markets and itself is not a market where digital assets can be bought and sold, it cannot be the principal market for GAAP purposes. As a result, please address the following:
- Identify for us the principal market or, in the absence of a principal market, the most advantageous market for each of the digital assets and stablecoins you hold or held during the periods included in your financial statements;
 - Tell us how you determined that these markets are the principal or most advantageous markets and reference for us the authoritative literature you rely upon to support your determinations;
 - Tell us whether Matrixport Cactus is your principal market for ETH and explain why or why not; and
 - Provide us a materiality analysis for each period presented in your filing that presents, by digital asset and stablecoin, the aggregate price from the principal or most advantageous market versus the price from CoinMarketCap. Assess the impact on revenues recorded, digital asset impairment and any stablecoins carried at fair value at the balance sheet date.

Revenue Recognition, Accounts Receivable and Allowance for Doubtful Accounts
Revenue from Solo-Staking business, page F-14

31. We note your response to comment 64. Please address the following comments and reference, where appropriate, the authoritative literature you rely upon to support your accounting:
- You identify the Ethereum chain as your customer and indicate that you have no written or electronic agreement with the Ethereum chain, yet you identify a contract with the Ethereum chain. Tell us the terms of this contract and how you determined them if you have no written or electronic agreement. To the extent you use some electronic information available from the Ethereum chain to support your assertion of a contract, provide us that information in your response.
 - Tell us why the transacting parties on the Ethereum chain that pay gas/transaction fees are not also your customers.

Yucheng Hu
MarsProtocol Inc.
October 5, 2023
Page 8

- Explain why you believe you have daily contracts if you can cancel the contract at any time. Tell us why the contract is not shorter than a day.
- Clarify what you mean that creation and validation of ETH transactions is a bundle of services not separately identifiable in the context of the contract.
- Tell us how your contract includes a series of creation and validation of ETH transactions yet the transfer of services are not substantially the same and that each creation and validation service is identified as a single performance obligation. Clarify for us whether each block written to the Ethereum chain is the result of a separate performance obligation or a series of performance obligations.
- Confirm for us that you receive the block reward and associated transaction fees as soon as the block is written.
- Tell us how your customer simultaneously receives and consumes the benefits of your staking services if you are not chosen by the Ethereum chain to validate and write an individual block to the chain.
- Tell us why you removed disclosure of network-based smart contracts from your annual financial statement policy note but continue to include it in your interim financial statement policy note on page F-44.

Note 5. Stablecoins, page F-22

32. We note your response to comment 67. Regarding your exchanges of stablecoins and digital assets in the year ended December 31, 2022 and the six months ended June 30, 2023, please tell us the following regarding each material transaction:
- Why any exchanges or sales for cash result in no realized gains or losses and how this is consistent with your accounting policies;
 - Specifically, for your exchange from BNB and USDT of \$446,600, tell us how you determined the exchange price and why there was no gain or loss recorded; and
 - Specifically, for your exchanges of stablecoins to ETH in both the year ended December 31, 2022 of \$350,200 and the six months ended June 30, 2023 of \$1,983,300, how you determined the exchange price and why there was no gain or loss recorded.

In your response, specifically tell us how you considered the guidance in ASC 610-20-32-2 and 32-3 to record a gain or loss on the disposal of nonfinancial digital assets based on the fair value of the consideration received in exchange for those nonfinancial digital assets.

Notes to Unaudited Condensed Consolidated Financial Statements

Note 2. Summary of Principal Accounting Policies, page F-41

33. We note your response to comment 48, and your disclosures throughout that effective July 1, 2023, you decided to suspend your SaaS business due to these actions taken by the SEC against cryptocurrency exchanges. Please reconcile your disclosure on page F-44 that commencing in March 2023, you provide your customers, through MTP, with proof-of-stake technology tools for digital assets through the staking platform "MarsProtocol."

Yucheng Hu
MarsProtocol Inc.
October 5, 2023
Page 9

Please also revise to provide detailed disclosure regarding your StaaS platform, including everything offered on the platform and whether it only provided staking services. In addition, disclose whether you have any specific plans to resume your StaaS business in the near term, and whether you have determined the mechanics of this new platform.

Please contact David Irving at 202-551-3321 or Mark Brunhofer at 202-551-3638 if you have questions regarding comments on the financial statements and related matters. Please contact Lulu Cheng at 202-551-3811 or Sandra Hunter Berkheimer at 202-551-3758 with any other questions.

Sincerely,

Division of Corporation Finance
Office of Crypto Assets

cc: John P. Yung

To: warren@chapman.com[warren@chapman.com]
From: Office of Crypto Assets
Sent: 2024-06-14T15:55:27Z
Subject: SEC Comment Letter: Fidelity Ethereum Fund S-1/A
Received: 2024-06-14T15:55:27Z
[Fidelity Ethereum Fund S-1_A Letter.pdf](#)

Do not respond to this email address since we do not monitor it for incoming emails.

The Securities and Exchange Commission’s Division of Corporation Finance has attached to this email a letter relating to an SEC filing.

If you have any questions regarding this letter, please contact one of the staff members identified in it.

Division of Corporation Finance
U.S. Securities & Exchange Commission
100 F Street, NE
Washington, D.C. 20549
www.sec.gov



DIVISION OF
CORPORATION FINANCE

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

June 14, 2024

Cynthia Lo Bessette
President
Fidelity Ethereum Fund
c/o FD Funds Management LLC
245 Summer Street V13E
Boston, Massachusetts 02210

Re: Fidelity Ethereum Fund
Amendment No. 2 to Registration Statement on Form S-1
Filed May 31, 2024
File No. 333-278249

Dear Cynthia Lo Bessette:

We have reviewed your registration statement and have the following comments.

Please respond to this letter by amending your registration statement and providing the requested information. If you do not believe a comment applies to your facts and circumstances or do not believe an amendment is appropriate, please tell us why in your response.

After reviewing any amendment to your registration statement and the information you provide in response to this letter, we may have additional comments.

Amendment No. 2 to Registration Statement on Form S-1

General

1. To the extent that you intend to use a fact sheet, please provide us with a copy for our review.

Cover Page

2. Please revise the cover page to state that the Trust will not participate in the proof-of-stake validation mechanism of the Ethereum network (i.e., the Trust will not “stake” its ether) to earn additional ether or seek other means of generating income from its ether holdings.

Cynthia Lo Bessette
Fidelity Ethereum Fund
June 14, 2024
Page 2

Prospectus Summary, page 1

3. Please revise your Prospectus Summary to disclose, if true, that:
 - The Trust, the Sponsor and the service providers will not loan or pledge the Trust's assets, nor will the Trust's assets serve as collateral for any loan or similar arrangement; and
 - The Trust will not utilize leverage, derivatives or any similar arrangements in seeking to meet its investment objective.
4. Please revise your Prospectus Summary to:
 - Disclose that the Trust may only conduct cash creations and redemptions and that it would need regulatory approval to commence in-kind creations and redemptions;
 - Clarify that the timing of in-kind regulatory approval is unknown and that there is no guarantee that the Exchange will receive in-kind regulatory approval; and
 - Disclose how you will inform shareholders if the Exchange receives in-kind regulatory approval and if the Sponsor chooses to allow in-kind creations and redemptions.
5. We note your references on pages 3 and 46 that "Shareholders may not receive the benefits of any forks or airdrops" and, on page 69, "Risk factors – The inability to recognize the economic benefit of a "fork" or an "air drop" could adversely impact an investment in the Trust." As we are unable to locate these references, please revise to correct. In addition, please include Prospectus Summary disclosure to clarify, if true, that with respect to any fork, airdrop or similar event, the Sponsor will cause the Trust to irrevocably abandon the Incidental Rights or IR Virtual Currency and in the event the Trust seeks to change this position, an application would need to be filed with the SEC by your listing exchange seeking approval to amend its listing rules.

The Trust's Service Providers

The Custodian, page 6

6. We note your references to the Custodian Agreement here and in other contexts where you discuss the Trust's ether custodian. The Custodian Agreement appears to be an agreement with the Cash Custodian. Please revise your disclosure to refer to the Custodial Services Agreement and update your discussion regarding the Cash Custodian accordingly.

Ether, Ether Markets and Regulation of Ether, page 11

7. Please revise to add a discussion of the spot ether markets and ether futures markets.

Summary of an Ether Transaction, page 14

8. We note your disclosure that a "validator must stake 32 ether to become a validator" and that "each 32 ether that is staked results in issuance of a validator key pair." Please expand

Cynthia Lo Bessette
Fidelity Ethereum Fund
June 14, 2024
Page 3

your disclosure to clarify that staking more ether can increase the numerical chances that a given validator will be randomly selected.

Modifications to the Ethereum Protocol, page 17

9. Please expand your disclosure in this section to describe the planned fork called "Dencun" that the Ethereum network underwent on March 13, 2024.

Risk Factors, page 23

10. Please add a separately-captioned risk factor addressing the fact that the Trust will not stake the ether it holds, so an investment in the Trust's shares will not realize the economic benefits of staking.

If a malicious actor or botnet obtains control of more than 50% of the validating stake, page 30

11. We note your disclosure that "it is believed that certain groups of coordinating or connected ether holders may together have more than 50% of outstanding ether, which if staked and if the users run validators, would permit them to exert authority over the validation of ether transactions." Please add a separate risk factor to discuss the risks of centralization that liquid staking applications, such as Lido, may pose, including that Lido has reportedly controlled around or in excess of 33% of the total staked ether on the Ethereum network.

Validators may suffer losses due to staking, which could make the Ethereum network less attractive, page 32

12. Please expand this risk factor to also address the risks associated with staking becoming less attractive to validators, including through the types of sanctions the Ethereum network may impose for validator misbehavior or inactivity.

A temporary or permanent "fork" could adversely affect the value of the Shares, page 38

13. In your disclosure providing examples of the impact that hard forks have had on crypto assets, please include quantitative information regarding the price of the impacted crypto asset immediately before and after the fork.

Shareholders may be adversely affected by creation or redemption orders, page 66

14. Please expand this risk factor to describe what is deemed as an "emergency" such that the fulfillment of a creation or redemption is not reasonably practicable, and disclose the factors the Sponsor will consider to determine whether the suspension of creations and redemptions or the postponement of settlement dates are necessary for the protection of the Trust's Shareholders.

Cynthia Lo Bessette
Fidelity Ethereum Fund
June 14, 2024
Page 4

Additional Information about the Trust

Termination of the Trust, page 74

15. Please clarify whether shareholders will be entitled to cash or ether upon the termination of the Trust. In addition, if shareholders will be entitled to cash, please explain how the Trust's ether will be sold in connection with the termination of the Trust.

The Trust's Service Providers, page 76

16. Please disclose whether the Sponsor contemplates utilizing a liquidity provider, such as a prime broker. If so, please disclose whether a portion of the Trust's ether may be held with the liquidity provider and, if so, what portion.
17. We note your references throughout to the Ether Trading Counterparties. Please revise here, under an appropriately captioned heading, and in your Summary disclosure to:
- Identify any Ether Trading Counterparties with whom the Sponsor has entered into an agreement. Clarify whether and to what extent any of the Ether Trading Counterparties are affiliated with or have any material relationships with any of the Authorized Participants. Alternatively, clarify, if true, that you are not able to identify any particular Ether Trading Counterparties at this time.
 - Disclose, if known, the material terms of any agreement you have entered into, or will enter into with an Ether Trading Counterparty, including whether and to what extent there will be any contractual obligations on the part of the Ether Trading Counterparty to participate in cash orders for creations or redemptions.

Plan of Distribution

Authorized Participants, page 81

18. Please revise to identify all of the Authorized Participants with which you have an agreement at the time of effectiveness of the registration statement.

Material Contracts

Custodial Services Agreement

Inspection and Audit Rights, page 100

19. Please provide a brief definition of "SOC 1, Type II audit" and "SOC 2, Type II audit."

We remind you that the company and its management are responsible for the accuracy and adequacy of their disclosures, notwithstanding any review, comments, action or absence of action by the staff.

Refer to Rules 460 and 461 regarding requests for acceleration. Please allow adequate time for us to review any amendment prior to the requested effective date of the registration statement.

Cynthia Lo Bessette
Fidelity Ethereum Fund
June 14, 2024
Page 5

Please contact Michelle Miller at 202-551-3368 or Mark Brunhofer at 202-551-3638 if you have questions regarding comments on the financial statements and related matters. Please contact Irene Paik at 202-551-6553 or Sandra Hunter Berkheimer at 202-551-3758 with any other questions.

Sincerely,

Division of Corporation Finance
Office of Crypto Assets

cc: Morrison C. Warren

To: andrew@21.co[andrew@21.co]
From: Office of Crypto Assets
Sent: 2024-06-14T15:56:14Z
Subject: SEC Comment Letter: 21Shares Core Ethereum ETF S-1/A
Received: 2024-06-14T15:56:14Z
[21Shares Core Ethereum ETF S-1_A Letter.pdf](#)

Do not respond to this email address since we do not monitor it for incoming emails.

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If you have any questions regarding this letter, please contact one of the staff members identified in it.

Division of Corporation Finance
U.S. Securities & Exchange Commission
100 F Street, NE
Washington, D.C. 20549
www.sec.gov



DIVISION OF
CORPORATION FINANCE

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

June 14, 2024

Ophelia Snyder
President
21Shares Core Ethereum ETF
477 Madison Avenue, 6th Floor
New York, NY 10022

**Re: 21Shares Core Ethereum ETF
Amendment No. 3 to Registration Statement on Form S-1
Filed May 31, 2024
File No. 333-274364**

Dear Ophelia Snyder:

We have reviewed your registration statement and have the following comments.

Please respond to this letter by amending your registration statement and providing the requested information. If you do not believe a comment applies to your facts and circumstances or do not believe an amendment is appropriate, please tell us why in your response.

After reviewing any amendment to your registration statement and the information you provide in response to this letter, we may have additional comments.

Amendment No. 3 to Registration Statement on Form S-1

Cover page

1. When available, please disclose here the price per Share and aggregate price of the initial Seed Creation Baskets.
2. Please revise the cover page to state that the Trust will not participate in the proof-of-stake validation mechanism of the Ethereum network (i.e., the Trust will not “stake” its ether) to earn additional ether or seek other means of generating income from its ether holdings.

Prospectus Summary, page 1

3. Please disclose here that the Trust is a passive investment vehicle that does not seek to generate returns beyond tracking the price of ether.
4. Please revise your Prospectus Summary disclosure to clarify, if true, that with respect to any fork, airdrop or similar event, the Sponsor will cause the Trust to irrevocably abandon the Incidental Rights or IR Virtual Currency and in the event the Trust seeks to change

Ophelia Snyder
21Shares Core Ethereum ETF
June 14, 2024
Page 2

this position, an application would need to be filed with the SEC by your listing exchange seeking approval to amend its listing rules.

5. Please revise your Prospectus Summary to disclose that shareholders do not have voting rights under the Trust Agreement except in limited circumstances and briefly describe those circumstances here and in the Voting by Shareholders section.
6. We note your disclosure in your Creation and Redemption of Shares section beginning on page 91 regarding the Ether Counterparties. Please revise your Prospectus Summary to:
 - Identify any Ether Trading Counterparties with whom the Sponsor has entered into an agreement. Clarify whether and to what extent any of the Ether Trading Counterparties are affiliated with or have any material relationships with any of the Authorized Participants. Alternatively, clarify, if true, that you are not able to identify any particular Ether Trading Counterparties at this time.
 - Disclose, if known, the material terms of any agreement you have entered into, or will enter into with an Ether Trading Counterparty, including whether and to what extent there will be any contractual obligations on the part of the Ether Trading Counterparty to participate in cash orders for creations or redemptions.

Risk Factors, page 14

7. Please add a risk factor describing the risks to Shareholders of the exclusive jurisdiction provision of the Trust Agreement and state whether this provision applies to causes of action arising under the U.S. federal securities laws.
8. Please add a risk factor addressing that at times, there has been a single entity that has reportedly controlled around or in excess of 33% of the total staked ether on the Ethereum network, which poses centralization concerns and could permit the entity to attempt to interfere with transaction finality or block confirmations. Address the concern that if such an entity, or a bad actor with a similar sized stake, were to attempt to interfere with transaction finality or block confirmations, it could negatively affect the use and adoption of the Ethereum network, the value of ether, and thus the value of your shares. Additionally, please revise your "Ethereum is subject to cybersecurity risk" discussion on page 32 to also address the possibility of a 33% attack and a 66% attack.

An investment in the Trust is not a deposit, page 23

9. Please clarify in the second paragraph, as you do on page 81, that the insurance maintained by the Ether Custodian is shared among all the Ether Custodian's customers and is not specific to the Trust or to customers holding ether with the Ether Custodian. Similarly revise the Summary discussion on pages 6 and 7.

Ether, Ether Markets and Regulation of Ether, page 61

10. Please add a separately captioned subsection discussing the following related to ether and the Ethereum network:

Ophelia Snyder
21Shares Core Ethereum ETF
June 14, 2024
Page 3

- Limitations on the supply of ether.
- Quantify the amount of ether outstanding and the amount of ether issued and burned as of a recent date.
- An expanded discussion of modifications to the Ethereum protocol.
- An updated discussion of recent planned forks, including “Dencun” and EIP 4844.

NAV Determination, page 72

11. Please disclose what policies or procedures you have in place if the Index becomes unavailable or if the Sponsor determines that the Index does not reflect an accurate ether price.

Potential In-Kind Creation and Redemption of Shares, page 95

12. Please clarify how you will inform Shareholders if the Exchange receives regulatory approval and the Sponsor chooses to allow creations and redemptions via in-kind transactions.

Suspension or Rejection of Redemption Orders, page 95

13. You state that the Sponsor may have difficulty liquidating the Trust’s positions because of “an unanticipated delay in the liquidation of a position in an over-the-counter contract.” Please describe the circumstances in which the Trust would have a position in an over-the-counter contract. In this regard, we note your disclosure that the Prime Broker exchanges the Trust’s ether for cash and the Trust’s cash for ether in connection with creations, redemptions and paying the Trust’s expenses.

We remind you that the company and its management are responsible for the accuracy and adequacy of their disclosures, notwithstanding any review, comments, action or absence of action by the staff.

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Please contact Michelle Miller at 202-551-3368 or Jason Niethamer at 202-551-3855 if you have questions regarding comments on the financial statements and related matters. Please contact J. Nolan McWilliams at 202-551-3217 or Sandra Hunter Berkheimer at 202-551-3758 with any other questions.

Sincerely,

Division of Corporation Finance
Office of Crypto Assets

To: allison.fumai@dechert.com[allison.fumai@dechert.com]
From: Office of Crypto Assets
Sent: 2024-06-14T15:56:16Z
Subject: SEC Comment Letter: 21Shares Core Ethereum ETF S-1/A
Received: 2024-06-14T15:56:16Z
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U.S. Securities & Exchange Commission
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DIVISION OF
CORPORATION FINANCE

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

June 14, 2024

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President
21Shares Core Ethereum ETF
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New York, NY 10022

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Ophelia Snyder
21Shares Core Ethereum ETF
June 14, 2024
Page 2

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Ophelia Snyder
21Shares Core Ethereum ETF
June 14, 2024
Page 3

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Sincerely,

Division of Corporation Finance
Office of Crypto Assets

To: carl.marcellino@ropesgray.com[carl.marcellino@ropesgray.com]
From: CF Office of Finance
Sent: 2022-10-14T20:00:15Z
Subject: SEC Comment Letter: Social Leverage Acquisition Corp I PREM14A
Received: 2022-10-14T20:00:15Z
[Social Leverage Acquisition Corp I PREM14A Letter.pdf](#)

Do not respond to this email address since we do not monitor it for incoming emails.

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If you have any questions regarding this letter, please contact one of the staff members identified in it.

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U.S. Securities & Exchange Commission
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Washington, D.C. 20549
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DIVISION OF
CORPORATION FINANCE

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

October 14, 2022

Howard Lindzon
Chief Executive Officer and Director
Social Leverage Acquisition Corp I
8390 E. Via De Ventura Suite F110-207
Scottsdale, AZ 85258

Re: Social Leverage Acquisition Corp I
Preliminary Proxy Statement on Schedule 14A
Filed September 9, 2022
File No. 001-40059

Dear Howard Lindzon:

We have reviewed your filing and have the following comments. In some of our comments, we may ask you to provide us with information so we may better understand your disclosure.

Please respond to these comments within ten business days by providing the requested information or advise us as soon as possible when you will respond. If you do not believe our comments apply to your facts and circumstances, please tell us why in your response.

After reviewing your response to these comments, we may have additional comments.

Preliminary Proxy Statement on Schedule 14A filed September 9, 2022

General

1. We note your disclosure on page 77 that all of your "current business is focused on providing storage and compute infrastructure to Web3 protocols like Ethereum, Filecoin and Pocket." We also note your statements at the top of page 53 and in the second risk factor on page 56 referencing "other digital assets" (in addition to Ethereum, Filecoin and Pocket) that you may hold or provide services. Please revise as follows:
 - affirmatively identify all of the crypto assets that you mine, invest in or transact in;
 - discuss your intentions to mine, invest in or transact in crypto assets other than Ethereum, Filecoin or Pocket and update this disclosure in future filings as appropriate;
 - describe your process, if any, for analyzing whether a particular crypto asset that you intend to mine, invest in, or transact in is a "security" within the meaning of Section 2(a)(1) of the Securities Act, including whether and how the recent completion

Howard Lindzon
Social Leverage Acquisition Corp I
October 14, 2022
Page 2

of Ethereum's transition to Proof-of-Stake consensus has impacted your analysis. Disclose that this is a risk-based judgment and does not constitute a legal determination binding on regulators or the courts; and

- expand your risk factors to describe the specific potential consequences to you and to investors if it is subsequently determined that you have participated in the unregistered issuance or distribution of securities, including the specific risks inherent in your business model that may necessitate corrective measures as a result of judicial or regulatory actions. Prominently disclose this risk in the Summary.

Summary Term Sheet, page 2

2. Please quantify the aggregate fees payable to Barclays upon completion of an initial business combination. We note your disclosure in the third bullet on page 9 that, in addition to the deferred underwriting fee, "Barclays is also entitled to certain additional fees for serving as SLAC's exclusive M&A advisor, capital markets advisor, and placement agent in connection with the private placements." In revising your disclosure, please also disclose the extent to which any fees pertaining to their additional services are conditioned on completion of the business combination.

Risk Factors, page 51

3. Please expand your risk factors to discuss the risks associated with your crypto assets held in deposit accounts or as collateral with BlockFi and any other similar counterparties, including quantification of the aggregate amount thereof as of the latest practicable date. As a non-exclusive example only, please discuss the impact of such counterparties entering bankruptcy proceedings or otherwise being unable to return the crypto assets and the impact that would have on your business. Alternatively, please explain to us why this is not material to investors.

Risks Related to Our Business and Industry

We have a business plan which is affected by the prices of the digital assets that we may hold...
page 52

4. Please revise to include quantitative disclosure that illustrates the significant price swings that have occurred in the price of Bitcoin, Ether, and any other crypto assets that you hold. In addition, revise the "Information About the Company" section beginning on page 142 to describe how the significant price changes in crypto assets have impacted you.

Our revenue for storage and compute infrastructure services relies heavily on payment....
page 56

5. You disclose that your revenue for storage and compute infrastructure services relies heavily on payment of crypto asset rewards from protocol smart contracts and/or third-party pool operators. Please disclose here how such rewards are held, how long they are held and whether the pool operator has insurance for theft or loss and the risks associated with transferring crypto assets. In addition, include a discussion regarding the payout

Howard Lindzon
Social Leverage Acquisition Corp I
October 14, 2022
Page 3

methods used by the pools you send your hashrate to. For example, explain whether the crypto asset rewards are distributed based on the hashrate provided regardless if a block is found, or if rewards are only earned upon confirmation of a new block, and any associated uncertainties in that regard.

The loss or destruction of private keys required to access any digital assets held in custody..., page 64

6. Please revise here and/or elsewhere in the filing to disclose who holds the private keys for your crypto assets.

Changes in general economic conditions may adversely affect our financial performance, page 70

7. Please update this risk factor if recent inflationary pressures have materially impacted your operations. In this regard, identify any types of inflationary pressures you are facing and how your business has been affected. Also please expand your discussion of interest rates to specifically identify the impact of rate increases on your operations and how your business has been affected.

Our status under the Investment Company Act of 1940 could be challenged, page 78

8. Please revise your risk factor disclosure to include discussion of your decentralized finance and other crypto-related investment activities, which could involve securities transactions depending on the facts and circumstances.

Risks Related to SLAC and the Business Combination, page 86

9. Please highlight the risk that the Sponsor will benefit from the completion of a business combination and may be incentivized to complete an acquisition of a less favorable target company or on terms less favorable to shareholders rather than liquidate.
10. Please highlight that the Sponsor and public shareholders may experience different rates of return and clarify if the Sponsor and its affiliates can earn a positive rate of return on their investment, even if other shareholders of the company experience a negative rate of return in the post-business combination company.
11. Please disclose the material risks to unaffiliated investors presented by taking the company public through a merger rather than an underwritten offering, including the absence of due diligence conducted by an underwriter subject to liability for any material misstatements or omissions in a registration statement.

SLAC's stockholders will experience immediate dilution due to the issuance of common stock..., page 92

12. Please revise to disclose all possible sources and extent of dilution that shareholders who elect not to redeem their shares may experience in connection with the business

Howard Lindzon
Social Leverage Acquisition Corp I
October 14, 2022
Page 4

combination. Provide disclosure of the impact of each significant source of dilution, including the amount of equity held by founders, convertible securities, including warrants retained by redeeming shareholders, at each of the redemption levels detailed in your sensitivity analysis, including any needed assumptions.

Warrants to purchase SLAC common stock will become exercisable following the Business Combination..., page 92

13. Please quantify the value of warrants, based on recent trading prices, that may be retained by redeeming stockholders assuming maximum redemptions and identify any material resulting risks. Also, revise your disclosure to show the potential impact of redemptions on the per share value of the shares owned by non-redeeming shareholders by including a sensitivity analysis showing a range of redemption scenarios, including minimum, maximum and interim redemption levels.

Special Meeting Of SLAC Stockholders
Vote of SLAC's Sponsor, Directors and Officers, page 112

14. We note your disclosure that the "Insiders have waived any redemption rights, including with respect to any shares of SLAC Class A common stock purchased in SLAC's IPO or in the aftermarket, in connection with the Business Combination." Please describe any consideration provided in exchange for this agreement.

SLAC Management's Discussion and Analysis of Financial Condition and Results of Operations
Underwriting Agreement, page 139

15. It appears that underwriting fees remain constant and are not adjusted based on redemptions. Please revise your disclosure to disclose the effective underwriting fee on a percentage basis for shares at each redemption level presented in your sensitivity analysis related to dilution.

Information About the Company
Our Business, page 142

16. Please expand the discussion of your business to address the following:
 - in light of your disclosure on page 143 that you have historically held crypto assets that you do not otherwise sell to fund your operating expenses, briefly discuss whether your business strategy is to hold your crypto assets for investment or convert them into fiat currency immediately upon receipt or soon thereafter. Discuss the average period between receipt of your crypto assets and the subsequent conversion into fiat currency and quantify the fees incurred; and
 - disclose whether you have a specific policy for how you will determine when to sell your crypto assets for fiat currency to pay for costs and expenses incurred, capital expenditures and other working capital and through what exchange or if you intend to hold your mining rewards. To the extent you have an agreement with a third-party

Howard Lindzon
Social Leverage Acquisition Corp I
October 14, 2022
Page 5

exchange for converting crypto assets to fiat currency, disclose the material terms.

17. We note your disclosure that "We are committed to implementing the highest levels of environmental, social and governance standards. Our infrastructure is primarily powered using renewable energy." Please revise to provide the details of you policies for environmental, social and governance standards. As part of your disclosure, include a discussion regarding what percentage of your power comes from renewable energy, and whether the percentage of renewable energy varies for each geographic location your datacenters operate in.
18. Please enhance your discussion to address and clarify the following:
 - the nature and revenues of each of the protocols for which you provide storage and compute services, including the basis for which you are entitled to any rewards or fees;
 - if and how Proof-of-Work, Proof-of-Spacetime and Proof-of-Stake relate and impact each of the protocols for which you provide storage and compute services, including impact to related respective revenue recognition policies;
 - if and how Proof-of-Work, Proof-of-Spacetime and Proof-of-Stake relate to your Business to Protocol (B2P) and each of the four categories;
 - if your transaction fee revenue includes other than a digital reward, e.g. transaction fees;
 - the time frame of when the revenue is deposited into your wallet for each protocol;
 - if the digital assets received are in whole or fractions; and
 - if you are only rewarded for your proportional efforts of successful incremental blocks to the blockchain, including if and how you minimize use of resources towards unsuccessful attempts to add to the blockchain.

Our Customers

Business to Business (B2B), page 145

19. We note your disclosure that you are "expanding into B2B and are allocating significant resources to this effort" and that you expect the revenue to be in fiat currency. Please revise to provide a more detailed discussion of your intended B2B offerings and the expected timeline for providing such products and services.

Treasury Function: Custodians and Trading Venues, page 146

20. Please briefly discuss the experience of Kraken Bank with respect to acting as a crypto asset custodian.
21. Please revise to disclose W3BCLOUD's custody arrangements with Kraken Bank for its long-term crypto asset holdings, including:
 - what portion of the crypto assets are held in hot storage and what portion is required to be held in cold storage;
 - the geographic location of where the crypto assets are held in cold wallets, if applicable;

Howard Lindzon
Social Leverage Acquisition Corp I
October 14, 2022
Page 6

- whether any persons (e.g., auditors, etc.) are responsible for verifying the existence of the crypto assets held by W3BCLOUD's third-party custodian;
- what security precautions the custodian is required to take;
- any auditing or inspection rights; and
- whether and to what degree the custodian is required to have insurance for the loss or theft of the crypto assets.

Also please disclose the material terms and conditions of any agreements that memorialize your custody arrangements with Kraken Bank, including the material obligations of the parties, the duration of the agreements and the termination provisions.

22. Briefly discuss what portion of your long-term digital asset holdings are held in hardware wallets maintained by you and by your custodian, Kraken Bank, respectively. Please clarify whether the crypto assets held in hardware wallets maintained by you are held in hot wallets and cold wallets, the respective portions thereof and whether and to what degree you have insurance for the loss or theft of the crypto assets.
23. We note your disclosure that you may invest your crypto assets in certain decentralized finance protocols from time to time. Please expand your disclosure here to briefly describe the nature of such investments and protocols in recent periods. In this regard, we note your disclosure on page F-55 and F-71 regarding your investments into decentralized finance liquidity pools and yield farming protocols, respectively. Also please add separate risk factor disclosure for the risks attendant to your decentralized finance investment activities, including, without limitation, disclosure regarding recent losses resulting from the "illicit cryptocurrency scam" referenced on pages 167 and F-71.
24. Please revise to briefly describe the material terms and purpose of the loan agreements you entered into with BlockFi in 2021 totaling 60,500,000 USDC, as referenced on page F-65, including your use of proceeds therefrom.

Data Center Facilities, page 147

25. Please revise to identify your hosting providers and disclose the material terms of your hosting arrangements, including the termination provisions and whether your hosting providers have insurance for interruption of service or damage to miners. In this regard, we note your risk factor disclosure on page 63 that your partners' data centers may experience damages, including damages that are not covered by insurance.
26. We note your disclosure that you believe your "[D]ata centers provide regulatory and power price advantage for operations to maintain competitiveness in a quickly changing market." Please revise to disclose your average cost of electricity per KWh, whether each geographic location has different rates, and provide support for your assertion that you have a power price advantage.

Howard Lindzon
Social Leverage Acquisition Corp I
October 14, 2022
Page 7

Joint Venture, page 148

27. Please expand your disclosure to discuss W3BCLOUD's joint venture relationship with AMD and ConsenSys in greater detail. Disclose the material terms of any related agreements, arrangements or understandings, including quantified disclosure, as applicable, termination provisions, and any other material terms.
28. Please briefly discuss, quantitatively if possible, the basis of your belief that you "benefit from supply chain access with certainty." Also please discuss how the global supply chain disruptions referenced on pages 59 and 71 impact your supply chain access.

W3BCLOUD Management's Discussion and Analysis of Financial Condition and Results of Operations

COVID-19 Business Update, page 159

29. On page 59 you disclose that should disruptions to the China-based global supply chain for hardware occur, you may only be able to acquire hardware at premium prices, if at all. Please disclose, including quantitatively, any extent to which you have in fact incurred higher than usual costs to obtain and deploy new miners, and discuss the extent to which higher costs represent a material known trend or uncertainty.

Key Indicators of Performance, page 161

30. Please revise your definition of Revenue per GPU and Revenue per Tebibyte to clarify the time period(s) used in calculating those key metrics.
31. Please revise to include a breakeven analysis for crypto assets you earn/mine that compares your cost to earn/mine one crypto asset with the value of the crypto asset.
32. Please enhance your disclosures of Key Indicators of Performance to include underlying metrics of average increase in USD value of ETH, daily average GPUs and ETH network hashrate and difficulty to provide context and support trends in your key operating and financial indicators.

Unrealized gain (loss) on digital asset borrowing, page 163

33. Given the material impact on results of operations in the periods presented, revise your disclosure in MD&A to discuss, in greater detail, the unrealized gain (loss) on digital asset borrowings, including the specific drivers of the gains/losses.

Revenue, page 165

34. You disclose that the USD value of ETH earned is not only driven by the ETH price, but by the size of the computing power on the Ethereum network (hashrate), the difficulty, and the mining rewards and fees. Please expand both your comparative June 30, 2022 and December 31, 2021 revenue discussion on pages 165 and 168 to explain the interrelationships between these variables and revenues and why despite the increase in

Howard Lindzon
Social Leverage Acquisition Corp I
October 14, 2022
Page 8

ETH price, ETH network hashrate and difficulty period over period, revenue per GPU declined.

35. We note your disclosure that for the six months ended June 30, 2022, you operated 109,317 GPUs and had an average daily profit of \$.039 per megahash per second ("MH/s"). Please revise to provide a more detailed discussion regarding the types of GPUs you operate and the average hashrate and efficiency of your GPUs, as well as your daily profit per MH/s. To the extent the daily profit per MH/s is primarily based on profit from mining Ethereum, include disclosure regarding the current profit per day per MH/s now that Ethereum is no longer a Proof-of-Work blockchain. Finally, tell us whether management uses daily profit per MH/s in assessing the performance of the business and what consideration you have given to including this metric in your key performance indicators. Refer to SEC Release No. 33-10751.

Non-GAAP Financial Measures, page 169

36. Please tell us why it is appropriate to make adjustments to remove impairment of digital assets, realized gain on sale of digital assets, and unrealized (gain) loss on digital asset borrowing when computing Adjusted EBITDA. Refer to the guidance in Item 10(e)(ii)(B), which states that, "*A registrant must not adjust a Non-GAAP performance measure to eliminate or smooth items identified as non-recurring, infrequent or unusual, when the nature of the charge or gain is such that it is reasonably likely to recur within two years or there was a similar charge or gain within the prior two years.*" Please remove these adjustments or advise us otherwise.

Quantitative and Qualitative Disclosure about Market Risk

Market Value Risk of Digital Assets, page 177

37. You disclose that the USD value of ETH earned is not only driven by the ETH price, but by the size of the computing power on the Ethereum network (hashrate), the difficulty, and the mining rewards and fees. Please enhance your disclosures to explain the interrelationships between the USD value of ETH, the Ethereum network (hashrate) and difficulty, including directional relationships to provide investors with an understanding of the exposure at risk with regard to changes in each of these variables. Refer to Item 305 of Regulation S-K.

The Business Combination and the Business Combination Agreement

Certain Projected Financial Information of the Company, page 190

38. We note your statement that the projected financial information is "not being included in this proxy statement to influence your decision whether to vote for or against the Business Combination but is being included because this unaudited projected financial information was provided to SLAC in connection with its evaluation of the Business Combination." Please remove or revise this disclaimer so it does not constitute an undue limitation on reliance of information provided in the proxy statement.

Howard Lindzon
Social Leverage Acquisition Corp I
October 14, 2022
Page 9

39. We note your disclosure on page 192 of the material assumptions underlying the projected financial information. Please revise to provide additional details and support, as appropriate, for the material assumptions that account for the projected revenue growth through 2023. Clearly describe the basis for projecting this growth and the factors or contingencies that would affect such growth ultimately materializing. For example, noting the recent completion of Ethereum's merge, please revise to explain whether you believe the assumptions are reasonable.

Description of Securities

Warrants, page 250

40. Please clarify whether recent common stock trading prices exceed the threshold that would allow you to redeem public warrants. Additionally, please clearly explain the steps, if any, you will take to notify all shareholders, including beneficial owners, regarding when the warrants become eligible for redemption.
41. We note your disclosure on page 256 regarding the exclusive forum provision contained in the warrant agreement. Please disclose whether this provision will apply to actions arising under the Securities Act or the Exchange Act. If the provision applies to Securities Act claims, please also state that investors cannot waive compliance with the federal securities laws and the rules and regulations thereunder. Also please include a risk factor discussing the risks associated with this provision, including increased costs to bring a claim and the potential that the provision will discourage claims or limit investors' ability to bring a claim in a judicial forum that they find favorable. Your disclosure should also address whether there is any question as to whether a court would enforce the provision.

Certain Relationships and Related Party Transactions

Commitments to Financing by PIPE Investors, page 287

42. Please expand your disclosure regarding the PIPE financing to address the following:
- fully describe the terms of the PIPE financing commitments, including, without limitation, the price of the securities to be issued and the "certain conditions" to which such commitments are subject, as your disclosure references;
 - highlight any material differences in the terms and price of securities issued at the time of the IPO as compared to the PIPE investments;
 - discuss the key terms of any convertible securities and disclose the potential impact of those securities on non-redeeming shareholders; and
 - disclose if the PIPE investors include SLAC's sponsor, directors, officers or their affiliates.

W3BCloud Partners Limited and Subsidiaries

Note 3. Summary of Significant Accounting Policies

Restricted Digital Assets, page F-55

43. Please tell us, and revise your next amendment, to disclose the following for your Digital

Howard Lindzon
Social Leverage Acquisition Corp I
October 14, 2022
Page 10

Assets:

- a breakout of your digital assets types (ETH, BTC, FIL) by non-restricted and restricted on pages F-61 and F-89;
- a breakout of your rollforward of non-restricted and restricted digital assets on pages F-61 and F-90;
- a breakout of impairment by non-restricted and restricted digital assets in the periods presented;
- disclose the nature of the restriction for restricted digital assets; and
- disaggregate cash flow activities between non-restricted and restricted digital assets based on the underlying activity. Refer to ASC 230-10-45-10.

Digital Asset Borrowings, page F-56

44. Enhance your disclosure to clarify, if true, that digital assets borrowed and contractually pledged as collateral are reported as restricted digital assets on the consolidated balance sheet.
45. In situations where you borrowed digital assets, you state that the borrowings are accounted for as hybrid instruments, with a liability host contract that contains an embedded derivative based on the changes in the fair value of the underlying digital asset. Further, you state that the host contract is not accounted for as a debt instrument. Please provide us with the following additional information:
 - provide additional detail to support your conclusion that the host contract is not a debt instrument. For example, clarify whether you believe the host contract is not a debt instrument because the loan can be open-ended or repayable upon demand;
 - further explain the substance and terms of open-ended or repayable upon demand agreements, quantify the amounts of these agreements you have entered into at each reporting date, including how digital asset borrowing amounts correlates to the related liability recognized and or outstanding;
 - explain why if the borrowing agreement is payable in ETH or FIL, the related liability is greater than the fair value of the underlying digital asset which would be used to settle the borrowing agreement;
 - clarify how interest is calculated based on loan balance of ETH and FIL;
 - provide us with a schedule that reconciles the period over period change in digital asset borrowings to digital asset activity (pages F-61 and F-90), supplemental non-cash borrowings, unrealized gain (loss) on digital asset borrowings and changes in fair value of derivative liability within convertible note; and
 - explain in greater detail how you determine the fair value of the underlying crypto assets for purposes of marking the embedded derivative to market. Tell us the specific exchange or principal market you use.

USDC Borrowings, page F-56

46. Please enhance your disclosure to clarify how related collateralized digital assets are accounted and classified on your consolidated balance sheet.

Howard Lindzon
Social Leverage Acquisition Corp I
October 14, 2022
Page 11

Revenue Recognition, page F-57

47. Please revise your next amendment to discuss your revenue by protocol (Ethereum, Bitcoin, Filecoin, Pocket, etc.) and type (storage, compute, transaction fees, and yield farming).
48. You disclose that you are a leading storage and compute infrastructure provider, that you receive digital asset rewards from providing storage and compute resources to protocol smart contracts and/or third-party pools and that W3BCLOUD provides customized enterprise-grade storage and compute infrastructure to power Web3 and that you recognized revenue per GPU of \$1.17 (compute) and revenue per Tebibyte of \$.08 (storage) for the six months ended June 30, 2022. You also disclose on pages F-57 and F-85, that revenue is earned as you provide compute to third-party pools, which represents a single performance obligation that you offer to pool operators. Please reconcile and enhance your disclosures to clarify the nature of the services provided for which you earn revenues, including if you earn revenues from storage as a separate and distinct service from compute and your related accounting policy. Refer to ASC 606-10-50-4. Please also provide us with authoritative reference to support your revenue recognition accounting policies other than digital asset awards.
49. Please tell us, and enhance your disclosures to address the following:
 - if and how Proof-of-Work, Proof-of-Spacetime and Proof-of-Stake relate and impact each of the protocols for which you provide storage and compute services, the respective reward structures and the impact to related respective revenue recognition policies; and
 - if Filecoin uses the Proof-of-Spacetime consensus mechanism as disclosed on pages 162, F-58 and F-85 or the Proof-of-Work consensus mechanism as disclosed on page 55.
50. In order to help us evaluate your digital asset award revenue recognition accounting policy, please provide your analysis of each of the five steps of ASC 606. Address in the analysis, but do not limit it to, the following points. Please also revise your disclosures to more clearly articulate the material terms of your contracts, including the material rights and obligations of the parties.
 - as it relates to ASC 606 Step 1, reconcile your statements that you do not have an explicit contract, but nonetheless have a binding agreement. Clarify how you meet the requirements in ASC 606-10-25-1, whether the parties have termination rights, and the duration of the contract (that is, the contractual period) in which the parties to the contract have present enforceable rights and obligations.
 - as it relates to ASC 606 Step 2, more clearly and fully articulate the promised goods and services in your contracts and your analysis as to whether they are distinct.
 - as it relates to ASC 606 Step 3, identify the consideration specified in the contract, how the amount of consideration is determined, and your determination that the consideration is variable consideration pursuant to ASC 600-10-32. Also, reconcile your accounting policy to the requirement to measure noncash consideration at

Howard Lindzon
Social Leverage Acquisition Corp I
October 14, 2022
Page 12

- inception of the contract, clarifying how you determined contract inception.
- as it relates to ASC 606, Step 3 and your disclosure that revenue is recognized net of pool operator fees, clarify whether the single amount (i.e., net fees received) represents the transaction price paid to you in satisfaction of your performance obligation to the pool operator and if the amounts retained by the pool operator relate to the activities it must undertake to fulfill its contract with you. Please also provide your analysis of the guidance for determining the transaction price beginning at ASC 606-10-32-2. That is, based on your contract with the pool operator, tell us the amount of consideration to which you are entitled for providing computing power to the pool operator.

Please reconsider the appropriateness of your statement that there is no official guidance for the accounting for digital assets. We observe that the FASB codification is the source of authoritative generally accepted accounting principles and that there is codification guidance whose scope applies to your transactions.

51. Please revise your next amendment to clearly identify the customer within your ASC 606, Revenue from Contracts with Customers disclosures. Please also disclose the following:
 - if your transaction fee revenue includes other than a digital reward, e.g., transaction fees and your consideration to disclose separately. Refer to ASC 606-10-50-4.
 - the time frame of when the revenue is deposited into your wallet for each protocol.
 - if the digital assets received are in whole or fractions.
52. Please enhance your Business to Protocol disclosure to address each protocol you provide service, including the nature of the related protocol reward.

Note 5. Property and Equipment, page F-62

53. Please tell us, and revise your next amendment, to discuss more specifically the components of work-in-progress, the timeline for placing in service, and the expected useful life when completed.

Note 6. Loans and Borrowings, page F-63

54. Please tell us, and revise your next amendment, to provide the following information related to digital asset borrowings:
 - how you determined that Level 2 classification was appropriate for Digital asset borrowings under ASC 820; and
 - how you specifically computed the unrealized gains/losses in the periods presented.

Howard Lindzon
Social Leverage Acquisition Corp I
October 14, 2022
Page 13

We remind you that the company and its management are responsible for the accuracy and adequacy of their disclosures, notwithstanding any review, comments, action or absence of action by the staff.

You may contact David Irving at (202) 551-3321 or Michelle Miller at (202) 551-3368 if you have questions regarding comments on the financial statements and related matters. Please contact David Lin at (202) 551-3552 or Matthew Derby at (202) 551-3334 with any other questions.

Sincerely,

Division of Corporation Finance
Office of Finance

To: lvenick@loeb.com[lvenick@loeb.com]
From: CF Office of Finance
Sent: 2022-10-27T13:34:00Z
Subject: SEC Comment Letter: Lion Group Holding Ltd F-1/A
Received: 2022-10-27T13:34:00Z
[Lion Group Holding Ltd F-1A Letter.pdf](#)

Do not respond to this email address since we do not monitor it for incoming emails.

The Securities and Exchange Commission’s Division of Corporation Finance has attached to this email a letter relating to an SEC filing.

If you have any questions regarding this letter, please contact one of the staff members identified in it.

Division of Corporation Finance
U.S. Securities & Exchange Commission
100 F Street, NE
Washington, D.C. 20549
www.sec.gov



DIVISION OF
CORPORATION FINANCE

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

October 27, 2022

Jian Wang
Chairman of the Board (Class II)
Lion Group Holding Ltd
Unit A-C, 33/F
Tower A, Billion Center
1 Wang Kwong Road
Kowloon Bay Hong Kong

**Re: Lion Group Holding Ltd
Amendment No.10 to
Registration Statement on Form F-1
Filed September 28, 2022
File No. 333-253342**

Dear Jian Wang:

We have reviewed your amended registration statement and have the following comments. In some of our comments, we may ask you to provide us with information so we may better understand your disclosure.

Please respond to this letter by amending your registration statement and providing the requested information. If you do not believe our comments apply to your facts and circumstances or do not believe an amendment is appropriate, please tell us why in your response.

After reviewing any amendment to your registration statement and the information you provide in response to these comments, we may have additional comments. Unless we note otherwise, our references to prior comments are to comments in our June 27, 2022 letter.

Amendment to Form F-1 filed September 28, 2022

Risks Related to Our Cryptocurrency Mining Operations

Any change in the interpretive positions of the SEC or its staff with respect to cryptocurrencies or digital asset mining, page 65

1. Please revise the first two paragraphs of this risk factor to remove the implication that there is no guidance regarding whether a crypto asset may be a "security" within the meaning of the Securities Act and Investment Company Act and that the legal test "evolves over time." The legal tests to determine whether an instrument is a "security" are

Jian Wang
Lion Group Holding Ltd
October 27, 2022
Page 2

well established by U.S. Supreme Court case law and the Commission and staff reports, orders, and statements providing guidance on when a crypto asset may be a security for purposes of the U.S. federal securities laws. Similarly revise the carryover risk factor on pages 66-67.

2. Please update your disclosure here and elsewhere, as appropriate, to address the recent completion of Ethereum's transition to Proof-of-Stake consensus.

Revenue from the Lion NFT Platform, page 77

3. Please refer to comment 9. Please revise to describe your obligations under the September 8, 2021 licensing agreement with Xu Bing Studio. Specifically describe how you compensate the Xu Bing Studio and the relevant accounting policies related to this agreement.

General

4. Please refer to comments 8, 10, and 11. We continue to evaluate your responses and may have further comments.
5. Refer to your response to comments 3 and 4. Please clarify whether you have any procedures other than KYC and IP Blacklist to prevent offers and sales to U.S. persons or persons located in the United States; whether your KYC procedures rely on self-certification or whether there are any verification procedures for the information collected; and whether there are any steps you take to ensure that persons in the United States cannot circumvent your restrictions.

You may contact William Schroeder at 202-551-3294 or Michael Volley at 202-5513437 if you have questions regarding comments on the financial statements and related matters. Please contact Jessica Livingston at 202-551-3448 or J. Nolan McWilliams at 202-551- 3217 with any other questions.

Sincerely,

Division of Corporation Finance
Office of Finance

cc: Lawrence Venick

To: doug@socialleverage.com[doug@socialleverage.com]
From: CF Office of Finance
Sent: 2022-12-19T19:43:21Z
Subject: SEC Comment Letter: Social Leverage Acquisition Corp I PRER14A
Received: 2022-12-19T19:43:21Z
[Social Leverage Acquisition Corp I PRER14A Letter.pdf](#)

Do not respond to this email address since we do not monitor it for incoming emails.

The Securities and Exchange Commission’s Division of Corporation Finance has attached to this email a letter relating to an SEC filing.

If you have any questions regarding this letter, please contact one of the staff members identified in it.

Division of Corporation Finance
U.S. Securities & Exchange Commission
100 F Street, NE
Washington, D.C. 20549
www.sec.gov



DIVISION OF
CORPORATION FINANCE

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

December 19, 2022

Howard Lindzon
Chief Executive Officer and Director
Social Leverage Acquisition Corp I
8390 E. Via De Ventura Suite F110-207
Scottsdale, AZ 85258

Re: Social Leverage Acquisition Corp I
Amendment No 1. to Preliminary Proxy Statement on Schedule 14A
November 10, 2022
File No. 001-40059

Dear Howard Lindzon:

We have reviewed your filing and have the following comments. In some of our comments, we may ask you to provide us with information so we may better understand your disclosure.

Please respond to these comments within ten business days by providing the requested information or advise us as soon as possible when you will respond. If you do not believe our comments apply to your facts and circumstances, please tell us why in your response.

After reviewing your response to these comments, we may have additional comments. Unless we note otherwise, our references to prior comments are to comments in our October 14, 2022 letter.

Amendment No 1. to Preliminary Proxy Statement on Schedule 14A

General

1. With a view toward disclosure, please tell us whether anyone or any entity associated with or otherwise involved in the transaction, is, is controlled by, or has substantial ties with a non-U.S. person. If so, also include risk factor disclosure that addresses how this fact could impact your ability to complete your initial business combination. For instance, discuss the risk to investors that you may not be able to complete an initial business combination with a U.S. target company should the transaction be subject to review by a U.S. government entity, such as the Committee on Foreign Investment in the United States (CFIUS), or ultimately prohibited. Further, disclose that the time necessary for government review of the transaction or a decision to prohibit the transaction could prevent you from completing an initial business combination and require you to liquidate.

Howard Lindzon
Social Leverage Acquisition Corp I
December 19, 2022
Page 2

Disclose the consequences of liquidation to investors, such as the losses of the investment opportunity in a target company, any price appreciation in the combined company, and the warrants, which would expire worthless.

2. To the extent material, discuss how the bankruptcies in the crypto market, including BlockFi, and the downstream effects of those bankruptcies have impacted or may impact your business, financial condition, customers, and counterparties, either directly or indirectly. Clarify whether you have material assets that may not be recovered due to the bankruptcies or may otherwise be lost or misappropriated.
3. Please ensure that all capitalized terms are defined the first time they are used, or otherwise provide an appropriate cross-reference to the relevant definition. For example, the capitalized terms “Issuer” and “Borrower” appear on page 251 without being defined.
4. Provide disclosure of any significant crypto asset market developments material to understanding or assessing your business, financial condition and results of operations, or share price since your last reporting period, including any material impact from the price volatility of crypto assets.

Summary of the Proxy Statement, page 28

5. We note your disclosure on page 162 that you are still developing your processes for analyzing whether the crypto assets you receive from Web3 protocols are securities. Please revise your summary and risk factors to disclose, if true, that you have not yet analyzed whether the crypto assets you receive are securities and that you have not finalized a process for making such determinations.

Organizational Structure of the Company, page 32

6. Please reconcile and revise as appropriate the companies shown in the charts on pages 32 and 34 with the disclosure in Note 1 on page F-51. Note 1 includes two companies not shown in the charts - W3BCLOUD Inc., a New York corporation, and W3BCLOUD Limited, a private limited company incorporated and domiciled in Ireland. The charts include two companies not included in Note 1 - W3BCLOUD Partners Unlimited (Ireland) and W3BCLOUD Unlimited (Ireland).

Risk Factors, page 52

7. To the extent material, discuss any reputational harm you may face in light of the recent disruption in the crypto asset markets. For example, discuss how market conditions have affected how your business is perceived by customers, counterparties, and regulators, and whether there is a material impact on your operations or financial condition.
8. Describe any material risks you face related to the assertion of jurisdiction by U.S. and foreign regulators and other government entities over crypto assets and crypto asset markets.

Howard Lindzon
Social Leverage Acquisition Corp I
December 19, 2022
Page 3

9. To the extent material, describe any gaps your board or management have identified with respect to risk management processes and policies in light of current crypto asset market conditions as well as any changes they have made to address those gaps.
10. Describe any material financing, liquidity, or other risks you face related to the impact that the current crypto asset market disruption has had, directly or indirectly, on the value of the crypto assets you use as collateral or the value of your crypto assets used by others as collateral.
11. To the extent material, describe any of the following risks due to disruptions in the crypto asset markets:
 - Risk from depreciation in your stock price.
 - Financing risk, including equity and debt financing.
 - Risk of increased losses or impairments in your investments or other assets.
 - Risks of legal proceedings and government investigations, pending or known to be threatened, in the United States or in other jurisdictions against you or your affiliates.
 - Risks from price declines or price volatility of crypto assets.

Our revenue for storage and compute infrastructure services relies heavily on payment... page 56

12. We note your revised disclosure in response to comment 5 that "[t]o the extent the pool operators maintain insurance for such loss or theft, the total value of digital assets in their possession and control may be significantly greater than the total value of insurance coverage that would compensate a pool operator in the event of theft or other loss." Please further revise to clearly discuss what insurance, if any, that the pool operators carry. If applicable, please provide additional details regarding the types of losses that such insurance covers, including quantitative disclosure regarding the amount of coverage for your digital assets in their possession.

The loss or destruction of private keys required to access any digital assets held in custody... page 65

13. We note your revised disclosure in response to comment 6 that Kraken Bank holds the private keys for the accounts that hold your digital assets. Please expand your disclosure here or elsewhere in the filing to:
 - Discuss how the private keys will be stored and the precautions that will be taken to keep them secure; and
 - Specifically address the circumstances under which Kraken Bank would, and would not have, have liability for the loss of private keys resulting from theft, fraud, hacking, or other loss.

Our digital assets holdings in interest-bearing deposit accounts and our digital assets granted as collateral... page 69

14. We note your response to comment 3 and your added risk factor disclosure on page 69. Please further revise to identify the "regulated counterparty" with whom you have digital

Howard Lindzon
Social Leverage Acquisition Corp I
December 19, 2022
Page 4

asset deposit accounts, as referenced in the first sentence, and the relevant regulatory bodies.

Unaudited Pro Forma Condensed Combined Financial Information, page 107

15. You disclose that the Business Combination Agreement requires that SLAC have at least \$150 million in available cash immediately prior to the consummation of the Business Combination after taking into account the PIPE Investment together with cash in the trust account net of stockholder redemptions and certain expenses. We note that there will only be \$95.4 million in cash on a pro forma combined basis assuming 100% redemption. Since this amount is below the \$150 million minimum available cash condition in the business combination agreement, please disclose the impact of this condition under the 100% redemption assumption. Also disclose the maximum redemption amount where the combined company will still meet the \$150 million minimum available cash condition.
16. With respect to pro forma adjustment (D), please quantify and briefly describe the significant components of the transaction costs of \$51.7 million.
17. Please disclose how you calculated the pro forma weighted average shares of 166,463,135 and 131,963,135.

Information About the Company

Our Business, page 149

18. We note your response to comment 31 and your disclosure that you now provide compute infrastructure for Ethereum Classic. Please further revise to address the following:
 - Provide a breakeven analysis for mining Ethereum Classic with your current hardware;
 - Provide supporting calculations of your breakeven points, including quantified disclosure of your direct costs for each period presented; and
 - Briefly discuss, with quantified disclosure (as applicable), your direct costs with respect to any crypto assets for which you currently provide Proof of Work compute services.
 - Prominently disclose whether there are any known trends regarding ETH mining revenue after the Ethereum merge as compared to ETC mining revenue, and the percentage of your revenue that will be impacted.
19. If material to an understanding of your business, describe any direct or indirect exposures to other counterparties, customers, custodians, or other participants in crypto asset markets, including BlockFi, known to:
 - Have filed for bankruptcy, been decreed insolvent or bankrupt, made any assignment for the benefit of creditors, or have had a receiver appointed for them.
 - Have experienced excessive redemptions or suspended redemptions or withdrawals of crypto assets.
 - Have the crypto assets of their customers unaccounted for.
 - Have experienced material corporate compliance failures.

Howard Lindzon
Social Leverage Acquisition Corp I
December 19, 2022
Page 5

20. If material to an understanding of your business, discuss any steps you take to safeguard your customers' crypto assets and describe any policies and procedures that are in place to prevent self-dealing and other potential conflicts of interest. Describe any policies and procedures you have regarding the commingling of assets, including customer assets, your assets, and those of affiliates or others. Identify what material changes, if any, have been made to your processes in light of the current crypto asset market disruption.

Our Customers, page 151

21. We note your response to comment 18. Your revised disclosure does not appear to address the last bullet point. Please revise your next amendment to enhance your discussion to address if you are only rewarded for your proportional efforts of successful incremental blocks to the blockchain, including if and how you minimize the use of resources towards unsuccessful attempts to add to the blockchain.

Treasury Function, page 154

22. We note your response to comment 23. Please revise to provide a more detailed discussion of how liquidity pools operate, what yield farming entails, and how rewards are earned. As part of your disclosure, be sure to include discussion of the automated market makers and decentralized exchanges and any interest you hold in them.
23. We note your revised disclosure in response to comment 21 that you currently hold your long-term digital assets in your digital assets trading account at Kraken Bank. Please further revise to disclose:
- Whether the "digital assets trading account" refers to your hot wallet;
 - Whether any persons (e.g., auditors, etc.) are responsible for verifying the existence of the crypto assets held in your digital assets trading account;
 - What security precautions Kraken Bank is required to take;
 - Any auditing or inspection rights;
 - Whether and to what degree Kraken Bank is required to have insurance for the loss or theft of the crypto assets; and
 - Whether Kraken Bank can loan, pledge or rehypothecate the crypto assets held by them.
24. Please revise to clarify whether Kraken Bank may halt or suspend withdrawals of digital assets currently held in your digital asset trading accounts and, if so, the circumstances under which it may do so. As applicable, please add risk factor disclosure addressing any risks attendant therewith or that Kraken Bank becomes subject to any bankruptcy related events.

Data Center Facilities, page 156

25. We note your response to comment 25; however, please note that required or material information must be disclosed, notwithstanding a confidentiality provision between the parties. Therefore, we reissue the comment.

Howard Lindzon
Social Leverage Acquisition Corp I
December 19, 2022
Page 6

26. We note your revised disclosure in response to comment 26. While we note your disclosure regarding your range of electricity costs per Kwh during 2022, we are unable to locate disclosure of your *average* cost of electricity per KWh, as previously requested. Therefore, we partially reissue the comment.

W3BCLOUD Management's Discussion and Analysis of Financial Condition and Results of Operations

Factors Affecting Our Performance

Know Trends or Uncertainties, page 169

27. Please enhance your disclosures to more fully explain how the change in Ethereum protocol from Proof-of-work to Proof-of-stake as a result of the Merge will impact your historical revenue trends and reference your risk factor disclosure on pages 52; "*If we fail to successfully execute on our business plan or if digital assets and blockchain do not become widely used on a mass scale through Web3 as we anticipate, our results of operations could be adversely affected.*" and 57 "*The transition of Ethereum to Proof-of-Stake consensus as part of the implementation of "The Merge" could make our Ethereum-related activities less competitive and ultimately adversely affect our business, financial condition and results of operations.*"

Key Indicators of Performance, page 171

28. We note your response to comment 30. Please enhance your revised disclosures to define the time value of daily average mining difficulty in footnote 7 of the time spent mining, e.g. minutes, hours.

Non-GAAP Financial Measures, page 180

29. We note your response to comment 36 and that you disclose Adjusted EBITDA as a useful financial measure in evaluating your operating performance. The exclusion of impairment of digital assets, unrealized (gain) loss on digital asset borrowing and change in fair value of derivative liability on convertible note measurements implies that these items are not an inherent part of your most central or essential operations and results. Please address the following:
- Tell us why you consider Adjusted EBITDA useful to investors under Item 10(e)(i)(C) of Regulation S-K, considering that revenues you earn are received in digital asset rewards, you have yet to achieve positive operating cash flows necessary to finance operations, digital asset are used as a source of collateral in your USDC borrowings, you disclose that your operating results and financial condition are substantially affected by fluctuations and long-term trends in the value of Ethereum Classic, Filecoin, Pocket and Zilliqa Proof-of-Work and that you are also long-term holders of the tokens of protocols you support. In this regard explain what Adjusted EBITDA is purported to represent and why the description of Adjusted EBITDA best describes this measure;
 - Tell us how the reconciliation from GAAP Net Income to Adjusted EBITDA meets

Howard Lindzon
Social Leverage Acquisition Corp I
December 19, 2022
Page 7

the requirements in Item 10(e)(i)(B) of Regulation S-K regarding the most directly comparable GAAP financial measure based on the requirements in Item 10(e)(i)(C) of Regulation S-K;

- Tell us how you considered the guidance in Item 10(e)(ii)(B) of Regulation S-K, and Questions 102.03 and 100.01 of the C&DI on Non-GAAP Financial Measures which prohibits adjustments reasonably likely to recur within two years that have been recognized within the prior two years; and
- Notwithstanding the above, please revise your next amendment to either remove the Adjusted EBITDA Non-GAAP indicator or provide substantive explanations that consider the guidance above.

Liquidity and Capital Resources

Overview, page 182

30. We note that you have several Ethereum denominated loans outstanding that require repayment in Ethereum. Please revise to provide a more complete discussion regarding how you intend to repay the outstanding Ethereum loans in light of the Ethereum merge.

Quantitative and Qualitative Disclosure about Market Risk

Market Value Risk of Digital Assets, page 188

31. We note your response to comment 37 and that your operating results and financial condition are substantially affected by fluctuations and long-term trends in the value of Ethereum Classic, Filecoin, Pocket and Zilliqa Proof-of-Work and that a hypothetical ETH price fluctuation of 10% would impact your revenue and intangible assets you recognize on a daily basis by approximately 5-15%, dependent on the reaction to the change of the ETH network and a decline is likely to trigger an impairment charge. Please address the following:
- Enhance your disclosures as required by Item 305 of Regulation S-K, using one of the three disclosure alternatives, to more fully address the underlying market risk exposure for your derivative and other financial instruments (Refer to general instructions to paragraph 305(a) and 305(b)) that aligns with your financial results. For example, you disclose that the USD value of ETH increased from \$533 in 2020 to \$3,001 in 2021, an approximately 405.1% increase, yet you recognized digital asset impairment of \$23.2 million and an unrealized loss on digital asset borrowings of \$54.4 million due to the decline in the value of the embedded derivatives related to your digital asset borrowings;
 - Disclose your basis for identifying ETH price as the only primary market risk exposure and or revise your disclosures accordingly. Refer to Instruction to paragraph 305(b)1.B of Item 305 of Regulation S-K;
 - Clarify the directional and or non-directional relationships between identified markets risks; and
 - In your analysis, select hypothetical changes in market rates or prices that are expected to reflect reasonably possible near-term changes in those rates and prices.

Howard Lindzon
Social Leverage Acquisition Corp I
December 19, 2022
Page 8

We note that the price of ETH has historically never only changed by approximately 5-15%. Refer to Instruction 3A of Item 305 of Regulation S-K.

Certain Projected Financial Information of the Company, page 201

32. We note your disclosure that "the Ethereum Merge was assumed to occur in the fourth quarter of 2022" and that your projections indicate an increase in Compute Infrastructure revenue from \$37 million to \$133 million from 2022 to 2023. Please revise to provide a more detailed discussion regarding how the increase in projected Compute Infrastructure revenue was calculated when taking into account the Ethereum merge.

W3BCLOUD Partners and Subsidiaries
Consolidated Statements of Cash Flows, page F-50

33. We note that you present proceeds from sale of digital assets in investing activities. Please address the following:
- Provide us your analysis supporting classification of cash inflows from the sale of cryptocurrencies as investing activities, specifically indicating your consideration for classifying these cash flows as operating activities. Reference for us the authoritative literature you rely upon to support your classification; and
 - Tell us the type of digital assets sold, for example digital asset received from mining activities, digital asset purchased or digital asset borrowings.

Digital Assets, page F-54

34. You disclose that it is your policy is to assess digital assets for impairment on a monthly basis, potentially impairing the asset to the lowest intraday value in the month of review. Please tell us, and revise your next amendment to disclose the following regarding your impairment testing on digital assets:
- How the lowest intraday value in a month of review is applied, including your consideration of ASC 350-30-35-18Bc and ASC 350-30-35-20. For example, if a sale of a digital asset occurs at 2pm that results in gain (quoted market price at 2pm is greater than cost at acquisition) but then at 3pm the quoted market price declines below cost, how does the quoted market price decline impact the sale at 2pm and then a subsequent sale at 4pm;
 - How you apply the qualitative assessment given the existence of a quoted price in apparently active markets; and
 - Why you state that you "potentially" impair the digital assets to the lowest intraday value in the month of review.

Notes to Consolidated Financial Statements, December 31, 2021 and 2020
Note 3. Summary of Significant Accounting Policies
Revenue Recognition, page F-57

35. We note your response to comment 50 and your disclosure on page F-58 that digital asset

Howard Lindzon
 Social Leverage Acquisition Corp I
 December 19, 2022
 Page 9

service fees to the mining pool operator are recorded as a deduction from revenue because they represent consideration payable to a customer consistent with the guidance in ASC 606-10-32-25 and that the digital asset service fee of 1-2% of the block reward represents a service fee to operate the pool that each pool operators states on its website and is included as a deduction in the payment scheme calculation by the pool operator. Please revise your next amendment, and tell us the following related to these transaction fees:

- Confirm the payment received from the mining pool operator is net of the 1-2% service fee and if not, how you separately settle the 1-2% service fee;
- You state in your response that digital asset service fees are fixed at contract inception and are deducted from the gross rewards received from the blockchain (by the pool operator) prior to allocating (net) rewards to you. You also disclose that the transaction price is calculated as: $\text{Transaction Price} = [(\text{cryptoassets awarded to the pool} \times \text{W3BCLOUD's share based on proportional processing power}) - \text{service fee to pool operator}] \times \text{hourly spot rate of cryptoasset upon receipt of funds}$. Please reconcile these statements;
- Provide us a sample contract and reference your analysis to the specific provisions of the contract;
- Revise to disclose digital asset mining pool operator service fees for each period presented; and
- Tell us on average how many mining pool operators you provide storage and compute infrastructure services.

36. We note your response to comment 50 and that contracts may be terminated by either party at any time without cause and without penalty. Please tell us the following concerning the contract:

- If it is your business practice to commit for the duration of each 24-hour period, and if that is considered the contract term;
- If the electronic account setup effectively provides you with the automatic renewal for successive contract terms every 24-hours thereafter;
- If you have the right under your contract with the pool operator to decide at what point in time and for what duration you will provide computing power, including whether you can start and stop providing computing power during a day and/or whether you can stop providing computing power for one or more days and then resume providing it;
- How your evaluation of contract inception and contract duration consider your rights, if any, to determine when to commence and cease providing computing power; and
- How the amount of rewards received for providing computing power may be impacted should you start and stop mining within a 24-hour period.

37. We note your response to comment 50. Please tell us the following regarding Step 3: Transaction price:

- You disclose that the block reward is credited according to the number and difficulty of the shares submitted during the last hour. Disclose what is a share and how is it determined;

Howard Lindzon
Social Leverage Acquisition Corp I
December 19, 2022
Page 10

- The formulas you use of how the pool/miner percentages are determined and how you validate the amounts you earn to determine you are being properly paid;
 - If and how you utilize your validated proportional processing power which you identify as one of the factors for constraining your variable consideration;
 - How you obtain your validated proportion of processing power contributed in a successful mining pool;
 - How you know if your miner is the one to solve the block;
 - Does only one miner work on a block at a time;
 - Is there a hard cut off at the end of each 24-hour contract period by the mining pool operator in calculating shares;
 - Explain in greater detail how the PPLNS payment structure works and more clearly define "specific reward" and "network difficulty" and how they factor into the block reward; and
 - Clarify the intersect between the Ethermine's reward calculation using PPLNS and Ezil's reward calculation using PPS+ in the determination of the amount of variable consideration you are entitled.
38. We note your response to comment 50 and that you have elected to receive rewards in minimum units of 5, which generally results in revenue recognition the same day as rewards become available. Please tell us the following concerning the timing of rewards received from the pool operators:
- Is a "share" as discussed under the PPLNS structure the same as a "unit" as defined under the reward structure. Revise your disclosures to clarify as necessary;
 - If and how often you are able to select and or change the payment terms and if the pool operators have a minimum or maximum number of cryptoassets for settlement;
 - Explain in more detail how you account for rewards earned that are less than the 5 unit minimum;
 - Explain in more detail how you account for fair value changes in digital assets for rewards earned that are less than the 5 unit minimum, including how underlying activity is calculated, determined and analyzed;
 - Explain the statement in your response "*generally results in revenue recognition the same day as rewards become available so the fair value of the rewards at receipt is not materially different than at contract inception*";
 - How the 24-hour mining period reconciles with the 24-48 hour period disclosed on page 151 as the time period for receiving digital asset reward from protocols in your revised disclosure; and
 - How you determined the 97% historical amount included in your response.
39. Please tell us and disclose your accounting for the receivables denominated in cryptocurrencies.

Note 6. Loans and Borrowings, page F-65

40. You disclose that at various dates between May 4, 2021, and December 31, 2021, you entered into loan agreements with BlockFi totaling 60,500,000 USDC, each with a one-

Howard Lindzon
Social Leverage Acquisition Corp I
December 19, 2022
Page 11

year term, bearing interest rates ranging from 5.25% to 9.5%, with interest payable monthly in USDC, and with digital assets (i.e. ETH) used as collateral and that during the months of May and June 2022, you fully repaid all BlockFi loans of 60,500,000 USDC. Please tell us and enhance your disclosures to clarify if you received cash or USD Coin from BlockFi under the terms of the agreement and how the underlying transactions are reflected in your cash flow statement, including related non-cash financing activities.

Note 9. Related Party Transactions, page F-70

41. We note the revised disclosure on page 157 with respect to your strategic relationships. Please revise to disclose all material related party transactions with AMD and ConsenSys in the notes to your consolidated financial statements on pages F-70 and F-102. Refer to ASC 850-10-50.

Notes to Consolidated Unaudited Financial Statements, June 30, 2022 and 2021

Note 3. Summary of Significant Accounting Policies

Revenue Recognition, page F-88

42. We note your response to comment 50 and that you removed your statement that there is no official guidance for the accounting for digital assets on page F-60. Please revise your next amendment to remove the statement on page F-90.

Note 4. Digital Assets, page F-94

43. Please disclose the underlying number of each digital asset type held for the periods disclosed.

We remind you that the company and its management are responsible for the accuracy and adequacy of their disclosures, notwithstanding any review, comments, action or absence of action by the staff.

You may contact David Irving at (202) 551-3321 or Michelle Miller at (202) 551-3368 if you have questions regarding comments on the financial statements and related matters. Please contact David Lin at (202) 551-3552 or Matthew Derby at (202) 551-3334 with any other questions.

Sincerely,

Division of Corporation Finance
Office of Finance

To: manuel.garciadiaz@davispolk.com[manuel.garciadiaz@davispolk.com]
From: CF Office of Finance
Sent: 2023-01-31T18:25:26Z
Subject: SEC Comment Letter: XP Inc. CORRESP
Received: 2023-01-31T18:25:26Z
[XP Inc. CORRESP Letter.pdf](#)

Do not respond to this email address since we do not monitor it for incoming emails.

The Securities and Exchange Commission’s Division of Corporation Finance has attached to this email a letter relating to an SEC filing.

If you have any questions regarding this letter, please contact one of the staff members identified in it.

Division of Corporation Finance
U.S. Securities & Exchange Commission
100 F Street, NE
Washington, D.C. 20549
www.sec.gov



DIVISION OF
CORPORATION FINANCE

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

January 31, 2023

Thiago Maffra
Chief Executive Officer
XP Inc.
Av. Chedid Jafet, 75, Torre Sul, 30th floor,
Vila Olímpia – São Paulo
Brazil 04551-065

Re: XP Inc.
Amendment No. 3 to Registration Statement on Form F-4
Filed November 21, 2022
File No. 333-264629

Dear Thiago Maffra:

We have reviewed your amended registration statement and have the following comments. In some of our comments, we may ask you to provide us with information so we may better understand your disclosure.

Please respond to this letter by amending your registration statement and providing the requested information. If you do not believe our comments apply to your facts and circumstances or do not believe an amendment is appropriate, please tell us why in your response.

After reviewing any amendment to your registration statement and the information you provide in response to these comments, we may have additional comments. Unless we note otherwise, our references to prior comments are to comments in our October 20, 2022 letter.

Amendment No. 3 to Registration Statement on Form F-4

General

1. Please provide disclosure of any significant crypto asset market developments material to understanding or assessing your business, financial condition and results of operations, or share price since your last reporting period, including any material impact from the price volatility of crypto assets.
2. We note your responses to comments 1, 2 and 3, respectively, regarding your:
 - Assessment that ether on the Proof-of-Stake-based Ethereum network is at a low risk of being considered a security under Brazilian law;
 - Belief that transactions on the XTAGE platform are spot transactions, rather than

Thiago Maffra
XP Inc.
January 31, 2023
Page 2

- derivative agreements; and
- Belief that the location of Ethereum network validation nodes is irrelevant to transactions on the XTAGE platform because "[a]ll customer transactions on the XTAGE platform take place on the books and records of XTAGE, and not directly on the Ethereum (or other) network."

As appropriate, please expand your risk factor disclosure to address the uncertainty of such assessments or beliefs. In each case, as applicable, please disclose the consequences of making an incorrect assessment or if your belief turns out to be incorrect or a regulatory body or court disagrees with your assessment or belief, including, without limitation, the potential regulatory risks under the U.S. federal securities laws. Finally, regarding the last bullet above, please add risk factor disclosure addressing any risks and uncertainties attendant to XTAGE's expanded operational capability in the near future to permit customers to transfer digital assets off of the XTAGE platform to other wallets on-chain, as referenced in your response to comment 2.

Summary

XTAGE, page 7

3. Please expand your disclosure to disclose the third-party source(s) from which your market maker acquires its crypto assets (e.g., on an exchange or otherwise). If material, please quantify your market maker's dependence upon any third-party source(s) from which it acquires a significant amount of its crypto assets.
4. Please revise to discuss how recent market events, including the bankruptcies of certain crypto asset market participants, and the downstream effects of those events have impacted or may impact your business, financial condition, customers, and counterparties, either directly or indirectly. Clarify whether you have material assets that may not be recovered due to the bankruptcies or may otherwise be lost or misappropriated.
5. To the extent material to an understanding of your crypto asset business, describe and quantify any direct or indirect exposures to other counterparties, customers, custodians, or other participants in crypto asset markets, including those known to:
 - Have filed for bankruptcy, been decreed insolvent or bankrupt, made any assignment for the benefit of creditors, or have had a receiver appointed for them.
 - Have experienced excessive redemptions or suspended redemptions or withdrawals of crypto assets.
 - Have the crypto assets of their customers unaccounted for.
 - Have experienced material corporate compliance failures.
6. To the extent material to an understanding of your crypto asset business, discuss any steps you have taken to safeguard your customers' crypto assets and describe any policies and procedures that are in place to prevent self-dealing and other potential conflicts of interest. Describe any policies and procedures you have regarding the commingling of assets, including customer assets, your assets, and those of affiliates or others. Identify

Thiago Maffra
XP Inc.
January 31, 2023
Page 3

what material changes, if any, have been made to your processes in light of the current crypto asset market disruption.

7. Refer to your response and revised disclosures in response to comment 7. In your next amendment, please address the following:
 - You disclose that the cold storage wallet keys are secured in bank vaults in "undisclosed locations." Please revise to disclose with greater specificity the geographic location (e.g., jurisdiction, etc.) where the private keys are held in cold storage to the extent such information is reasonably available.
 - Please revise to identify the person(s) that have access to the private keys.
 - You disclose that XTAGE can verify transfers to and from the BitGo custody accounts, and the resulting balances thereof, on-chain. Please further revise to clarify whether your auditors can verify the existence of crypto assets held by XTAGE's third-party custodians (i.e., BitGo and Parfin) in the course of their audit procedures.
 - Your response letter indicates that the persons authorized to release the proceeds from the wallets are of what the company believes is an appropriate level of seniority and experience to perform this obligation and the company has vetted each such person as appropriate. Please revise your filing to disclose the same.
8. We note your revised disclosure in response to comment 8. Please further revise to address the following:
 - Describe in greater detail your use of digital engagement practices in connection with your technology platform, including, as examples only, behavioral prompts, differential marketing, game-like features and other design elements or features designed to engage with retail investors.
 - State whether you provide investor education information on your platform.
 - Clarify whether any of your digital engagement practices encourage retail investors to trade more often, invest in different crypto assets or change investment strategies.
 - Describe in greater detail your data collection practices or those of your third-party service providers, including the data that you or your third-party service providers collect on existing users of the XTAGE app or XTAGE trading platform and prospective users, respectively. Also clarify what you mean by "standard business analysis of data" on page 7 and provide examples, as appropriate.
9. Based on your disclosure on pages 10-11, it appears that you provide a service to safeguard users' crypto assets and an agent (i.e., BitGo or Parfin) acting on your behalf is therefore obligated to secure these crypto assets and protect them from loss, theft or other misuse. Please provide us a detailed analysis of how you considered Staff Accounting Bulletin No. 121. This analysis should include how you considered the regulatory, technological and legal risks and loss exposure associated with safeguarding the crypto assets for your users. Please also expand your disclosure to separately quantify crypto assets on the XTAGE platform that are held in warm or cold wallets by Parfin and BitGo, respectively, for each period presented.
10. We note your disclosure on page 7 that the XTAGE platform currently offers only trading

Thiago Maffra
XP Inc.
January 31, 2023
Page 4

in bitcoin and ether. Please revise to disclose that in addition to bitcoin and ether, the platform also supports MATIC and LINK, as disclosed on page 21.

Risk Factors

Certain Risks Relating to XTAGE, page 16

11. We note your response to comment 2 that "XTAGE is in the process of building the operational capability to permit customers to transfer digital assets off of the XTAGE platform to other wallets on-chain and plans to begin permitting customers to make such transfers in the near future." To the extent material, please add risk factor disclosure regarding any potential risks associated with this future operational capability, including, without limitation:
 - Describing any material risk to you, either direct or indirect, due to excessive redemptions, withdrawals, or a suspension of redemptions or withdrawals, of crypto assets; and
 - Identifying any material concentrations of risk and quantifying any estimated material exposures, to the extent known.
12. To the extent material, please discuss any reputational harm you may face in light of recent disruptions in the crypto asset markets, including bankruptcies, crypto asset price volatility, and legal proceedings involving prominent crypto platforms. For example, discuss how market conditions have affected how your business is perceived by customers, counterparties, and regulators, and whether there is a material impact on your operations or financial condition.
13. Please expand your discussion of the material risks related to unauthorized or impermissible customer access to XTAGE's offering of crypto assets and services outside of Brazil. Describe the potential impact to your business of administration sanctions, including fines, or legal claims based upon the laws of such other jurisdictions.
14. Please describe any material risks to your business from the possibility of regulatory developments related to crypto assets and crypto asset markets. Identify material pending crypto legislation or regulation and describe any material effects it may have on your business, financial condition, and results of operations.
15. Please describe any material risks you face related to the assertion of jurisdiction by U.S. and foreign regulators and other government entities over crypto assets and crypto asset markets or trading platforms.
16. To the extent material, describe any gaps your board or management have identified with respect to risk management processes and policies in light of current crypto asset market conditions as well as any changes they have made to address those gaps.
17. Please describe any material financing, liquidity, or other risks you face related to the impact that the current crypto asset market disruption has had, directly or indirectly, on the value of the crypto assets you use as collateral or the value of your crypto assets used

Thiago Maffra
XP Inc.
January 31, 2023
Page 5

by others as collateral, to the extent applicable.

18. To the extent material, please describe any of the following risks due to disruptions in the crypto asset markets:
- Risk from depreciation in your stock price.
 - Risk of loss of customer demand for your products and services.
 - Financing risk, including equity and debt financing.
 - Risk of increased losses or impairments in your investments or other assets.
 - Risks of legal proceedings and government investigations, pending or known to be threatened, in the United States or in other jurisdictions against you or your affiliates.
 - Risks from price declines or price volatility of crypto assets.
 - Risks of increased regulation of the crypto asset industry.
 - Specific recent examples of negative publicity associated with crypto trading platforms.

Changes in the price or volatility of specific digital assets, or digital assets more generally, may decrease our revenue.... page 21

19. We note your added risk factor on page 21 in response to comment 9. Please further revise this risk factor to provide quantitative information regarding the volatility of crypto assets listed on the XTAGE platform in recent periods. As previously requested, please describe how the significant price changes in crypto assets have impacted you, including, without limitation, with respect to any crypto assets that you hold and trading volumes of crypto assets on the XTAGE platform.

A failure to safeguard and manage our customers' digital assets by us or our partners.... page 21

20. Please describe any material risks related to safeguarding your, your affiliates', or your customers' crypto assets. Describe any material risks to your business and financial condition if your policies and procedures surrounding the safeguarding of crypto assets, conflicts of interest, or comingling of assets are not effective.

We may expand XTAGE's offering to include additional types of digital assets and services.... page 21

21. We note your response to comment 10 and the added risk factor on page 21. We reissue the comment in part. Please further revise to address the risks attendant to your plans to expand XTAGE's offering to include access to third party trading platforms and the transfer of crypto assets, including the risks associated with transferring assets.

Management's Discussion and Analysis of Financial Condition and Results of Operations of XP, page 72

22. We note that you own and appear to hold crypto assets on behalf of third parties. To the extent material, explain whether these crypto assets serve as collateral for any loan, margin, rehypothecation, or other similar activities to which you or your affiliates are a

Thiago Maffra
XP Inc.
January 31, 2023
Page 6

party. If so, identify and quantify the crypto assets used in these financing arrangements and disclose the nature of your relationship for loans with parties other than third-parties. State whether there are any encumbrances on the collateral. Discuss whether the current crypto asset market disruption has affected the value of the underlying collateral.

Please contact Jessica Livingston at 202-551-3448 or David Lin at 202-551-3552 with any questions.

Sincerely,

Division of Corporation Finance
Office of Finance

To: Aniss.Amdiss@hut8.io[Aniss.Amdiss@hut8.io]
From: CF Office of Crypto Assets
Sent: 2023-03-23T15:13:37Z
Subject: SEC Comment Letter: Hut 8 Corp. S-4
Received: 2023-03-23T15:13:37Z
[Hut 8 Corp. S-4 Letter.pdf](#)

Do not respond to this email address since we do not monitor it for incoming emails.

The Securities and Exchange Commission’s Division of Corporation Finance has attached to this email a letter relating to an SEC filing.

If you have any questions regarding this letter, please contact one of the staff members identified in it.

Division of Corporation Finance
U.S. Securities & Exchange Commission
100 F Street, NE
Washington, D.C. 20549
www.sec.gov



DIVISION OF
CORPORATION FINANCE

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

March 23, 2023

Asher Genoot
President
Hut 8 Corp.
c/o U.S. Data Mining Corp.
1221 Brickell Avenue, Suite 900
Miami, Florida 33131

Re: Hut 8 Corp.
Registration Statement on Form S-4
Filed February 13, 2023
File No. 333-269738

Dear Asher Genoot:

We have reviewed your registration statement and have the following comments. In some of our comments, we may ask you to provide us with information so we may better understand your disclosure.

Please respond to this letter by amending your registration statement and providing the requested information. If you do not believe our comments apply to your facts and circumstances or do not believe an amendment is appropriate, please tell us why in your response.

After reviewing any amendment to your registration statement and the information you provide in response to these comments, we may have additional comments.

Registration Statement on Form S-4

General

1. Please provide disclosure of any significant crypto asset market developments material to understanding or assessing Hut 8's and USBTC's respective business, financial condition and results of operations, or share price since either company's last reporting period, including any material impact from the price volatility of crypto assets.

Questions and Answers about the Business Combination

What are the U.S. federal income tax consequences of the Merger..., page 5

2. You disclose that the parties intend that the Hut 8 Share Exchange occurring pursuant to the Arrangement and the Merger, together, be treated as an exchange by Hut 8

Asher Genoot
Hut 8 Corp.
March 23, 2023
Page 2

shareholders and USBTC stockholders, respectively, that qualifies under Section 351(a) of the Internal Revenue Code. Since it appears that the tax consequences to the transaction are material to shareholders, please file a tax opinion as an exhibit to the registration statement. Refer to Item 601(b)(8) of Regulation S-K. For guidance, please refer to Staff Legal Bulletin No. 19, Section III.A.2.

Selected Unaudited Financial Data as of January 31, 2023, page 23

3. The combined financial information does not appear to comply with the requirements for the presentation of pro forma financial information in Article 11 of Regulation S-X. Please either remove this presentation, or explain to us the purpose of the presentation and the basis for its presentation. Refer to Item 11-02(a)(12) of Regulation S-X.

Market Price of and Dividends on Common Equity

Comparative Per Share Market Price, page 24

4. Please disclose the market value of Hut 8 on an equivalent per share basis. Refer to Item 3(g) of Form S-4.

Risk Factors, page 27

5. To the extent material, please discuss any reputational harm that either Hut 8 or USBTC may face in light of recent disruptions in the crypto asset markets, including bankruptcies, crypto asset price volatility, and legal proceedings involving prominent crypto platforms. For example, discuss how market conditions have affected how either company's business is perceived by customers, counterparties, and regulators, and whether there is a material impact on its operations or financial condition.
6. Please describe any material risks to either Hut 8's or USBTC's business from the possibility of regulatory developments related to crypto assets and crypto asset markets. Identify material pending crypto legislation or regulation and describe any material effects it may have on either company's business, financial condition, and results of operations.
7. Please describe any material risks that either Hut 8 or USBTC faces related to the assertion of jurisdiction by U.S. and foreign regulators and other government entities over crypto assets and crypto asset markets.
8. To the extent material, please describe any gaps that either Hut 8's or USBTC's respective board or management have identified with respect to risk management processes and policies in light of current crypto asset market conditions as well as any changes they have made to address those gaps.

Asher Genoot
Hut 8 Corp.
March 23, 2023
Page 3

9. Please describe any material financing, liquidity, or other risks that either Hut 8 or USBTC faces related to the impact that the current crypto asset market disruption has had, directly or indirectly, on:
- The value of the crypto assets or miners that either company uses as collateral; or
 - The value of either company's crypto assets, miners or mining real estate used by others as collateral, as applicable in each case.
10. To the extent material to either Hut 8 or USBTC, please describe any of the following risks from disruptions in the crypto asset markets:
- Risk from depreciation in either company's stock price.
 - Risk of loss of customer demand for either company's products and services.
 - Financing risk, including equity and debt financing.
 - Risk of increased losses or impairments in either company's investments or other assets.
 - Risks of legal proceedings and government investigations, pending or known to be threatened, in the United States or in other jurisdictions against either company or its affiliates.
 - Risks from price declines or price volatility of crypto assets.
 - Risks of increased regulation of the crypto asset industry.

Risks Related to USBTC's Business, page 38

11. Please expand on your statement on page 46 that “an adverse outcome of the Niagara Falls Litigation may affect U.S. Data Technologies Group Ltd.’s permits and operations with respect to its Niagara Falls data site.” Describe the potential practical implications of an adverse decision in the Niagara Falls Litigation, including whether the site may be required to be closed and its impact on USBTC’s business performance and results of operations.

USBTC’s Power Generation-Related Risks

Maintenance, expansion and refurbishment of power generation facilities...., page 58

12. We note your references to "NYISO" and "ERCOT" on page 58 of your filing. Please ensure that all acronyms and terms are defined when first used. Refer to Rule 421(b) of the Securities Act of 1933, as amended.

USBTC's future success will depend upon the value of Bitcoin, page 67

13. Please tell us why you disclose that USBTC will be marking Bitcoin to fair value each quarter since this policy does not appear consistent with that disclosed on page F-31.

The Business Combination, page 75

14. We note that Hut 8 and USBTC provided certain financial forecasts and projections to the financial advisors and that the financial advisors relied upon these financial projections in preparing their fairness opinions. Please disclose in this section the financial projections

Asher Genoot
Hut 8 Corp.
March 23, 2023
Page 4

and forecasts provided to the financial advisors or explain why such information is not material to security holders.

Fairness Opinion of Stifel GMP, page 82

15. Please revise to quantify the fees Hut 8 paid to Stifel GMP when it rendered its fairness opinion. Also please quantify the fees payable to Stifel GMP contingent on completion of the Business Combination or an alternative transaction. Refer to Item 4(b) of Form S-4 and Item 1015(b)(4) of Regulation M-A.

Accounting Treatment of the Business Combination, page 95

16. Please tell us about the pertinent facts and circumstances you considered in determining the acquirer in the business combination. Refer to ASC 805-10, including ASC 805-10-55-12. Further, you disclose that the preliminary assessment of the accounting acquirer is subject to evaluation and may be impacted by matters such as New Hut board rights related to tie-break votes and the relative fair values of USBTC and Hut 8 at closing. Include a discussion of these matters in your response.

The Business Combination Agreement

Conditions to Completion of the Business Combination, page 114

17. We note your disclosure that certain conditions to the consummation of the business combination may be waived by mutual consent of the Parties. Please specify which, if any, conditions may not be waived by mutual consent of the Parties.

Information About Hut 8, page 125

18. To the extent material, please discuss how the bankruptcies of companies in crypto asset-related businesses and the downstream effects of those bankruptcies have impacted or may impact Hut 8's business, financial condition, customers, and counterparties, either directly or indirectly. Clarify whether Hut 8 has material assets that may not be recovered due to the bankruptcies or may otherwise be lost or misappropriated.
19. To the extent material to an understanding of Hut 8's business, please describe any direct or indirect exposures to other counterparties, customers, custodians, or other participants in crypto asset markets known to:
 - Have filed for bankruptcy, been decreed insolvent or bankrupt, made any assignment for the benefit of creditors, or have had a receiver appointed for them.
 - Have experienced excessive redemptions or suspended redemptions or withdrawals of crypto assets.
 - Have the crypto assets of their customers unaccounted for.
 - Have experienced material corporate compliance failures.
20. To the extent material, please explain whether Hut 8's crypto assets serve as collateral for any loan, margin, rehypothecation, or other similar activities to which Hut 8 or its affiliates are a party. If so, identify and quantify the crypto assets used in these financing

Asher Genoot
Hut 8 Corp.
March 23, 2023
Page 5

arrangements and disclose the nature of Hut 8's relationship for loans with parties other than third-parties. State whether there are any encumbrances on the collateral. Discuss whether the current crypto asset market disruption has affected the value of the underlying collateral. Please include similar disclosure for Hut 8's miners used as collateral.

21. Please revise to address the following:
 - Discuss Hut 8's intentions to mine, invest in or transact in crypto assets other than Bitcoin and update this disclosure in future filings as appropriate;
 - Describe Hut 8's process, if any, for analyzing whether a particular crypto asset that it intends to mine, invest in, or transact in is a "security" within the meaning of Section 2(a)(1) of the Securities Act, including whether and how the recent completion of Ethereum's transition to Proof-of-Stake consensus has impacted its analysis. Disclose that this is a risk-based judgment and does not constitute a legal determination binding on regulators or the courts; and
 - Expand the risk factors section to describe the specific potential consequences to Hut 8 and to investors if it is subsequently determined that Hut 8 has participated in the unregistered issuance or distribution of securities, including the specific risks inherent in its business model that may necessitate corrective measures as a result of judicial or regulatory actions.

22. Refer to your disclosure in your Annual Information Form, which has been filed as Exhibit 99.1 to Hut 8's Annual Report on Form 40-F for the year ended December 31, 2021 and revise to address the following points:
 - On page 11, you disclose that Hut 8 provides cloud services and data centre colocation services to its customers. Please revise to briefly discuss Hut 8's fee structure for providing such services to its customers and include illustrative examples, as appropriate.
 - On page 12, you disclose that Hut 8 has entered into agreements with each of ATCO Electric Ltd., City of Medicine Hat and Validus for the provision of power or use of electricity. Please revise to describe in greater detail the material terms and conditions of these agreements, including, without limitation, the material obligations of the parties, the duration of the agreement and the material termination provisions.
 - On page 13, you state that the primary seasonality that Hut 8 experiences is related to potential changes in electricity prices and that electricity is your largest expense. Please revise to provide a discussion of your average cost of electricity for the periods presented, and whether there are any known trends regarding the fluctuations in the cost of electricity. In addition, consider including a discussion of the differences in the cost of electricity for each of the geographic regions you operate.
 - On page 16, we note the statements in the bottom risk factor that the Commission's views regarding whether a particular crypto asset falls within the definition of a "security" under the U.S. federal securities laws have "evolved over time and it is difficult to predict the direction or timing of any continuing evolution. It is also possible that a change in the governing administration or the appointment of new SEC commissioners could substantially impact the views of the SEC and its staff."

Asher Genoot
Hut 8 Corp.
March 23, 2023
Page 6

Please remove these statements as the legal tests are well-established by U.S. Supreme Court case law and the Commission and staff have issued reports, orders, and statements that provide guidance on when a crypto asset may be a security for purposes of the U.S. federal securities laws.

Information About USBTC, page 129

23. Please revise this section of your filing to address comments 18 through 20 above as they apply to your disclosure concerning USBTC.

Business Overview, page 129

24. Please discuss USBTC's intentions to mine, invest in or transact in crypto assets other than Bitcoin and update this disclosure in future filings as appropriate.
25. You disclose that USBTC owns a 50% interest in the King Mountain JV with a "leading North American energy company." Please identify your joint venture partner.

Reactor: Energy Curtailment, page 130

26. We note your disclosure regarding Reactor, "an advanced, algorithmic energy curtailment platform that USBTC believes will drive significant Bitcoin mining profitability for USBTC." Please provide further detail regarding Reactor, its development, its role in USBTC's current operations and any measurable changes in energy efficiency, profitability or any other relevant metrics that may drive USBTC's results of operations.

Custody Policy, page 132

27. Please revise this section to address the following:
- Provide quantified disclosure regarding the respective portions of USBTC's Bitcoin balance held by each of the third-party custodians referenced.
 - Disclose the material terms of USBTC's arrangement with each third-party custodian, including, for example, in what manner the relevant custodian is required to store USBTC's crypto assets, whether it is contractually required to hold USBTC's crypto assets in cold storage, what security precautions the custodian is required to undertake, what inspection rights USBTC has, and what type of insurance, if any, the custodian is required to have to protect USBTC from loss.

Also please apply this comment to the same or similar disclosures of Hut 8 throughout the filing, as applicable.

28. You disclose that USBTC uses third-party custody solutions to safeguard its bitcoin and "does not currently hold any bitcoin for third parties." Please disclose whether USBTC has any current plans or intentions to hold any crypto assets for third parties in the future.

Asher Genoot
Hut 8 Corp.
March 23, 2023
Page 7

King Mountain JV, page 133

29. Please disclose the material terms of the King Mountain JV Senior Note, including repayment terms, principal events of default, and any security interests that the lenders may hold. Please clarify the nature of USBTC's assumption of the note, including whether the JV partner has also assumed the note.

Anchorage, page 134

30. We note your disclosure that the Refinanced Loan Agreement with Anchorage Lending CA, LLC is “repaid through profits generated from those certain USBTC miners underlying the security interest, as further specified in the Refinanced Loan Agreement...USBTC is not required to make a minimum monthly payment.” Please provide further disclosure regarding USBTC’s repayment obligations, including how profit from the relevant miners is determined, what would occur in the event that the relevant miners were rendered inoperative or generated lower profit than expected, what would constitute a payment default under the agreement and other relevant terms.

Cost of Electricity, page 145

31. On page 146, if material, please disclose the amount of demand response payments netted within your costs of electricity for each period. If not material, separately tell us the amounts netted for each period.

Management’s Discussion and Analysis of Financial Condition and Results of Operations of USBTC

Trends and Key Factors Affecting USBTC's Performance

Halving, page 145

32. Please disclose the steps you are taking to address and/or mitigate the impacts of halving, as well as the potential impact of decreased rewards on revenues and economics of your business model.

Key Operating and Financial Indicators, page 146

33. We note the trends and key factors affecting your performance discussed on page 145. Please include in the table on page 146 quantification of your key indicators for the network hash rate and difficulty, and the number of miners for each period presented to provide context and support trends in your key operating and financial indicators. If material, also disclose the number of miners that were non-operational in those periods.
34. Please balance your tabular disclosure and following narrative disclosures to include, with equal or greater prominence, the most comparable GAAP measure to Adjusted EBITDA. See Item 10(e)(1)(i)(A) of Regulation S-K and Question 102.10(a) of the Compliance and Disclosure Interpretations on Non-GAAP Financial Measures.

Asher Genoot
Hut 8 Corp.
March 23, 2023
Page 8

35. Please revise to include a breakeven analysis for USBTC's mining operations or any other crypto assets that it earns or mines that compares the cost to earn or mine one crypto asset with the value of the crypto asset. Please provide a discussion of how USBTC expects the Business Combination to impact its breakeven analysis in the future. Also please apply this comment to the same or similar disclosures of Hut 8 throughout the filing, as applicable.

Critical Accounting Policies and Significant Estimates, page 148

36. Please revise your disclosure to provide the qualitative and quantitative information necessary to understand the estimation uncertainty and the impact the critical accounting estimates have had or are reasonably likely to have on your financial condition or results of operations to the extent the information is material and reasonably available. In your revised disclosure discuss why each critical accounting estimate is subject to uncertainty and, to the extent the information is material and reasonably available, how much each estimate and/or assumption has changed over a relevant period, and the sensitivity of the reported amount to the methods, assumptions and estimates underlying its calculation. See Item 303(b)(3) of Regulation S-K and Instruction 3 to Item 303(b).

Digital Asset Mining, page 150

37. Please expand your disclosure regarding USBTC's arrangements with mining pool operators to address the following:
- Provide more detailed disclosure regarding each mining pool, including how each pool operates, the transaction fees paid and the amount of reward received from each pool.
 - Disclose the material terms of any service agreements with such providers, including the term and termination provisions thereof.
 - Clarify how USBTC calculates or verifies its proportion of the contributed computing power resulting in the amount of cryptocurrency awarded.

Also please apply this comment to the same or similar disclosures of Hut 8 throughout the filing, as applicable.

38. Please briefly discuss whether USBTC's business strategy is to hold its crypto assets for investment or convert them into fiat currency immediately upon receipt or soon thereafter. Discuss the average period between receipt of USBTC's crypto assets and the subsequent conversion into fiat currency and quantify the fees incurred. Please revise to disclose whether USBTC has a specific policy for how it will determine when to sell crypto assets for fiat currency to fund operations or growth and through what exchange or if USBTC intends to hold its mining rewards for investment purposes. To the extent USBTC has an agreement with a third-party exchange for converting crypto assets to fiat currency, please disclose the material terms and file the agreement as an exhibit or tell us why this is not required by Item 601(b)(10) of Regulation S-K. Also please apply this comment to the same or similar disclosures of Hut 8 throughout the filing, as applicable.

Asher Genoot
Hut 8 Corp.
March 23, 2023
Page 9

Common Stock Valuations, page 152

39. Please provide us your analysis supporting the decline in the fair value of USBTC common stock from \$4.34 per share in March 2022 to \$0.01 per share in August 2022. In your response also tell us why the exercise price of the options granted in August 2022 was reduced from the March 2022 exercise price of \$4.34 per share to only \$1.78 per share if the fair value of common stock at that time was \$0.01 per share.

Results of Operations, page 153

40. Please discuss, including quantitatively where possible, all known trends or uncertainties that have had, or that you reasonably expect will have, a material favorable or unfavorable impact on revenue or results of operations. We note by way of example that USBTC is currently subject to the Niagara Falls Litigation (page 46).

The year ended June 30, 2022 compared to the period from December 4, 2020 (inception) through June 30, 2021, page 156

41. It appears that the \$3.8 million of payments to your officers disclosed in the last two paragraphs on page 162 may be included in the \$5.3 million of cash payments to certain employees and advisors included in your one time cost non-GAAP adjustment. Please confirm whether this is true or not. Regardless, tell us how cash payments to current employees do not represent normal cash operating expenses similar to other cash compensation paid to your employees that should not be removed from non-GAAP performance measures under Question 100.01 of the Compliance and Disclosure Interpretations on Non-GAAP Financial Measures.

Unaudited Pro Forma Condensed Combined Statement of Financial Condition, page 194

42. Please consider revising the title of this section as your pro forma financial information is not limited to a statement of financial condition.
43. Please revise your introductory disclosure to also discuss the debt extinguishment transaction presented in Note 3 as required by Item 11-02(a)(2) of Regulation S-X.
44. Please tell us your consideration for presenting the Note 2 Acquisition Transaction Adjustments before the Note 3 Debt Extinguishment adjustments in your pro forma financial statements and including a subtotal column presenting the proposed business combination to differentiate it from the debt extinguishment.
45. With respect to other transactions or events that have occurred such as the Niagara Falls litigation of USBTC and the shut down of Hut 8's North Bay facility and the associated relocation of miners, please tell us your consideration for presenting Management's Adjustments under Item 11-02(a)(7) of Regulation S-X. In your response tell us whether the inclusion of pro forma adjustments for these events would enhance an understanding of the pro forma effects of your proposed transaction since we note these transactions

Asher Genoot
Hut 8 Corp.
March 23, 2023
Page 10

are not included or discussed. If so, revise your presentation to provide Management's Adjustments or tell us why they are not warranted. If not, tell us why they would not enhance such an understanding.

Unaudited Pro Forma Combined Statement of Operations, page 196

46. Please revise pages 196 and 197 to present historical basic and diluted per share amounts and the number of shares used to calculate such per share amounts on the face of the pro forma condensed statement of operations. Refer to Item 11-02(a)(9)(i) of Regulation S-X.

Note 1. Basis of Presentation, page 198

47. You disclose that New Hut elected not to present Autonomous Entity Adjustments. We note that under Item 11-02(a)(6) of Regulation S-X, you must include adjustments that depict the registrant as an autonomous entity if the conditions in Item 11-01(a)(7) are met (i.e., the registrant previously was a part of another entity and such presentation is necessary to reflect operations and financial position of the registrant as an autonomous entity). As the presentation of Autonomous Entity Adjustments is not optional, please revise your disclosure to remove the indication that you elected not to provide them.

Note 2. Business Combination Transaction Adjustments, page 199

48. In the introduction to the table in pro forma adjustment a) you disclose that you determined the purchase using the share price as of February 10, 2023, but in the table you disclose that the price is as of February 6, 2022. Please revise.
49. Please disclose in more detail how you determined the adjustment to depreciation and amortization expenses. For example, explain how you changed the method of depreciation and/or useful lives of the assets.
50. Please tell us how your pro forma statement of financial position presents current and deferred income taxes. In your response explain why there are no apparent pro forma adjustments for income taxes and reference for us the authoritative literature you rely upon to support your position.

Note 3. Adjustment for USBTC debt extinguishment, page 201

51. Please explain to us why the pro forma footnotes do not include any impact to your revenues and related costs given that you exchanged miners with the finance company. Refer to Item 11-02(a)(11)(i) of Regulation S-X. Please also disclose the number of miners exchanged.

Asher Genoot
Hut 8 Corp.
March 23, 2023
Page 11

Note 4. Adjustments for the effect of reclassifications, foreign exchange and IFRS / U.S. GAAP differences for Hut 8, page 201

52. We note that the tables all state that the amounts are in thousands of U.S. dollars. It appears that only the amounts in the last column of the tables are in U.S. dollars and the other columns are in Canadian dollars. If true, please revise to clarify.
53. Please disclose the basis for the conversion from Canadian dollars to U.S. dollars.
54. For U.S. GAAP purposes, you classify Hut 8's cryptocurrency in current assets. Please tell us how your classification of cryptocurrencies as current assets is consistent with the definition of current assets in ASC 210-10-20.
55. We note that you made a U.S. GAAP adjustment to reverse the impact of applying the revaluation model for cryptocurrency under IFRS as the revaluation model is prohibited under U.S. GAAP and any impairment losses recognized cannot be subsequently reversed. With respect to the accounting for impairment under U.S. GAAP please address the following and reference for us the authoritative literature you rely upon to support your accounting:
 - Briefly disclose Hut 8's accounting policy for impairment of cryptocurrency under U.S. GAAP.
 - Disclose the timing of the assessment. Tell us whether you considered using the lowest intraday amount. Refer to ASC 350-30-35-18B.
 - Tell us the market(s) you use to determine the quoted price used to assess impairment for Hut 8's cryptocurrency holdings.
 - Tell us how you identified the principal markets. Explain to us the process you undertook to evaluate the various exchanges on which Hut 8 trades and how this process and ultimate conclusion conforms to the guidance in ASC Topic 820 and ASC 820-10-35-5A.
56. We note that you reflect no U.S. GAAP adjustments to the Hut 8 financial statements for the recognition of revenue. Please provide us with a thorough accounting analysis, including what literature applies to these arrangements (e.g., ASC 842, ASC 606, ASC 460, etc.). To the extent ASC 606 is the applicable guidance, please ensure your analysis describes, in appropriate detail, your application of the five steps in ASC 606 and cites the authoritative literature supporting that application. Also ensure your analysis highlights significant accounting judgments you made and the alternatives, if any, that you considered and rejected. In your response, specifically address the following for Hut 8's self-mining:
 - Provide us a representative sample of the contracts with Hut 8's customers for self-mining.
 - Substantiate how the provision of computing power to the mining pool is Hut 8's sole performance obligation.
 - Tell us the types of cryptocurrencies mined by Hut 8 (for example, bitcoin, ethereum, etc.).

Asher Genoot
Hut 8 Corp.
March 23, 2023
Page 12

- Tell us whether there are any penalties for contract termination by either party. Tell us what happens if Hut 8 cancels midterm. Also explain whether Hut 8 can withdraw computing power midterm and reinstitute it later that same day.
 - Tell us how you determine contract inception.
 - Tell us the payment terms for cryptocurrencies earned from the mining pool operator, including identifying the form of consideration (including the type of cryptocurrency), how the amount of consideration is determined, and when Hut 8 is paid.
 - Explain the timing of when Hut 8 measures the value of any non-cash consideration under ASC 606-10-32-21.
 - Explain the application of any variable consideration constraints.
 - Tell us the market used to value the non-cash consideration and how it was determined. Explain to us whether this is your principal market.
57. Please tell us why there is no income tax impact of GAAP adjustments on the historical statement of operations for Hut 8 for the three months ended September 30, 2022 and no apparent US GAAP income tax adjustments on the historical statement of financial condition at September 30, 2022.
58. Regarding adjustment 4(c), please tell us why there is no warrant liability under US GAAP at either the Hut 8 level or at the combined pro forma level. In your response specifically clarify whether the warrants are exercisable in Canadian dollars or U.S. dollars and the impact this has on your classification at either the Hut 8 or combined pro forma level.

Financial Statements of USBTC

Note 3. Basis of Presentation, Summary of Significant Accounting Policies and Recent Accounting Pronouncements

Revenue Recognition

Cryptocurrency mining, page F-9

59. Please address the following related to your cryptocurrency mining revenue recognition. In your response, where appropriate, reference for us the authoritative literature you rely upon to support your accounting:
- Provide us with the contracts you have with each of your mining pool operators.
 - Tell us specifically how you determine contract inception for each mining pool contract.
 - Tell us the payment terms from each mining pool operator. Explain to us the method you use to estimate variable consideration in your arrangements and how you apply the variable consideration constraint in ASC 606-10-32-11 through 32-13. Also describe for us the agreed-upon calculation that measures the bitcoin that could have been mined with your contributed hashrate.
 - In your disclosure, clarify whether just the transaction fee or all of the consideration received for your mining pool activities is variable and whether it is constrained.

Asher Genoot
Hut 8 Corp.
March 23, 2023
Page 13

- You disclose that you measure consideration received at fair value by using the quoted price of the related cryptocurrency at contract inception and you also disclose that you value the non-cash consideration at fair value when notified of the earnings. Please reconcile and revise as necessary and tell us how you considered ASC 606-10-32-21 which requires noncash consideration to be measured at contract inception.
 - Tell us why it is appropriate to deduct operating fees to the mining pool operator from revenue. Clarify whether the single amount (i.e., the net fees received) represents the transaction price paid to you in satisfaction of your performance obligation to the pool operator and if the amounts retained by the pool operator relate to the activities it must undertake to fulfill its contract with you.
 - Tell us your accounting for the receivables denominated in cryptocurrencies.
60. You disclose that your enforceable right to compensation only begins when you provide computing power to the mining pool operator, and exists in any period that you provide computing power (hourly or daily period depending on the mining pool operator). Please address how this disclosure reconciles with your determination of the timing of contract inception. In circumstances when you are not performing at the beginning of each hour / day but commence performance at some point within the hour / day, please clarify for us when contract inception occurs. Refer, for example, to ASC 606-10-25-4. Similarly, if you start and stop performing more than one time within an hour / day, tell us what constitutes contract inception and how many contracts you have during that hour. Further, if you provide continuous performance across more than one hour / day, tell us what constitutes contract inception and contract duration and the reasons why. Please cite the relevant ASC 606 guidance that supports your determination.

Hosting services, page F-10

61. Please tell us the material rights and obligations of the parties to your hosting transactions. Provide us with a thorough accounting analysis, including what literature applies to these arrangements (e.g., ASC 842, ASC 606, ASC 460, etc.). To the extent ASC 606 is the applicable guidance, please ensure your analysis describes, in appropriate detail, your application of the five steps in ASC 606 and cites the authoritative literature supporting that application. Also ensure your analysis highlights significant accounting judgments you made and the alternatives, if any, that you considered and rejected.

Mining equipment sales, page F-11

62. Please tell us the material rights and obligations of the parties to your mining equipment transactions. Provide us with a thorough accounting analysis, including what literature applies to these arrangements (e.g., ASC 842, ASC 606, ASC 460, etc.). To the extent ASC 606 is the applicable guidance, please ensure your analysis describes, in appropriate detail, your application of the five steps in ASC 606 and cites the authoritative literature supporting that application. Also ensure your analysis highlights significant accounting judgments you made and the alternatives, if any, that you considered and rejected.

Asher Genoot
Hut 8 Corp.
March 23, 2023
Page 14

63. Please tell us why you do not have mining equipment inventory on your balance sheet. Tell us the nature of the mining equipment you sell and how and when you obtain the equipment for sale. Tell us how a customer takes possession or control of the equipment and describe any obligation you have to dispose of the mining equipment. Also tell us whether your mining equipment sales include any other performance obligations, such as hosting services.

Note 15. Subsequent Events

Acquisition, page F-19

64. You disclose that on December 6, 2022, you acquired a 50% membership interest in a joint venture. Please tell us about your analysis in determining whether you are required to provide audited financial statements and pro forma financial information for this acquisition. Refer to Rule 3-05 and Article 11 of Regulation S-X.

Strategic Operator Agreements, page F-19

65. Please address the following related to your strategic operator agreements. In your response, where appropriate, reference for us the authoritative literature you rely upon to support your accounting:
- Tell us the significant terms of your strategic operator agreements, including payment terms.
 - Tell us your revenue recognition accounting policy for the strategic operator agreements.
 - Tell us how you measure progress toward satisfaction of the performance obligation.
 - Tell us how you determine the transaction price, including estimating variable consideration and assessing whether an estimate of variable consideration is constrained.

Consolidated Statements of Operations, page F-24

66. Please state separately the amount of costs of revenues for tangible goods sold and services. Refer to Item 5-03(b)(2) of Regulation S-X.

Consolidated Statements of Cash Flows, page F-26

67. Please tell us why it is appropriate to classify the proceeds from the sale of cryptocurrencies as an operating activity and reference for us the authoritative literature you rely upon to support your accounting. In your response, tell us how long you hold cryptocurrencies before selling them for cash. Provide us the general time frame you hold these cryptocurrencies including the average time you hold them as well as the shortest and longest time periods you have held cryptocurrencies before sale.

Asher Genoot
Hut 8 Corp.
March 23, 2023
Page 15

Note 3. Basis of Presentation, Summary of Significant Accounting Policies and Recent Accounting Pronouncements
Cryptocurrency, net, page F-31

68. You classify your cryptocurrency (bitcoin) in current assets. Please tell us how your classification of cryptocurrencies as current assets is consistent with the definition of current assets in ASC 210-10-20.
69. You disclose that you perform a quantitative impairment test daily, determining the fair value of your cryptocurrency by using the quoted price as determined by your principal market. Please address the following and reference for us the authoritative literature you rely upon to support your accounting:
- Tell us the market(s) you use to determine the quoted price used to assess impairment for your cryptocurrency holdings.
 - Tell us how you identify the principal market. Explain to us the process you undertook to evaluate the various exchanges on which you trade and how this process and ultimate conclusion conforms to the guidance in ASC Topic 820 in general and specifically in ASC 820-10-35-5A.
 - Disclose the timing of the quoted price used in your assessment. Tell us whether you considered using the lowest intraday amount. Refer to ASC 350-30-35-18B.
 - Explain how you apply the qualitative assessment given the existence of a quoted price on apparently active markets.

Stock-based compensation, page F-34

70. Please revise your policy disclosure to clarify how/when you record compensation for awards with market conditions versus those with performance conditions.

Note 5. Cryptocurrency, page F-36

71. Please revise your rollforward of cryptocurrencies to remove the proceeds from sale and realized gains/losses on crypto currencies and replace them with the carrying value of the cryptocurrencies sold. Provide sufficient supplementary disclosure below the reconciliation to relate the carrying value of cryptocurrencies sold to the realized gains/losses on cryptocurrencies sold on your statements of operations. In this regard, we note that the sale proceeds themselves does not impact the cryptocurrencies account balance on your general ledger. Furthermore, tell us why the "proceeds from the sale of cryptocurrency in accounts receivable" is a line item in your rollforward if it does not represent carrying value and/or was not included in the beginning balance of cryptocurrencies.

Asher Genoot
Hut 8 Corp.
March 23, 2023
Page 16

Exhibits

72. Please revise to disclose the material terms of the lease agreement between U.S. Data Technologies Group Ltd. and 2747 Buffalo Avenue, LLC filed as Exhibit 10.12 to the registration statement.
73. The fairness opinion provided by Stifel GMP filed as Exhibit 99.1 indicates that it is provided to the Board of Directors of Hut 8 for "its exclusive use only...and may not be used or relied upon by any other person...without [Stifel GMP's] prior written consent." Please also refer to similar language contained in the fairness opinion provided by Kroll, LLC filed as Exhibit 99.2. Please remove this limitation on reliance as it is inconsistent with the disclosure relating to the fairness opinions.
74. Please tell us what consideration you have given to filing the following documents as exhibits to the registration statement:
 - any agreements that memorialize USBTC's joint venture arrangements in connection with its 50% ownership interest in the King Mountain JV, as discussed on page 133; and
 - the property management agreements that USBTC has entered into with the owners of Charlie, Delta, and Echo, respectively, as discussed on pages 44 and 133.

Please refer to Item 601(b)(10) of Regulation S-K.

75. Please ensure each exhibit is in the proper text-searchable format. See Rules 301 and 304 of Regulation S-T. For example, we note Exhibits 10.6 through 10.8 and 10.12 are not in text-searchable format.

Asher Genoot
Hut 8 Corp.
March 23, 2023
Page 17

We remind you that the company and its management are responsible for the accuracy and adequacy of their disclosures, notwithstanding any review, comments, action or absence of action by the staff.

Refer to Rules 460 and 461 regarding requests for acceleration. Please allow adequate time for us to review any amendment prior to the requested effective date of the registration statement.

You may contact Kate Tillan at 202-551-3604 or Mark Brunhofer at 202-551-3638 if you have questions regarding comments on the financial statements and related matters. Please contact Christopher Wall at 202-551-4162 or David Lin at 202-551-3552 with any other questions.

Sincerely,

Division of Corporation Finance
Office of Crypto Assets

To: mlyons@wsgr.com[mlyons@wsgr.com]

From: CF Office of Crypto Assets

Sent: 2023-06-12T14:19:41Z

Subject: SEC Comment Letter: Bakkt Holdings, Inc. S-3

Received: 2023-06-12T14:19:41Z

[Bakkt Holdings, Inc. S-3 Letter.pdf](#)

Do not respond to this email address since we do not monitor it for incoming emails.

The Securities and Exchange Commission’s Division of Corporation Finance has attached to this email a letter relating to an SEC filing.

If you have any questions regarding this letter, please contact one of the staff members identified in it.

Division of Corporation Finance
U.S. Securities & Exchange Commission
100 F Street, NE
Washington, D.C. 20549
www.sec.gov



DIVISION OF
CORPORATION FINANCE

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

June 12, 2023

Gavin Michael
Chief Executive Officer
Bakkt Holdings, Inc.
10000 Avalon Boulevard, Suite 1000
Alpharetta, Georgia 30009

Re: Bakkt Holdings, Inc.
Registration Statement on Form S-3
Filed April 21, 2023
File No. 333-271362

Dear Gavin Michael:

We have limited our review of your registration statement to those issues we have addressed in our comments. In some of our comments, we may ask you to provide us with information so we may better understand your disclosure.

Please respond to this letter by amending your registration statement and providing the requested information. If you do not believe our comments apply to your facts and circumstances or do not believe an amendment is appropriate, please tell us why in your response.

After reviewing any amendment to your registration statement and the information you provide in response to these comments, we may have additional comments.

Registration Statement on Form S-3

General

1. Please confirm that you will include in future Exchange Act filings all applicable disclosures you include, or will include, in your Form S-3 in response to our comments.
2. Please provide disclosure of any significant crypto asset market developments material to understanding or assessing your business, financial condition and results of operations, or share price since your last reporting period, including any material impact from the price volatility of crypto assets.
3. We note your April 3, 2023 Form 8-K disclosing the completion of your acquisition of Apex Crypto LLC and your disclosure on pages 8 - 9 of your Form 10-K for the year ended December 31, 2022 regarding your belief that the Apex acquisition will enable you

Gavin Michael
Bakkt Holdings, Inc.
June 12, 2023
Page 2

to provide new and expanded crypto capabilities to your platform, including, among others, the addition of over 30 coins to your platform. Please substantially revise your disclosure throughout the Form S-3 filing, including the prospectus summary and risk factors sections, to include a materially complete discussion of the Apex platform. As examples only, please revise your disclosure to address the following:

- Please disclose in greater detail the new and expanded crypto capabilities that the Apex acquisition will enable you to provide, as referenced in Exhibit 99.2 to your November 10, 2022 Form 8-K filing, including, without limitation, the NFT order management system, deposits and withdrawals, advanced order types, staking capabilities and access to additional liquidity providers. Also please expand your disclosure to discuss how the Apex acquisition provides you access to new clients through Apex Fintech Solution's client network, including the "30+ signed fintech partners" referenced therein. Disclose the material terms of: (i) any agreements, arrangements or understandings with such fintech partners, including any term and termination provisions thereof, and (ii) your commercial agreement with Apex Fintech Solutions, including the contingent earnout targets thereof.
- It appears based on recent news articles that you have decided to delist the majority of tokens listed on the Apex trading platform. Please include a recent developments section addressing such decision and the potential impact on the company, including why you are delisting those crypto assets. For example purposes only, please disclose if this is pursuant to policies and procedures or based on other rationale. Please revise your disclosure accordingly throughout the registration statement, including your risk factor section, to the extent material.
- Specifically identify the crypto assets you facilitate transactions in, as well as those for which you have plans to facilitate transactions in. In addition, please identify any and all crypto asset services that you offer and intend to offer for each crypto asset. Consider using a table or chart to list these various crypto assets and corresponding services, as applicable.
- Please describe your policies and procedures, if any, for analyzing whether a particular crypto asset that you intend to make available on the your platform is a "security" within the meaning of Section 2(a)(1) of the Securities Act and disclose that this is a risk-based judgment and does not constitute a legal determination binding on regulators or the courts. Disclose whether and how the recent completion of Ethereum's transition to Proof-of-Stake consensus has impacted your analysis, if any, of whether a particular crypto asset that you make available on the platform is a "security" within the meaning of Section 2(a)(1) of the Securities Act.
- Expand your risk factors to describe (i) the regulatory risks associated with any such policies and procedures for determining the characterization of crypto assets and (ii) the risks attendant to your plans to expand your platform's capabilities to include additional types of crypto assets.

Gavin Michael
Bakkt Holdings, Inc.
June 12, 2023
Page 3

Prospectus Summary

Overview, page 1

4. We note your disclosure that you are in the process of enabling clients to offer crypto asset rewards to their customers. We also note your disclosure that you are in the process of enabling customers to automatically invest a portion of payments into crypto assets. Please revise your disclosure to include a discussion of the development and status of these programs, and, to the extent known, please revise to discuss the material terms and features of these programs.

Risk Factors, page 3

5. We note your risk factor disclosure starting on page 15 of your Form 10-K for the year ended December 31, 2022. Please expand your risk factor disclosure to address the following:
- Describe any material risk to you, either direct or indirect, due to excessive redemptions, withdrawals, or a suspension of redemptions or withdrawals, of crypto assets. Identify any material concentrations of risk and quantify any material exposures.
 - To the extent material, discuss any reputational harm you may face in light of the recent disruption in the crypto asset markets. For example, discuss how market conditions have affected how your business is perceived by customers, counterparties, and regulators, and whether there is a material impact on your operations or financial condition.
 - Please expand your risk factor disclosure on page 34 to describe any material risks to your business from the possibility of regulatory developments related to crypto assets and crypto asset markets. Identify material pending crypto legislation or regulation and describe any material effects it may have on your business, financial condition, and results of operations.
 - Describe any material risks you face related to the assertion of jurisdiction by U.S. and foreign regulators and other government entities over crypto assets and crypto asset markets. Additionally, noting your risk factor disclosure on page 33 regarding your plans to expand your business activities, both as to the products and services offered and into jurisdictions beyond the United States, please disclose the material risks related to unauthorized or impermissible customer access to your products and services outside of United States. Describe the potential impact to your business of administrative sanctions, including fines, or legal claims based upon the laws of such other jurisdictions.
 - To the extent material, describe any gaps your board or management have identified with respect to risk management processes and policies in light of current crypto asset market conditions as well as any changes they have made to address those gaps.
 - To the extent material, please describe any of the following risks due to disruptions in the crypto asset markets: (i) risk from depreciation in your stock price, (ii) risk of loss

Gavin Michael
Bakkt Holdings, Inc.
June 12, 2023
Page 4

of customer demand for your products and services, (iii) financing risk, including equity and debt financing, (iv) risk of increased losses or impairments in your investments or other assets, (v) risks of legal proceedings and government investigations, pending or known to be threatened, in the United States or in other jurisdictions against you or your affiliates, or (vi) risks from price declines or price volatility of crypto assets.

6. We note your risk factor captioned "A crypto's status as a 'security' in any relevant jurisdiction is subject to a high degree of uncertainty..." on page 36 of your Form 10-K for the fiscal year ended December 31, 2022. Please expand your risk factor disclosure to highlight the risk that your trading platform may be operating as an unregistered exchange, unregistered broker-dealer or unregistered clearing agency, and discuss the potential consequences associated with those risks. In this regard, we note your disclosure on page 8 regarding your belief that Apex will accelerate your product road map by providing new capabilities to your platform, including the addition of crypto assets thereto.
7. We note the statements on page 36 of your Form 10-K for the fiscal year ended December 31, 2022 that the legal test for determining whether any given asset is a security is a highly complex, fact-driven analysis that "evolves over time," that "[i]t is also possible that a change in the governing administration or the appointment of new SEC commissioners could substantially impact the views of the SEC and its staff" and "[f]urthermore, it is difficult to predict the direction or timing of any continuing evolution of the SEC's views with regard to crypto." Please remove these statements as the legal tests are well-established by U.S. Supreme Court case law and the Commission and staff have issued reports, orders, and statements that provide guidance on when a crypto asset may be a security for purposes of the U.S. federal securities laws.
8. We note the statements in the risk factor on page 36 of your Form 10-K for the fiscal year ended December 31, 2022 that:
 - "The SEC generally has not provided advance guidance or confirmation on the status of any particular cryptoasset as a security;"
 - Bitcoin and Ether in their current forms "are the only cryptoassets as to which senior officials at the SEC have publicly expressed...a view;" and
 - "With respect to all other cryptoassets, there is currently no certainty under the existing securities laws to determine that such assets are not securities."

Please remove or revise these statements in light of the fact that the Commission has identified numerous crypto assets as securities, the legal tests are well-established by U.S. Supreme Court case law, and the Commission and staff have issued reports, orders and statements that provide guidance on when a crypto asset may be a security for purposes of the U.S. federal securities laws.

Gavin Michael
Bakkt Holdings, Inc.
June 12, 2023
Page 5

Incorporation By Reference, page 10

9. We note your disclosure in the Business section of your Form 10-K for the year ended December 31, 2022, which is incorporated by reference into this registration statement. Please revise your disclosure here and elsewhere as appropriate to address the following:
- To the extent material, please discuss how the bankruptcies of certain crypto asset market participants and the downstream effects of these events have impacted or may impact your business, financial condition, customers, and counterparties, either directly or indirectly. Clarify whether you have material assets that may not be recovered due to the bankruptcies or may otherwise be lost or misappropriated.
 - If material to an understanding of your business, describe any direct or indirect exposures to other counterparties, customers, custodians, or other participants in crypto asset markets known to: (i) have filed for bankruptcy, been decreed insolvent or bankrupt, made any assignment for the benefit of creditors, or have had a receiver appointed for them; (ii) have experienced excessive redemptions or suspended redemptions or withdrawals of crypto assets; (iii) have the crypto assets of their customers unaccounted for; or (iv) have experienced material corporate compliance failures.
 - If material to an understanding of your business, please revise to: (i) discuss any steps you take to safeguard your customers' crypto assets and describe any policies and procedures that are in place to prevent self-dealing and other potential conflicts of interest; (ii) describe any policies and procedures you have regarding the commingling of assets, including customer assets, your assets, and those of affiliates or others; (iii) identify what material changes, if any, have been made to your processes in light of the current crypto asset market disruption; and (iv) describe any material risks to your business and financial condition if your policies and procedures surrounding the safeguarding of crypto assets, conflicts of interest, or comingling of assets are not effective.
10. As a related matter, refer to the Management's Discussion and Analysis disclosure in your Form 10-K for the year ended December 31, 2022, and please revise your disclosure here and elsewhere as appropriate to address the following points:
- Disclose whether you have experienced excessive redemptions or withdrawals, or have suspended redemptions or withdrawals, of crypto assets and explain the potential effects on your financial condition and liquidity.
 - We note that you own crypto assets and/or hold crypto assets on behalf of third parties. To the extent material, explain whether these crypto assets serve as collateral for any loan, margin, rehypothecation, or other similar activities to which you or your affiliates are a party. If so, please revise to: (i) identify and quantify the crypto assets used in these financing arrangements; (ii) disclose the nature of your relationship for loans with parties other than third-parties; (iii) state whether there are any encumbrances on the collateral; (iv) discuss whether the current crypto asset market disruption has affected the value of the underlying collateral; and (v) disclose any

Gavin Michael
Bakkt Holdings, Inc.
June 12, 2023
Page 6

material financing, liquidity, or other risks you face related to the impact that the current crypto asset market disruption has had, directly or indirectly, on the value of the crypto assets you use as collateral and/or the value of your crypto assets used by others as collateral.

We remind you that the company and its management are responsible for the accuracy and adequacy of their disclosures, notwithstanding any review, comments, action or absence of action by the staff.

Refer to Rules 460 and 461 regarding requests for acceleration. Please allow adequate time for us to review any amendment prior to the requested effective date of the registration statement.

Please contact David Lin, Staff Attorney, at (202) 551-3552 or Sandra Hunter Berkheimer, Legal Branch Chief, at (202) 551-3758 with any questions.

Sincerely,

Division of Corporation Finance
Office of Crypto Assets

To: mlyons@wsgr.com[mlyons@wsgr.com]
From: CF Office of Crypto Assets
Sent: 2023-06-12T14:22:11Z
Subject: SEC Comment Letter: Bakkt Holdings, Inc. POS AM
Received: 2023-06-12T14:22:11Z
[Bakkt Holdings, Inc. POS AM Letter.pdf](#)

Do not respond to this email address since we do not monitor it for incoming emails.

The Securities and Exchange Commission’s Division of Corporation Finance has attached to this email a letter relating to an SEC filing.

If you have any questions regarding this letter, please contact one of the staff members identified in it.

Division of Corporation Finance
U.S. Securities & Exchange Commission
100 F Street, NE
Washington, D.C. 20549
www.sec.gov



DIVISION OF
CORPORATION FINANCE

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

June 12, 2023

Gavin Michael
Chief Executive Officer
Bakkt Holdings, Inc.
10000 Avalon Boulevard, Suite 1000
Alpharetta, Georgia 30009

Re: Bakkt Holdings, Inc.
Post-Effective Amendment No. 2 to Form S-1 on Form S-3
Filed April 21, 2023
File No. 333-261034

Dear Gavin Michael:

We have reviewed your post-effective amendment and have the following comments. In some of our comments, we may ask you to provide us with information so we may better understand your disclosure.

Please respond to this letter by amending your registration statement and providing the requested information. If you do not believe our comments apply to your facts and circumstances or do not believe an amendment is appropriate, please tell us why in your response.

After reviewing any amendment to your registration statement and the information you provide in response to these comments, we may have additional comments.

Post-Effective Amendment No. 2 to Form S-1 on Form S-3

General

1. Please confirm that you will include in future Exchange Act filings all applicable disclosures you include, or will include, in your next post-effective amendment in response to our comments.
2. Please provide disclosure of any significant crypto asset market developments material to understanding or assessing your business, financial condition and results of operations, or share price since your last reporting period, including any material impact from the price volatility of crypto assets.
3. We note your April 3, 2023 Form 8-K disclosing the completion of your acquisition of Apex Crypto LLC and your disclosure on pages 8 - 9 of your Form 10-K for the year

Gavin Michael
Bakkt Holdings, Inc.
June 12, 2023
Page 2

ended December 31, 2022 regarding your belief that the Apex acquisition will enable you to provide new and expanded crypto capabilities to your platform, including, among others, the addition of over 30 coins to your platform. Please substantially revise your disclosure throughout the post-effective amendment, including the prospectus summary and risk factors sections, to include a materially complete discussion of the Apex platform. As examples only, please revise your disclosure to address the following:

- Please disclose in greater detail the new and expanded crypto capabilities that the Apex acquisition will enable you to provide, as referenced in Exhibit 99.2 to your November 10, 2022 Form 8-K filing, including, without limitation, the NFT order management system, deposits and withdrawals, advanced order types, staking capabilities and access to additional liquidity providers. Also please expand your disclosure to discuss how the Apex acquisition provides you access to new clients through Apex Fintech Solution's client network, including the "30+ signed fintech partners" referenced therein. Disclose the material terms of: (i) any agreements, arrangements or understandings with such fintech partners, including any term and termination provisions thereof, and (ii) your commercial agreement with Apex Fintech Solutions, including the contingent earnout targets thereof.
- It appears based on recent news articles that you have decided to delist the majority of tokens listed on the Apex trading platform. Please include a recent developments section addressing such decision and the potential impact on the company, including why you are delisting those crypto assets. For example purposes only, please disclose if this is pursuant to policies and procedures or based on other rationale. Please revise your disclosure accordingly throughout the registration statement, including your risk factor section, to the extent material.
- Specifically identify the crypto assets you facilitate transactions in, as well as those for which you have plans to facilitate transactions in. In addition, please identify any and all crypto asset services that you offer and intend to offer for each crypto asset. Consider using a table or chart to list these various crypto assets and corresponding services, as applicable.
- Please describe your policies and procedures, if any, for analyzing whether a particular crypto asset that you intend to make available on the your platform is a "security" within the meaning of Section 2(a)(1) of the Securities Act and disclose that this is a risk-based judgment and does not constitute a legal determination binding on regulators or the courts. Disclose whether and how the recent completion of Ethereum's transition to Proof-of-Stake consensus has impacted your analysis, if any, of whether a particular crypto asset that you make available on the platform is a "security" within the meaning of Section 2(a)(1) of the Securities Act.
- Expand your risk factors to describe (i) the regulatory risks associated with any such policies and procedures for determining the characterization of crypto assets and (ii) the risks attendant to your plans to expand your platform's capabilities to include additional types of crypto assets.

Gavin Michael
Bakkt Holdings, Inc.
June 12, 2023
Page 3

Prospectus Summary

Overview, page 3

4. We note your disclosure that you are in the process of enabling clients to offer crypto asset rewards to their customers. We also note your disclosure that you are in the process of enabling customers to automatically invest a portion of payments into crypto assets. Please revise your disclosure to include a discussion of the development and status of these programs, and, to the extent known, please revise to discuss the material terms and features of these programs.

Risk Factors, page 6

5. We note your risk factor disclosure starting on page 15 of your Form 10-K for the year ended December 31, 2022. Please expand your risk factor disclosure to address the following:
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Gavin Michael
Bakkt Holdings, Inc.
June 12, 2023
Page 4

of customer demand for your products and services, (iii) financing risk, including equity and debt financing, (iv) risk of increased losses or impairments in your investments or other assets, (v) risks of legal proceedings and government investigations, pending or known to be threatened, in the United States or in other jurisdictions against you or your affiliates, or (vi) risks from price declines or price volatility of crypto assets.

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 - "The SEC generally has not provided advance guidance or confirmation on the status of any particular cryptoasset as a security;"
 - Bitcoin and Ether in their current forms "are the only cryptoassets as to which senior officials at the SEC have publicly expressed...a view;" and
 - "With respect to all other cryptoassets, there is currently no certainty under the existing securities laws to determine that such assets are not securities."

Please remove or revise these statements in light of the fact that the Commission has identified numerous crypto assets as securities, the legal tests are well-established by U.S. Supreme Court case law, and the Commission and staff have issued reports, orders and statements that provide guidance on when a crypto asset may be a security for purposes of the U.S. federal securities laws.

Gavin Michael
Bakkt Holdings, Inc.
June 12, 2023
Page 5

Incorporation By Reference, page 20

9. We note your disclosure in the Business section of your Form 10-K for the year ended December 31, 2022, which is incorporated by reference into this registration statement. Please revise your disclosure here and elsewhere as appropriate to address the following:
- To the extent material, please discuss how the bankruptcies of certain crypto asset market participants and the downstream effects of these events have impacted or may impact your business, financial condition, customers, and counterparties, either directly or indirectly. Clarify whether you have material assets that may not be recovered due to the bankruptcies or may otherwise be lost or misappropriated.
 - If material to an understanding of your business, describe any direct or indirect exposures to other counterparties, customers, custodians, or other participants in crypto asset markets known to: (i) have filed for bankruptcy, been decreed insolvent or bankrupt, made any assignment for the benefit of creditors, or have had a receiver appointed for them; (ii) have experienced excessive redemptions or suspended redemptions or withdrawals of crypto assets; (iii) have the crypto assets of their customers unaccounted for; or (iv) have experienced material corporate compliance failures.
 - If material to an understanding of your business, please revise to: (i) discuss any steps you take to safeguard your customers' crypto assets and describe any policies and procedures that are in place to prevent self-dealing and other potential conflicts of interest; (ii) describe any policies and procedures you have regarding the commingling of assets, including customer assets, your assets, and those of affiliates or others; (iii) identify what material changes, if any, have been made to your processes in light of the current crypto asset market disruption; and (iv) describe any material risks to your business and financial condition if your policies and procedures surrounding the safeguarding of crypto assets, conflicts of interest, or comingling of assets are not effective.
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Gavin Michael
Bakkt Holdings, Inc.
June 12, 2023
Page 6

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We remind you that the company and its management are responsible for the accuracy and adequacy of their disclosures, notwithstanding any review, comments, action or absence of action by the staff.

Please contact David Lin, Staff Attorney, at (202) 551-3552 or Sandra Hunter Berkheimer, Legal Branch Chief, at (202) 551-3758 with any questions.

Sincerely,

Division of Corporation Finance
Office of Crypto Assets

To: marc.dannunzio@bakkt.com[marc.dannunzio@bakkt.com]
From: CF Office of Crypto Assets
Sent: 2023-06-12T14:22:10Z
Subject: SEC Comment Letter: Bakkt Holdings, Inc. POS AM
Received: 2023-06-12T14:22:10Z
[Bakkt Holdings, Inc. POS AM Letter.pdf](#)

Do not respond to this email address since we do not monitor it for incoming emails.

The Securities and Exchange Commission’s Division of Corporation Finance has attached to this email a letter relating to an SEC filing.

If you have any questions regarding this letter, please contact one of the staff members identified in it.

Division of Corporation Finance
U.S. Securities & Exchange Commission
100 F Street, NE
Washington, D.C. 20549
www.sec.gov



DIVISION OF
CORPORATION FINANCE

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

June 12, 2023

Gavin Michael
Chief Executive Officer
Bakkt Holdings, Inc.
10000 Avalon Boulevard, Suite 1000
Alpharetta, Georgia 30009

Re: Bakkt Holdings, Inc.
Post-Effective Amendment No. 2 to Form S-1 on Form S-3
Filed April 21, 2023
File No. 333-261034

Dear Gavin Michael:

We have reviewed your post-effective amendment and have the following comments. In some of our comments, we may ask you to provide us with information so we may better understand your disclosure.

Please respond to this letter by amending your registration statement and providing the requested information. If you do not believe our comments apply to your facts and circumstances or do not believe an amendment is appropriate, please tell us why in your response.

After reviewing any amendment to your registration statement and the information you provide in response to these comments, we may have additional comments.

Post-Effective Amendment No. 2 to Form S-1 on Form S-3

General

1. Please confirm that you will include in future Exchange Act filings all applicable disclosures you include, or will include, in your next post-effective amendment in response to our comments.
2. Please provide disclosure of any significant crypto asset market developments material to understanding or assessing your business, financial condition and results of operations, or share price since your last reporting period, including any material impact from the price volatility of crypto assets.
3. We note your April 3, 2023 Form 8-K disclosing the completion of your acquisition of Apex Crypto LLC and your disclosure on pages 8 - 9 of your Form 10-K for the year

Gavin Michael
Bakkt Holdings, Inc.
June 12, 2023
Page 2

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- Please describe your policies and procedures, if any, for analyzing whether a particular crypto asset that you intend to make available on the your platform is a "security" within the meaning of Section 2(a)(1) of the Securities Act and disclose that this is a risk-based judgment and does not constitute a legal determination binding on regulators or the courts. Disclose whether and how the recent completion of Ethereum's transition to Proof-of-Stake consensus has impacted your analysis, if any, of whether a particular crypto asset that you make available on the platform is a "security" within the meaning of Section 2(a)(1) of the Securities Act.
- Expand your risk factors to describe (i) the regulatory risks associated with any such policies and procedures for determining the characterization of crypto assets and (ii) the risks attendant to your plans to expand your platform's capabilities to include additional types of crypto assets.

Gavin Michael
Bakkt Holdings, Inc.
June 12, 2023
Page 3

Prospectus Summary

Overview, page 3

4. We note your disclosure that you are in the process of enabling clients to offer crypto asset rewards to their customers. We also note your disclosure that you are in the process of enabling customers to automatically invest a portion of payments into crypto assets. Please revise your disclosure to include a discussion of the development and status of these programs, and, to the extent known, please revise to discuss the material terms and features of these programs.

Risk Factors, page 6

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 - To the extent material, describe any gaps your board or management have identified with respect to risk management processes and policies in light of current crypto asset market conditions as well as any changes they have made to address those gaps.
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Gavin Michael
Bakkt Holdings, Inc.
June 12, 2023
Page 4

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6. We note your risk factor captioned "A crypto's status as a 'security' in any relevant jurisdiction is subject to a high degree of uncertainty..." on page 36 of your Form 10-K for the fiscal year ended December 31, 2022. Please expand your risk factor disclosure to highlight the risk that your trading platform may be operating as an unregistered exchange, unregistered broker-dealer or unregistered clearing agency, and discuss the potential consequences associated with those risks. In this regard, we note your disclosure on page 8 regarding your belief that Apex will accelerate your product road map by providing new capabilities to your platform, including the addition of crypto assets thereto.
7. We note the statements on page 36 of your Form 10-K for the fiscal year ended December 31, 2022 that the legal test for determining whether any given asset is a security is a highly complex, fact-driven analysis that "evolves over time," that "[i]t is also possible that a change in the governing administration or the appointment of new SEC commissioners could substantially impact the views of the SEC and its staff" and "[f]urthermore, it is difficult to predict the direction or timing of any continuing evolution of the SEC's views with regard to crypto." Please remove these statements as the legal tests are well-established by U.S. Supreme Court case law and the Commission and staff have issued reports, orders, and statements that provide guidance on when a crypto asset may be a security for purposes of the U.S. federal securities laws.
8. We note the statements in the risk factor on page 36 of your Form 10-K for the fiscal year ended December 31, 2022 that:
 - "The SEC generally has not provided advance guidance or confirmation on the status of any particular cryptoasset as a security;"
 - Bitcoin and Ether in their current forms "are the only cryptoassets as to which senior officials at the SEC have publicly expressed...a view;" and
 - "With respect to all other cryptoassets, there is currently no certainty under the existing securities laws to determine that such assets are not securities."

Please remove or revise these statements in light of the fact that the Commission has identified numerous crypto assets as securities, the legal tests are well-established by U.S. Supreme Court case law, and the Commission and staff have issued reports, orders and statements that provide guidance on when a crypto asset may be a security for purposes of the U.S. federal securities laws.

Gavin Michael
Bakkt Holdings, Inc.
June 12, 2023
Page 5

Incorporation By Reference, page 20

9. We note your disclosure in the Business section of your Form 10-K for the year ended December 31, 2022, which is incorporated by reference into this registration statement. Please revise your disclosure here and elsewhere as appropriate to address the following:
- To the extent material, please discuss how the bankruptcies of certain crypto asset market participants and the downstream effects of these events have impacted or may impact your business, financial condition, customers, and counterparties, either directly or indirectly. Clarify whether you have material assets that may not be recovered due to the bankruptcies or may otherwise be lost or misappropriated.
 - If material to an understanding of your business, describe any direct or indirect exposures to other counterparties, customers, custodians, or other participants in crypto asset markets known to: (i) have filed for bankruptcy, been decreed insolvent or bankrupt, made any assignment for the benefit of creditors, or have had a receiver appointed for them; (ii) have experienced excessive redemptions or suspended redemptions or withdrawals of crypto assets; (iii) have the crypto assets of their customers unaccounted for; or (iv) have experienced material corporate compliance failures.
 - If material to an understanding of your business, please revise to: (i) discuss any steps you take to safeguard your customers' crypto assets and describe any policies and procedures that are in place to prevent self-dealing and other potential conflicts of interest; (ii) describe any policies and procedures you have regarding the commingling of assets, including customer assets, your assets, and those of affiliates or others; (iii) identify what material changes, if any, have been made to your processes in light of the current crypto asset market disruption; and (iv) describe any material risks to your business and financial condition if your policies and procedures surrounding the safeguarding of crypto assets, conflicts of interest, or comingling of assets are not effective.
10. As a related matter, refer to the Management's Discussion and Analysis disclosure in your Form 10-K for the year ended December 31, 2022, and please revise your disclosure here and elsewhere as appropriate to address the following points:
- Disclose whether you have experienced excessive redemptions or withdrawals, or have suspended redemptions or withdrawals, of crypto assets and explain the potential effects on your financial condition and liquidity.
 - We note that you own crypto assets and/or hold crypto assets on behalf of third parties. To the extent material, explain whether these crypto assets serve as collateral for any loan, margin, rehypothecation, or other similar activities to which you or your affiliates are a party. If so, please revise to: (i) identify and quantify the crypto assets used in these financing arrangements; (ii) disclose the nature of your relationship for loans with parties other than third-parties; (iii) state whether there are any encumbrances on the collateral; (iv) discuss whether the current crypto asset market disruption has affected the value of the underlying collateral; and (v) disclose any

Gavin Michael
Bakkt Holdings, Inc.
June 12, 2023
Page 6

material financing, liquidity, or other risks you face related to the impact that the current crypto asset market disruption has had, directly or indirectly, on the value of the crypto assets you use as collateral and/or the value of your crypto assets used by others as collateral.

We remind you that the company and its management are responsible for the accuracy and adequacy of their disclosures, notwithstanding any review, comments, action or absence of action by the staff.

Please contact David Lin, Staff Attorney, at (202) 551-3552 or Sandra Hunter Berkheimer, Legal Branch Chief, at (202) 551-3758 with any questions.

Sincerely,

Division of Corporation Finance
Office of Crypto Assets

To: adam.teufel@dechert.com[adam.teufel@dechert.com]
From: Office of Crypto Assets
Sent: 2024-08-20T22:09:19Z
Subject: SEC Comment Letter: Hashdex Nasdaq Crypto Index US ETF S-1
Received: 2024-08-20T22:09:19Z
[Hashdex Nasdaq Crypto Index US ETF S-1 Letter.pdf](#)

Do not respond to this email address since we do not monitor it for incoming emails.

The Securities and Exchange Commission’s Division of Corporation Finance has attached to this email a letter relating to an SEC filing.

If you have any questions regarding this letter, please contact one of the staff members identified in it.

Division of Corporation Finance
U.S. Securities & Exchange Commission
100 F Street, NE
Washington, D.C. 20549
www.sec.gov



DIVISION OF
CORPORATION FINANCE

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

August 20, 2024

Bruno Ramos de Sousa
Director of the Sponsor
Hashdex Nasdaq Crypto Index US ETF
Ataulfo de Paiva, no 1120, Store A
Leblon- Rio de Janeiro

**Re: Hashdex Nasdaq Crypto Index US ETF
Registration Statement on Form S-1
Filed July 24, 2024
File No. 333-280990**

Dear Bruno Ramos de Sousa:

We have reviewed your registration statement and have the following comments.

Please respond to this letter by amending your registration statement and providing the requested information. If you do not believe a comment applies to your facts and circumstances or do not believe an amendment is appropriate, please tell us why in your response.

After reviewing any amendment to your registration statement and the information you provide in response to this letter, we may have additional comments.

Registration Statement on Form S-1

Cover Page

1. Refer to the first paragraph. Please clarify here and throughout, consistent with your disclosure on page 48, that the listing standard will limit the Trust to holding only bitcoin and ether, regardless of whether additional components are added to the Index. In addition, please explain that the listing standard would need to be amended for the Trust to hold any additional crypto assets. Please also revise your disclosure on page 1 to clarify that there may be circumstances in which you are unable to replicate the holdings of the Index and the Trust may therefore be unable to meet its investment objective.
2. Please revise your disclosure here and throughout the prospectus to clearly and explicitly disclose that the Index currently has only two components: bitcoin and ether. Please also discuss the possibility and likelihood of additional components being added to the Index. Finally, please disclose that if any crypto asset other than bitcoin and ether becomes eligible for inclusion in the Index, the Sponsor will transition to a sample replication strategy, with only bitcoin and ether in the same proportions determined by the Index.

August 20, 2024

Page 2

3. Please disclose here and in the Prospectus Summary that the Trust, Sponsor, Custodian, or any other person associated with the Trust will not, directly or indirectly, engage in action where any portion of the Trust's ether becomes subject to the Ethereum proof-of-stake validation or is used to earn additional ether or generate income or other earnings.
4. Please disclose that you are offering an indeterminate number of shares.

Prospectus Summary, page 1

5. Please revise your Prospectus Summary to:
 - Disclose that the Trust may only conduct cash creations and redemptions and that it would need regulatory approval to commence in-kind creations and redemptions;
 - Clarify here that the timing of in-kind regulatory approval is unknown and that there is no guarantee that the Exchange will receive in-kind regulatory approval; and
 - Disclose how you will inform shareholders if the Exchange receives in-kind regulatory approval and if the Sponsor chooses to allow in-kind creations and redemptions.

Trust Overview, page 1

6. You state that the Trust will not utilize leverage. Please clarify, if true, that the Trust will not utilize derivatives or any similar arrangements in seeking to meet its investment objective.

Trust Legal Structure, page 2

7. We note your references throughout the document that the trust is "a series of a Delaware statutory trust" and to "other series of the Trust." Please disclose whether any other series of the Trust exist and identify them. Also disclose the year of organization of the Trust and the Sponsor.

The Offering, page 4

8. Please disclose here the minimum number of Baskets and associated Shares specified for the Trust. Also disclose how the Sponsor will determine if and when the minimum level of Shares will change, and how the Sponsor will notify Shareholders of such a change.

Trust Expenses, page 5

9. Please revise your disclosure regarding the Management Fee and Trust Expenses to address the following:
 - Clarify whether the cash balance will be sufficient to pay all fees and expenses, including the Management Fee, or whether crypto assets will be exchanged for cash to pay certain fees and expenses;
 - Disclose who will calculate the Management Fee, the methodology that will be used to calculate the Management Fee, and how payment will be made;
 - Reconcile your disclosure that the Sponsor will pay all of the routine operational, administrative, and other ordinary expenses of the Trust, including but not limited to, fees and expenses of the Administrator with the compensation table on page 71 that payment to the Sponsor will be separate from the payment to the Administrator. Also

August 20, 2024

Page 3

clarify whether the annual payment to the Trustee is also covered by the Management Fee; and

- Clarify what you mean by the statement that the Sponsor pays certain fees and expenses "generally as determined by the Sponsor," including whether the Sponsor can change the categories of fees and expenses it determines to pay.

Risk Factors, page 8

10. Please add a separately captioned risk factor addressing the fact that the Trust will not stake the ether it holds, so an investment in the Trust's shares will not realize the economic benefits of staking.

Risks Related to Crypto Asset Markets, page 8

11. Please include a risk factor discussing the particular risks associated with the limited operational history of the Index.

"Forks" in the Index Constituents Networks could have adverse effects, page 10

12. Please revise to provide an example of the impact that hard forks have had on crypto assets, including quantitative information regarding the price of the impacted crypto asset immediately before and after the fork.

Crypto platforms are largely unregulated and may be more exposed to fraud and failure, page 11

13. We note the use of the term "unregulated" when referring to certain crypto asset trading markets. Please revise to qualify your use of this term by clarifying that such markets may be subject to regulation in a relevant jurisdiction but may not be complying.

Networked systems are vulnerable to attacks, page 13

14. Please discuss the risk of attacks on the Ethereum Network, including the levels of concentration of staked ether (i.e., 33% and 66%) that could pose risks and the possibility of obtaining control over the Ethereum network through the influence over core developers. We note in this regard that at times, there has been a single entity that has reportedly controlled around or in excess of 33% of the total staked ether on the Ethereum network, which poses centralization concerns and could permit the entity to attempt to interfere with transaction finality or block confirmations. Address the concern that if such an entity, or a bad actor with a similar sized stake, were to attempt to interfere with transaction finality or block confirmations, it could negatively affect the use and adoption of the Ethereum network, the value of ether, and thus the value of your shares. Additionally, illustrate the risks presented by providing examples of previous attacks on the Bitcoin Network and Ethereum Network and the resulting impacts.

Risks to the Index Constituents from other parts of the crypto assets market, page 14

15. Please place these risks in context by describing how the prices of bitcoin and ether may be affected by stablecoins, the activities of stablecoin issuers, and their regulatory treatment.

August 20, 2024

Page 4

Risks Related to Ether and the Ethereum Network, page 18

16. Please include a risk factor discussing centralization concerns around a single persons or entity controlling a large percentage of the validating stake. Please also discuss the risks of centralization that liquid staking applications, such as Lido, may pose.
17. Please disclose the risks or challenges posed by the emergence of other public, permissionless blockchains that are similarly designed to support the development, deployment, and operation of smart contracts, and explain the potential impact on the demand for and value of ether and an investment in the Trust. Please also explain that the Ethereum blockchain has historically faced scalability challenges and that these alternative blockchains generally attempt to compete with Ethereum by offering faster transaction processing and lower fees. Finally, explain that further development and use of the blockchain for its intended purpose are, and may continue to be, substantially dependent on "Layer 2" solutions; briefly describe Layer 2 networks and any risks or challenges that they pose to the blockchain and ether.
18. We note your disclosure on page 18 that "[t]here is no guarantee that the Ethereum community will embrace Ethereum 2.0, and the new protocol may never fully scale." Please expand your disclosure to discuss additional updates and changes to the Ethereum network that have occurred or are currently being considered, and discuss how these updates and changes may impact an investment in the Trust.

Changes in the Trust's NAV may not correlate well with changes in the price of the Index, page 22

19. Please address the correlation risks if additional components are added to the Index and the Trust cannot hold them.

Correlation Risk, page 22

20. Please include risk factor disclosure to discuss the impact of the use of cash creations and redemptions on the efficiency of the arbitrage mechanism and how this compares to the use of in-kind creations and redemptions.

Crypto asset markets in the U.S. exist in a state of regulatory uncertainty, page 25

21. Please remove the first three sentences of the first paragraph on page 26 as this disclosure lacks the appropriate context for the referenced statements.

The Trust's Operating Risks, page 29

22. Please revise this risk factor to address the risks associated with having to replace the Prime Execution Agent. Also address the risks associated with the insolvency, business failure or interruption, default, failure to perform, security breach, or other problems affecting the Prime Execution Agent.

Lack of recourse, page 34

23. We note your disclosure that the Crypto Custodians have limited liability even in the event of fraud. When known, please specify the limitations on liability in the Crypto Custody Agreement.

August 20, 2024

Page 5

The development and commercialization of the Trust is subject to competitive pressures, page 39

24. The risks described here are presented as hypothetical. Please specifically identify the competitive forces that the Trust and Sponsor face with regard to exchange-traded products offering exposure to the crypto assets market, including whether the timing of the Trust's entry on the market may have an impact on its performance. In this regard, we note that several applications for spot exchange-traded crypto products have been approved and are currently listed and trading.

Overview of the Index Constituents' Industry, page 46

25. Please expand this section to address the following:
- Compare and contrast bitcoin and the Bitcoin network with ether and the Ethereum network;
 - Disclose in more detail how a bitcoin and ether transaction works, including the function of the blockchain, wallets, public and private keys, and validation;
 - Provide a description of the market participants in the Bitcoin and Ethereum industry;
 - Describe the various use cases for the Bitcoin and Ethereum networks and for bitcoin and ether;
 - Describe the spot and futures bitcoin and ether markets and the regulation of bitcoin and ether futures; and
 - Discuss government oversight of Bitcoin, Ethereum, and crypto asset markets, including probable future regulatory proposals that may materially affect an investment in the Trust.

Ethereum Industry, page 47

26. Please discuss modifications to the Ethereum protocol and discuss recent planned forks, including "Dencun" and EIP 4844.

Business of the Trust

The Trust's Benchmark, page 49

27. You state here that the Index will be reconstituted and rebalanced quarterly. Please revise your disclosure to describe the mechanics of rebalancing, along with a discussion of who will bear the costs and how those costs may impact the performance of the product. Please also tell us about, and revise your disclosure to explain, any correlation risk that results from tracking the Index on a daily basis and rebalancing on a quarterly basis.

Index Constituents Criteria, page 49

28. Please revise to clarify what you mean by "U.S. regulated digital asset trading platform," including examples, as appropriate.
29. Please supplementally tell us why none of the other high market capitalization crypto assets meet the Index criteria. In your response, please provide a few examples of such crypto assets and the reason(s) they do not qualify.

August 20, 2024

Page 6

Custody of Crypto Assets, page 54

30. Please describe the "similarly secure technology" used by the Crypto Custodians for safekeeping the Trust's crypto assets.

Creation and Redemption of Shares, page 58

31. Please disclose how the Sponsor will inform Shareholders that it has engaged additional Crypto Trading Counterparties.
32. Please disclose which party will be responsible for fees relating to on-chain transactions. In this regard, we note your disclosure on page 59 that transfers from the Trust's Trading Balance to the Trust's Vault Balance are "on-chain" transactions represented on the crypto asset blockchain and that "any costs related to transactions and transfers from the Trust's Trading Balance to the Trust's Vault Balance are not borne by the Trust or its Shareholders."

Issuance of Baskets, page 58

33. Please provide additional information about the Trade Credit Lender and the Trade Financing Agreement referenced on pages 59 and 60, including:
- The material terms of the Trade Financing Agreement, including the term and termination provisions;
 - The maximum amount of Trade Credit that the Trade Financing Agreement permits to be outstanding at any one time;
 - The Trade Credit interest rate;
 - The Sponsor's policy regarding whether the intention is to generally fund the Trading Balance at the Prime Execution Agent with sufficient cash or the Constituent Index to pay fees and expenses, or whether it regularly expects to utilize the Trade Financing Agreement for fees and expenses;
 - To the extent the execution price of the Constituent Index acquired exceeds the cash deposit amount, disclose who bears the responsibility for this difference; and
 - For creation and redemption transactions, whether or not the interest payable on Trade Credits utilized under the Trade Financing Agreement are included in the execution price and therefore the responsibility of the Authorized Participants. If they are the responsibility of the Trust, revise your risk factor disclosure to explain the impact these interest payments will have on the net assets of the Trust over time.

The Trust Agreement, page 62

34. Please describe the specific circumstances under which the Trust Agreement may be amended and disclose the termination provisions of the Trust.

Sponsor, page 66

35. Please describe the conflicts of interest that may arise because the Sponsor serves as the sponsor, investment manager, or investment adviser to investment vehicles other than the Trust. Also discuss the Sponsor's experience sponsoring exchange-traded products and specifically its experience related to crypto asset markets. Revise your risk factors on page 40 as appropriate.

August 20, 2024

Page 7

36. You state on pages 30-31 that the Sponsor "relies heavily on key personnel to manage its activities." Please identify the key personnel and provide the disclosure called for by Item 401 of Regulation S-K.

The Trust's Service Providers, page 66

37. Please revise to:
- Identify any Crypto Trading Counterparties with whom the Sponsor has entered into an agreement;
 - Describe the approval process of the Crypto Trading Counterparty, including any specific criteria for engagement as a Crypto Trading Counterparty, such as whether the Crypto Trading Counterparty may be an affiliate of the Trust and/or Sponsor; and
 - Disclose the material terms of any agreement you have with the Crypto Trading Counterparty, including whether and to what extent there will be any contractual obligations on the part of the Crypto Trading Counterparty to participate in cash orders for creations or redemptions.
38. Please provide a separately captioned section to describe the Prime Execution Agent, including without limitation:
- The material provisions of any material agreement between any transaction party and the Prime Execution Agent;
 - The Prime Execution Agent's experience and operating history;
 - The Prime Execution Agent's policies and procedures with respect to any assets held by it on behalf of the Trust;
 - How the Prime Execution Agent will be compensated;
 - Who will be responsible for any fees associated with crypto transactions between the Authorized Participants, Crypto Custodian and Prime Execution Agent;
 - Whether or not assets of the Trust held at the Prime Execution Agent will be held in segregated accounts;
 - How much of the Trust's assets will be held at the Prime Execution Agent; and
 - Whether there are any limits on the percentage or amount of Trust's assets that may be held at the Prime Execution Agent at any point in time.

Crypto Custodian, page 69

39. Please discuss the extent of any insurance policy held by the Crypto Custodian(s), including the amount of coverage, the extent to which the insurance is shared among other customers, and any coverage limitations. Also add risk factor disclosure as appropriate.

Conflicts of Interest, page 84

40. Please disclose all existing and potential conflicts of interest between your Sponsor and its affiliates and the Trust. Please also clarify whether the Sponsor or any insiders have exposure related to the Index Constituents that could create conflicts of interest and disclose whether you have a code of conduct or other requirements for pre-clearance of transactions related to the Index Constituents that apply to your employees, the Sponsor,

August 20, 2024

Page 8

or any of its affiliates.

Exhibit Index, page II-2

41. Please file a tax opinion or tell us why the tax consequences of the Shares are not material to investors. Refer to Item 601(b)(8) of Regulation S-K and, for guidance, section III of Staff Legal Bulletin No. 19 (Oct. 14, 2011).

General

42. Please update your disclosure regarding the markets for bitcoin and ether and limitations on supply as of the latest practicable date. By way of example:
- Update the number of bitcoin in circulation;
 - On page 17, update the market capitalization of crypto assets and bitcoin;
 - In the carryover risk factor on pages 15-16 discuss when the last halving occurred;
 - Disclose the year by which it is estimated that the current 21 million supply cap for outstanding bitcoin will be reached;
 - Quantify the amount of ether outstanding and the amount of ether issued and burned as of a recent date; and
 - Disclose the market capitalization of ether.
43. Please provide the address and telephone number of your agent for service.

We remind you that the company and its management are responsible for the accuracy and adequacy of their disclosures, notwithstanding any review, comments, action or absence of action by the staff.

Refer to Rules 460 and 461 regarding requests for acceleration. Please allow adequate time for us to review any amendment prior to the requested effective date of the registration statement.

Please contact Kate Tillan at 202-551-3604 or Jason Niethamer at 202-551-3855 if you have questions regarding comments on the financial statements and related matters. Please contact Irene Paik at 202-551-6553 or Justin Dobbie at 202-551-3469 with any other questions.

Sincerely,

Division of Corporation Finance
Office of Crypto Assets

cc: Adam T. Teufel

To: ehl@dhclegal.com[ehl@dhclegal.com]
From: CF Office of Finance
Sent: 2022-08-30T13:25:37Z
Subject: SEC Comment Letter: Bit Digital, Inc F-3
Received: 2022-08-30T13:25:38Z
[Bit Digital, Inc F-3 Letter.pdf](#)

Do not respond to this email address since we do not monitor it for incoming emails.

The Securities and Exchange Commission's Division of Corporation Finance has attached to this email a letter relating to an SEC filing.

If you have any questions regarding this letter, please contact one of the staff members identified in it.

Division of Corporation Finance
U.S. Securities & Exchange Commission
100 F Street, NE
Washington, D.C. 20549
www.sec.gov



DIVISION OF
CORPORATION FINANCE

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

August 30, 2022

Bryan Bullett
Chief Executive Officer
Bit Digital, Inc
33 Irving Place
New York, NY 10003

Re: Bit Digital, Inc
Registration Statement on Form F-3
Filed August 10, 2022
File No. 333-266746

Dear Mr. Bullett:

We have limited our review of your registration statement to those issues we have addressed in our comments. In some of our comments, we may ask you to provide us with information so we may better understand your disclosure.

Please respond to this letter by amending your registration statement and providing the requested information. If you do not believe our comments apply to your facts and circumstances or do not believe an amendment is appropriate, please tell us why in your response.

After reviewing any amendment to your registration statement and the information you provide in response to these comments, we may have additional comments.

Registration Statement on Form F-3

General

1. We note your disclosure that you currently own 731 Ether miners and that, as of March 31, 2022, 713 such miners were in operation. Please expand your disclosure throughout regarding your Ether mining business, including, for example, the number of Ether mined for the most recently completed fiscal year on a quarterly basis, the location of your Ether mining machines, disclosure regarding how you hold, store and maintain custody of the Ether, whether you intend to hold or monetize the mined Ether and the impact on your business of the anticipated migration of Ether from proof of work to proof of stake. In addition, please expand your risk factors section to disclose the risks related to your Ether mining business.

Bryan Bullett
Bit Digital, Inc
August 30, 2022
Page 2

Where You Can Find More Information: Incorporation by Reference
Incorporation by Reference, page iii

2. Please incorporate by reference the amended Form 20-F filed on May 16, 2022.

Prospectus
Digital Asset Transactions, page 11

3. We note your disclosure that you expect your results of operations to continue to be affected by crypto asset prices. Please revise your disclosure here and in your risk factors section to discuss the recent significant decline in the trading prices of crypto assets and the impact on your business.

Risk Factors
Risks Related to United States Government Regulation
A particular digital asset's status as a security, page 49

4. We note the statements in the risk factor on page 49 that the legal test for determining whether a particular crypto asset is a security may “evolve over time” and that the “SEC’s views in this area have evolved over time and it is difficult to predict the direction or timing of any continuing evolution.” Please remove these statements as the legal tests are well-established by U.S. Supreme Court case law and the Commission and staff have issued reports, orders, and statements that provide guidance on when a crypto asset may be a security for purposes of the U.S. federal securities laws.

We remind you that the company and its management are responsible for the accuracy and adequacy of their disclosures, notwithstanding any review, comments, action or absence of action by the staff.

Refer to Rules 460 and 461 regarding requests for acceleration. Please allow adequate time for us to review any amendment prior to the requested effective date of the registration statement.

Please contact Tonya K. Aldave at (202) 551-3601 or Sonia Bednarowski at (202) 551-3666 with any questions.

Sincerely,

Division of Corporation Finance
Office of Finance

cc: Elliot Lutzker, Esq.

To: erkeh@bit-digital.com[erkeh@bit-digital.com]
From: CF Office of Finance
Sent: 2022-08-30T13:25:35Z
Subject: SEC Comment Letter: Bit Digital, Inc F-3
Received: 2022-08-30T13:25:35Z
[Bit Digital, Inc F-3 Letter.pdf](#)

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DIVISION OF
CORPORATION FINANCE

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

August 30, 2022

Bryan Bullett
Chief Executive Officer
Bit Digital, Inc
33 Irving Place
New York, NY 10003

Re: Bit Digital, Inc
Registration Statement on Form F-3
Filed August 10, 2022
File No. 333-266746

Dear Mr. Bullett:

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After reviewing any amendment to your registration statement and the information you provide in response to these comments, we may have additional comments.

Registration Statement on Form F-3

General

1. We note your disclosure that you currently own 731 Ether miners and that, as of March 31, 2022, 713 such miners were in operation. Please expand your disclosure throughout regarding your Ether mining business, including, for example, the number of Ether mined for the most recently completed fiscal year on a quarterly basis, the location of your Ether mining machines, disclosure regarding how you hold, store and maintain custody of the Ether, whether you intend to hold or monetize the mined Ether and the impact on your business of the anticipated migration of Ether from proof of work to proof of stake. In addition, please expand your risk factors section to disclose the risks related to your Ether mining business.

Bryan Bullett
Bit Digital, Inc
August 30, 2022
Page 2

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Incorporation by Reference, page iii

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Digital Asset Transactions, page 11

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Risk Factors
Risks Related to United States Government Regulation
A particular digital asset's status as a security, page 49

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Refer to Rules 460 and 461 regarding requests for acceleration. Please allow adequate time for us to review any amendment prior to the requested effective date of the registration statement.

Please contact Tonya K. Aldave at (202) 551-3601 or Sonia Bednarowski at (202) 551-3666 with any questions.

Sincerely,

Division of Corporation Finance
Office of Finance

cc: Elliot Lutzker, Esq.

To: rjz@haddanzenfel.com[rjz@haddanzenfel.com]
From: CF Office of Finance
Sent: 2022-11-02T14:51:34Z
Subject: SEC Comment Letter: Global-Smart.Tech Inc. S-1
Received: 2022-11-02T14:51:33Z
[Global-Smart.Tech Inc. S-1 Letter.pdf](#)

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Washington, D.C. 20549
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DIVISION OF
CORPORATION FINANCE

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

November 2, 2022

Yehor Rodin
President
Global-Smart.Tech Inc.
Kava b.b.
85320, Tivat, Montenegro

**Re: Global-Smart.Tech Inc.
Registration Statement on Form S-1
Filed October 5, 2022
File No. 333-267740**

Dear Yehor Rodin:

We have reviewed your registration statement and have the following comments. In some of our comments, we may ask you to provide us with information so we may better understand your disclosure.

Please respond to this letter by amending your registration statement and providing the requested information. If you do not believe our comments apply to your facts and circumstances or do not believe an amendment is appropriate, please tell us why in your response.

After reviewing any amendment to your registration statement and the information you provide in response to these comments, we may have additional comments.

Form S-1 filed October 5, 2022

General

1. It appears that your pagination is out of order, please ensure that the pagination in future filings is correct. In this regard, your financial statement index indicates that your financial statement footnotes begin on page F-6 when your filing has them beginning on page 41.

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2. We note your disclosures regarding Mr. Rodin's share ownership. Please revise this disclosure to specify that you are a "controlled company," and include the definition of controlled company and how that impacts potential shareholders.

Yehor Rodin
Global-Smart.Tech Inc.
November 2, 2022
Page 2

3. Please revise your cover page to disclose that you are offering a "penny stock." In addition, please revise your risk factors section to include a separately captioned risk factor that describes the risk associated with purchasing a penny stock.

Overview, page 6

4. Please revise this section to clearly indicate that you have not begun any operations and that your intentions are purely speculative.
5. We note your references to "crypto-asset," "crypto mining," "cryptocurrency," and "digital asset" throughout. Please define these terms on first use, in particular if there is a distinction to be made between them. To the extent you are using these terms interchangeably, please revise to consistently use one term.
6. Please identify all of the cryptocurrencies that you intend to mine and briefly discuss whether your business strategy is to hold your crypto assets for investment or convert them into fiat currency immediately upon receipt or soon thereafter. In addition, clarify whether you have a specific policy for how you will determine when to sell your crypto assets for fiat currency to pay for costs and expenses incurred, capital expenditures and other working capital and through what exchange or if you intend to hold your mining rewards.
7. Please revise this section to indicate where your operations are currently and anticipated to be located.

Risk Factors, page 9

8. Please place this section in front of the The Offering section. Refer to Item 105(b) of Regulation S-K.
9. Please include a separate risk factor regarding the risks that the cryptocurrencies you mine are susceptible to theft which would result in a significant loss to you. As part of your disclosure, be sure to include a discussion regarding who will hold the private keys associated with your crypto asset wallets, how they will be stored, and the precautions that will be taken to keep them secure.
10. We note that your sole officer and director, Yehor Rodin, appears to reside outside the United States. Please include a risk factor addressing the risk to U.S. stockholders of effecting service of process, enforcing judgments, and bringing original actions in foreign courts to enforce liabilities based on the U.S. federal securities laws.

The loss of any of our management team..., page 9

11. We note that here, and throughout your registration statement you make references to your "management team," "our management," and "employees." It appears that only one person, Yehor Rodin, has any role or position in the company. If true, please clarify this fact throughout your registration statement.

Yehor Rodin
Global-Smart.Tech Inc.
November 2, 2022
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We are at an early stage of development of our crypto-asset mining..., page 9

12. Please revise this risk factor to indicate that rather than "limited revenue" you have no revenue for your most recent reporting period. Also provide more factual support for your assertion that you plan to generate revenue in 2023.

We have a business plan which is dependent on the price of Bitcoin, Ether and/or other crypto-assets., page 9

13. We note this, and other risk factors that describe risks related to Ether. Please revise your disclosure here and in your Description of Business section to address how you have taken into consideration the Ethereum merge with respect to your business model.
14. We note your disclosures that your "current strategy will continue to expose us to the numerous risks and volatility associated within this sector." Please identify those risks with specificity in this section. In addition, please provide support for your assertion that, "based on the current trend in crypto-asset mining, we do not expect to incur losses from our crypto mining operations for the near-term."
15. Please revise this risk factor to define and explain the term "co-hosting customer."

Cryptocurrencies other than bitcoin may have properties..., page 15

16. We note your disclosure that, "virtually all of our mining income comes from bitcoin mining." Please revise this risk factor as it does not appear that you have had any mining income to date.

Our reliance on third-party mining pool service providers..., page 16

17. Please revise this risk factor and your Business section to define what a mining pool is, how they work, and how they fit into your current and future business operations. As part of your disclosure, include a discussion of the fees charged by the Hive OS operating system and the mining pools you send your hash rate to.

Prospectus Summary

Emerging Growth Company Status, page 18

18. In the last bullet point on page 19, you disclose that as an emerging growth company you will not be required to present more than two years of financial statements in future filings. As the two-year presentation only relates to an initial public offering, please revise your disclosure to clarify, noting that you may present only two years of financial statements in future filings if you remain a smaller reporting company.

Yehor Rodin
Global-Smart.Tech Inc.
November 2, 2022
Page 4

Description of Securities, page 23

19. You disclose a liquidation preference for preferred stock. It does not appear that you have preferred stock authorized. Please remove the reference in future amendments or revise your disclosure to expand your discussion of preferred stock.

Description of Business, page 25

20. Please define the term "store of value."

Growth Strategy, page 25

21. We note your disclosure indicating that you are "developing unique IT code" to mine the most profitable crypto assets, "developing special software", and "developing artificial intelligence." Please revise to discuss the status of those products and whether you have any agreements with developers. To the extent you have not yet entered into any agreements or begun development of the products, revise your disclosure accordingly.

Interest of Named Experts, page 25

22. We note that Haddan & Zepfel LLP provided the opinion contained in Exhibit 5.1. Please properly identify the entity that is passing upon the legality of the shares offered under this registration statement.

Mining Operations, page 26

23. Please revise this section to clarify whether you intend to mine crypto assets solely for the benefit of the Company, or if you intend to offer mining services to third-party customers. To the extent you will have customers, indicate what type of contractual relationship you anticipate having and how you intend to compensate them.
24. We note your disclosure regarding the acquisition of Sapphire Pulse Radeon RX 6800 XT graphics processing units ("6800XT GPU") and their associated hash rate. Please revise to clarify which blockchain the hash rate numbers represent mining on and provide a discussion of the material terms of the agreements to acquire 5000 6800XT GPUs including the timeline for delivery and any termination provisions.

Management's Discussion and Analysis of Financial Condition and Results of Operations
Liquidity and Capital Resources, page 28

25. Please revise your disclosure in the first paragraph of this section to exclude from your total current assets the fixed assets and other assets depicted on your balance sheet.
26. You provide narrative disclosure for your operational and financing cash flows on page 29, but do not discuss your investing cash flows, including the May 2022 equipment purchase. Please revise your disclosure to include a discussion of investing cash flows.

Yehor Rodin
Global-Smart.Tech Inc.
November 2, 2022
Page 5

Index to Financial Statements, page 35

27. Please revise your filing to provide audited financial statements from inception through the July 31, 2022 end of your indicated fiscal year.

Notes to the Financial Statements

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29. Please tell us more about your intended operations. In your response, where appropriate, separately reference for us the authoritative literature you rely upon to support your accounting and specifically address the following:
- Identify for us and disclose the products or services you expect to provide within the next year, including a description of your intended customers.
 - Tell us and disclose your intended revenue recognition policies for these products and/or services.
 - Tell us whether you will accept crypto-assets in payment for your products and/or services, and if so how you will account for receivables denominated in crypto-assets and the crypto assets actually received.
 - Tell us and disclose whether you will store the crypto-assets you mine for your customers. If so, tell us your consideration of the custody guidance in SAB 121, and explain whether you are obligated under your agreements to safekeep customers' crypto-assets and/or whether you must replace any such assets lost or stolen through breach of or malfunction of the software underlying your system.

Foreign Currency, page 41

30. We note that you credited your foreign currency gain to other comprehensive income. Please tell us how this gain represents the translation of foreign financial statements under ASC 830-30. Otherwise revise your accounting to include this gain in net income as a foreign currency transaction gain under ASC 830-20. Regardless, revise your policy disclosure to clarify as it does not differentiate between transaction and translation gains and losses nor does it identify where they are reflected in your financial statements.

Signatures, page 47

31. Please revise your signature page to have your principal executive officer, principal financial officer, and principal accounting officer sign the registration statement in their individual capacities. These signatures should appear in the second signature block of the signature section. If someone has signed in more than one capacity, indicate each capacity in which he or she has signed. Finally, revise your Summary Compensation Table on page

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Sincerely,

Division of Corporation Finance
Office of Finance

To: office@global-smart.tech[office@global-smart.tech]
From: CF Office of Finance
Sent: 2022-11-02T14:51:32Z
Subject: SEC Comment Letter: Global-Smart.Tech Inc. S-1
Received: 2022-11-02T14:51:31Z
[Global-Smart.Tech Inc. S-1 Letter.pdf](#)

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Division of Corporation Finance
U.S. Securities & Exchange Commission
100 F Street, NE
Washington, D.C. 20549
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DIVISION OF
CORPORATION FINANCE

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

November 2, 2022

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29. Please tell us more about your intended operations. In your response, where appropriate, separately reference for us the authoritative literature you rely upon to support your accounting and specifically address the following:
- Identify for us and disclose the products or services you expect to provide within the next year, including a description of your intended customers.
 - Tell us and disclose your intended revenue recognition policies for these products and/or services.
 - Tell us whether you will accept crypto-assets in payment for your products and/or services, and if so how you will account for receivables denominated in crypto-assets and the crypto assets actually received.
 - Tell us and disclose whether you will store the crypto-assets you mine for your customers. If so, tell us your consideration of the custody guidance in SAB 121, and explain whether you are obligated under your agreements to safekeep customers' crypto-assets and/or whether you must replace any such assets lost or stolen through breach of or malfunction of the software underlying your system.

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Sincerely,

Division of Corporation Finance
Office of Finance

To: erkeh@bit-digital.com[erkeh@bit-digital.com]
From: CF Office of Finance
Sent: 2022-11-08T19:27:17Z
Subject: SEC Comment Letter: Bit Digital, Inc F-3/A
Received: 2022-11-08T19:27:17Z
[Bit Digital, Inc F-3A Letter.pdf](#)

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The Securities and Exchange Commission’s Division of Corporation Finance has attached to this email a letter relating to an SEC filing.

If you have any questions regarding this letter, please contact one of the staff members identified in it.

Division of Corporation Finance
U.S. Securities & Exchange Commission
100 F Street, NE
Washington, D.C. 20549
www.sec.gov



DIVISION OF
CORPORATION FINANCE

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

November 8, 2022

Bryan Bullett
Chief Executive Officer
Bit Digital, Inc
33 Irving Place
New York, NY 10003

**Re: Bit Digital, Inc
Amendment No. 2 to
Registration Statement on Form F-3
Filed October 26, 2022
File No. 333-266746**

Dear Bryan Bullett:

We have reviewed your amended registration statement and have the following comments. In some of our comments, we may ask you to provide us with information so we may better understand your disclosure.

Please respond to this letter by amending your registration statement and providing the requested information. If you do not believe our comments apply to your facts and circumstances or do not believe an amendment is appropriate, please tell us why in your response.

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Amendment No. 2 to Registration Statement on Form F-3

General

1. We note your response to comment 7 that, while you have no current plans to offer staking-as-a-service, "it is a potential source of revenue in the future." Please tell us how you intend to offer such a service in compliance with the federal securities laws and add risk factor disclosure regarding the impact to your company if you fail to offer such service in compliance with the federal securities laws.
2. Please revise to include a breakeven analysis for each crypto asset that you earn or mine or intend to earn or mine in the future, such as ETH Classic, that compares the cost to earn

Bryan Bullett
Bit Digital, Inc
November 8, 2022
Page 2

or mine one crypto asset with the value of the crypto asset. In addition, we note your disclosure on page 14 that you "provisionally" intend to use your ETH miners to mine ETH Classic. Please revise to disclose the factors you will consider in deciding whether to mine ETH Classic in the future.

3. We note that there are outstanding staff comments on your most recent Form 20-F. As applicable, please make corresponding changes to your registration statement on Form F-3 in response to these comments.
4. Please advise us as to whether (and, if so, how) you have re-evaluated the characterization of Ether in light of the recent Ethereum merge under your policies and procedures in place to make risk-based assessments regarding the likelihood that a particular crypto asset could be deemed a security under applicable laws.

Our Company, page 3

5. We note your response to our prior comment 2. Please revise to describe the differences between the miners you received from Riot and the miners you delivered to Riot pursuant to the Hash Rate Swap Agreement. For example, disclose whether the miners you received from Riot are less energy efficient or may have a higher failure rate than the miners you delivered.
6. We note your response to our prior comment 3. Please identify here the crypto assets you mine as a participant of the Foundry USA Mining Pool ("Foundry"), disclose the average, mean and range of crypto assets received from the mining pool on a monthly basis for the periods covered by your financial statements, clarify what you mean by your disclosure that you do not pay a "direct" fee to Foundry and provide quantitative disclosure regarding the fees you may be required to pay to Foundry in the future. In addition, please clarify what you mean by your disclosure that "Foundry may, at its sole discretion, offer payments or credits in the event of a disruption in service" by providing examples of when you may receive payments or credits and how the amount of such payments or credits is determined. Also add risk factor disclosure addressing the risks related to the loss or theft of crypto assets when Foundry USA Mining Pool transfers crypto assets to your custodian wallet addresses.
7. We note your response to our prior comment 4. Please clarify what you mean by your disclosure on page 4 that you enjoy "strategic relationships with leading miner manufacturers like Bitmain and MicroBT," and disclose the material terms of the agreements regarding such strategic relationships. Alternatively, please remove this disclosure. In addition, revise your disclosure on pages 4 and 10 that states that you believe "there is currently an excess supply of miners in the market," to clarify, if true, that you are referring to the supply of used miners available in the market.

Power and Hosting Overview, page 4

8. We note your disclosure here and on page 9 that the "Coinmint Facility operates in an

Bryan Bullett
Bit Digital, Inc
November 8, 2022
Page 3

upstate New York region that utilizes power that is reported to be 90% emissions-free" and your disclosure that this facility powers only 650 of your miners. Please revise here and on page 9 to balance your disclosure regarding the emissions rate at the Coinmint Facility in upstate New York by clarifying the percentage of your energy usage that comes from the Coinmint Facility and the emission rates of the other hosting facilities.

Compute North, page 6

9. We note your disclosure on page 4 that Compute North filed for Chapter 11 in the U.S. Bankruptcy Court and that you do not believe the bankruptcy filing will adversely affect your active mining operations. Please revise to disclose whether your miners could be encumbered or repossessed by Compute North creditors as the result of these bankruptcy proceedings. Also please disclose the provisions of your agreement with Compute North that address the impact of a bankruptcy filing. In addition, as applicable, please include risk factor disclosure so investors can assess the pertinent risk of Compute North's bankruptcy filing.

Digihost, page 7

10. We note your response to our prior comment 6. Please disclose the total hash rate of the two companies pursuant to the Colocation Services Agreements as it appears that Digihost has not yet identified a location to power the remaining 100 MW of contracted hosting capacity pursuant to the agreements.

Risk Factors

If, pursuant to our hosting service contracts (the "Hosting Agreements") with hosting service providers, page 39

11. Please revise to provide quantitative disclosure here regarding the impact that the loss of power at the Blockfusion and the Digihost facilities has had upon your business. In this regard, we note your revised disclosure on page 39 that "the loss of power at Blockfusion and Digihost facilities has had a material adverse effect on [y]our operations."

A particular digital asset's status as a "security" in any relevant jurisdiction is subject to a high degree of uncertainty, page 54

12. Please revise this risk factor to address specifically all crypto assets you hold or plan to hold in the future. Discuss any determinations you have made related to ETH Classic.

Bryan Bullett
Bit Digital, Inc
November 8, 2022
Page 4

Please contact Tonya K. Aldave at (202) 551-3601 or Sonia Bednarowski at (202) 551-3666 with any questions.

Sincerely,

Division of Corporation Finance
Office of Finance

cc: Elliot Lutzker, Esq.

To: ehl@dhclegal.com[ehl@dhclegal.com]
From: CF Office of Finance
Sent: 2022-11-08T19:27:19Z
Subject: SEC Comment Letter: Bit Digital, Inc F-3/A
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or mine one crypto asset with the value of the crypto asset. In addition, we note your disclosure on page 14 that you "provisionally" intend to use your ETH miners to mine ETH Classic. Please revise to disclose the factors you will consider in deciding whether to mine ETH Classic in the future.

3. We note that there are outstanding staff comments on your most recent Form 20-F. As applicable, please make corresponding changes to your registration statement on Form F-3 in response to these comments.
4. Please advise us as to whether (and, if so, how) you have re-evaluated the characterization of Ether in light of the recent Ethereum merge under your policies and procedures in place to make risk-based assessments regarding the likelihood that a particular crypto asset could be deemed a security under applicable laws.

Our Company, page 3

5. We note your response to our prior comment 2. Please revise to describe the differences between the miners you received from Riot and the miners you delivered to Riot pursuant to the Hash Rate Swap Agreement. For example, disclose whether the miners you received from Riot are less energy efficient or may have a higher failure rate than the miners you delivered.
6. We note your response to our prior comment 3. Please identify here the crypto assets you mine as a participant of the Foundry USA Mining Pool ("Foundry"), disclose the average, mean and range of crypto assets received from the mining pool on a monthly basis for the periods covered by your financial statements, clarify what you mean by your disclosure that you do not pay a "direct" fee to Foundry and provide quantitative disclosure regarding the fees you may be required to pay to Foundry in the future. In addition, please clarify what you mean by your disclosure that "Foundry may, at its sole discretion, offer payments or credits in the event of a disruption in service" by providing examples of when you may receive payments or credits and how the amount of such payments or credits is determined. Also add risk factor disclosure addressing the risks related to the loss or theft of crypto assets when Foundry USA Mining Pool transfers crypto assets to your custodian wallet addresses.
7. We note your response to our prior comment 4. Please clarify what you mean by your disclosure on page 4 that you enjoy "strategic relationships with leading miner manufacturers like Bitmain and MicroBT," and disclose the material terms of the agreements regarding such strategic relationships. Alternatively, please remove this disclosure. In addition, revise your disclosure on pages 4 and 10 that states that you believe "there is currently an excess supply of miners in the market," to clarify, if true, that you are referring to the supply of used miners available in the market.

Power and Hosting Overview, page 4

8. We note your disclosure here and on page 9 that the "Coinmint Facility operates in an

Bryan Bullett
Bit Digital, Inc
November 8, 2022
Page 3

upstate New York region that utilizes power that is reported to be 90% emissions-free" and your disclosure that this facility powers only 650 of your miners. Please revise here and on page 9 to balance your disclosure regarding the emissions rate at the Coinmint Facility in upstate New York by clarifying the percentage of your energy usage that comes from the Coinmint Facility and the emission rates of the other hosting facilities.

Compute North, page 6

9. We note your disclosure on page 4 that Compute North filed for Chapter 11 in the U.S. Bankruptcy Court and that you do not believe the bankruptcy filing will adversely affect your active mining operations. Please revise to disclose whether your miners could be encumbered or repossessed by Compute North creditors as the result of these bankruptcy proceedings. Also please disclose the provisions of your agreement with Compute North that address the impact of a bankruptcy filing. In addition, as applicable, please include risk factor disclosure so investors can assess the pertinent risk of Compute North's bankruptcy filing.

Digihost, page 7

10. We note your response to our prior comment 6. Please disclose the total hash rate of the two companies pursuant to the Colocation Services Agreements as it appears that Digihost has not yet identified a location to power the remaining 100 MW of contracted hosting capacity pursuant to the agreements.

Risk Factors

If, pursuant to our hosting service contracts (the "Hosting Agreements") with hosting service providers, page 39

11. Please revise to provide quantitative disclosure here regarding the impact that the loss of power at the Blockfusion and the Digihost facilities has had upon your business. In this regard, we note your revised disclosure on page 39 that "the loss of power at Blockfusion and Digihost facilities has had a material adverse effect on [y]our operations."

A particular digital asset's status as a "security" in any relevant jurisdiction is subject to a high degree of uncertainty, page 54

12. Please revise this risk factor to address specifically all crypto assets you hold or plan to hold in the future. Discuss any determinations you have made related to ETH Classic.

Bryan Bullett
Bit Digital, Inc
November 8, 2022
Page 4

Please contact Tonya K. Aldave at (202) 551-3601 or Sonia Bednarowski at (202) 551-3666 with any questions.

Sincerely,

Division of Corporation Finance
Office of Finance

cc: Elliot Lutzker, Esq.

EXHIBIT F

Doc ID	Family Date	Email To	Email From	Email CC	File Name / Subject	FOIA Exemptions/ Privilege Tags	Basis for Withholding	File Extension	Is Attachment
GC-LIT-0470-0713074	02/12/2018 06:51:33 PM	Federal Reserve Board staff	Bricker, Wesley		FW OCA Innovation Pillar - Blockchain, et al Surge - Output Memorandum.msg	Exemption 5 (deliberative process privilege) Exemption 6	The withheld transmittal email and attachments are inter-agency. The withheld attachments consist of a confidential SEC Office of the Chief Accountant ("OCA") memorandum and a draft attachment thereto. The withheld attachments are deliberative because they reflect analysis and discussion by an OCA team about accounting and auditing implications relating to digital assets. The withheld attachments are pre-decisional because no final agency decisions had been made by senior OCA staff or the Commission about the issues discussed in the records. Additionally, the attachment to the memorandum is a non-final draft. The email has no content. Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.	.msg	False
GC-LIT-0470-0713075	02/12/2018 06:51:33 PM				OCA Information Memorandum - Accounting and Auditing Implications of Blockchain Technology, et al - February 12, 2018.pdf			.pdf	True
GC-LIT-0470-0713076	02/12/2018 06:51:33 PM				OCA Innovation Pillar - OCA Information Memorandum - Blockchain, et al - Attachment A.pdf			.pdf	True
GC-LIT-0470-0713108	03/06/2018 09:47:16 AM	External third party	Kahl, Daniel		RE Brilliant Analysis of the limits of Blockchain technology.msg	Exemption 6	SEC staff and third parties have a privacy interest in their contact information and details about their personal lives, and there is no public interest in knowing their contact information or details about their personal lives. Portions of this email thread have been released.	.msg	False
GC-LIT-0470-0713141	03/06/2018 11:08:56 AM	Christopher Lamirand	Lamirand, Charlotte Elizabeth		FW Brilliant Analysis of the limits of Blockchain technology .msg	Exemption 6	SEC staff and third parties have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Portions of this email thread have been released.	.msg	False

GC-LIT-0470-0711966	05/08/2018 01:27:16 PM	Brian Fields; Steele, Amy	Minke-Girard, Jenifer	Cameron McInnis; Jonathan Bravo	FW Firm publications on cryptocurrency accounting.msg	Exemption 4 Exemption 6	The withheld attachment consists of a March 2018 PwC overview. The SEC's understanding is that this overview has not been published and is not otherwise publicly available. Should Plaintiff seek the release of the attachment, the SEC will move forward with the confidential treatment process pursuant to the SEC's FOIA regulations.	.msg	False
GC-LIT-0470-0711967	05/08/2018 01:27:16 PM				cryptocurrency-bitcoin- accounting.pdf		SEC staff and third parties have a privacy interest in their contact information, and there is no public interest in knowing their contact information.	.pdf	True
GC-LIT-0470-0711968	05/08/2018 01:27:16 PM				EY-IFRS-Accounting-for-crypto- assets.pdf		Portions of this email thread have been released.	.pdf	True
GC-LIT-0470-0663342	06/15/2018 10:33:20 AM	Treasury staff	Szczepanik, Valerie		RE Crypto Working Group 4.msg	Exemption 6	Agency staff have a privacy interest in their names and contact information, and there is no public interest in knowing this information.	.msg	False
GC-LIT-0470-0663348	06/15/2018 10:33:20 AM				HKMA 20171024e1.pdf		Portions of this email thread have been released.	.pdf	True
GC-LIT-0470-0663334	06/18/2018 01:22:31 PM	Treasury staff	Szczepanik, Valerie		WS1 Docs - Regulatory.msg	Exemption 6	Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.	.msg	False
GC-LIT-0470-0663339	06/18/2018 01:22:31 PM				Euro Agency for Info and Network Security.pdf		Portions of this email thread have been released.	.pdf	True
GC-LIT-0470-0663423	09/05/2018 02:23:50 PM	Tomer, Kenneth	Szczepanik, Valerie		this is the product.msg	Exemption 4	The withheld records consist of a transmittal email and an attached base prospectus. The SEC's understanding is that this prospectus has not been made publicly available. Should Plaintiff seek the release of the attachment, the SEC will move forward with the confidential treatment process pursuant to the SEC's FOIA regulations.	.msg	False
GC-LIT-0470-0663424	09/05/2018 02:23:50 PM				2018-prospectus-(unofficial-- english-language-- translation).pdf	Exemption 6	Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.	.pdf	True
GC-LIT-0470-0663440	10/12/2018 02:39:24 PM	Kirk, Tyler	Szczepanik, Valerie		RE WSGR Practitioner Insight Overview of the Patent Landscape in the Blockchain, Cryptocurrency, and Cryptographic Token Space.msg	Exemption 6	Agency staff and third parties have a privacy interest in their contact information, and there is no public interest in knowing their contact information.	.msg	False

GC-LIT-0470-0714178	12/12/2018 12:09:10 PM	PCAOB staff	Jacobs, Elizabeth		Greetings & you around next week.msg	Exemption 6	Agency staff have a privacy interest in their contact information and personal lives, and there is no public interest in knowing their contact information and details about their personal lives. Portions of this email have been released.	.msg	False
GC-LIT-0470-0714179	12/12/2018 12:09:10 PM				federalregister121118.pdf			.pdf	True
GC-LIT-0470-0714180	01/23/2019 09:20:59 AM	External third party	Jacobs, Elizabeth		Fwd #117 Japan is trying to replace cash with crypto.msg	Exemption 6	Agency staff and third parties have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Portions of this email have been released.	.msg	False
GC-LIT-0470-0692369	02/08/2020 06:41:05 PM	Treasury staff	Szczepanik, Valerie		FATF Check-in.msg	Exemption 5 (deliberative process privilege) Exemption 6	The withheld email and attachment are inter-agency and consist of SEC analysis relating to digital assets for the Financial Action Task Force ("FATF"). The withheld records are deliberative because they reflect discussion and analysis about particular issues relevant to a digital asset and about related FATF work. The withheld records are pre-decisional because no decisions had been made about related FATF work. Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.	.msg	False
GC-LIT-0470-0692370	02/08/2020 06:41:05 PM				Summary Compilation - FATIF Version.docx			.docx	True
GC-LIT-0470-0663776	03/09/2020 05:35:35 PM	Treasury staff; FATF members	Szczepanik, Valerie		FW [B5] assessment - Next steps.msg	Exemption 5 (deliberative process privilege)	The withheld email thread and attachment are inter-agency and consist of discussion among FATF members about a draft digital-assets-related "assessment template." The withheld records are deliberative because they reflect discussion, analysis, and questions about the development of a draft document. The withheld records are pre-decisional because the draft document was not yet final.	.msg	False
GC-LIT-0470-0663777	03/09/2020 05:35:35 PM				Summary Compilation - [B5] assessment template - V2.docx	Exemption 6	Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.	.docx	True

GC-LIT-0470-0684303	03/27/2020 02:16:30 PM	Eric Baker	Srour, Dani		FW crypto and blockchain articles.msg	Exemption 4 Exemption 6	The withheld attachment consists of a book. The SEC's understanding is that this book has not been made publicly available. Should Plaintiff seek the release of the attachment, the SEC will move forward with the confidential treatment process pursuant to the SEC's FOIA regulations.	.msg	False
GC-LIT-0470-0684304	03/27/2020 02:16:30 PM				Investigating Cryptocurrencies.pdf		Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Portions of this email thread have been released.	.pdf	True
GC-LIT-0470-0663772	03/27/2020 03:11:47 PM	FATF member	Szczepanik, Valerie	Treasury staff	[B5] assessment - additional info.msg	Exemption 5 (deliberative process privilege) Exemption 6	The withheld email and attachment are inter-agency and consist of SEC staff discussion and comments about a draft digital-assets-related "assessment template." The withheld records are deliberative because they reflect discussion, analysis, and questions about the development of a draft document. The withheld records are pre-decisional because the draft document was being developed and was not final.	.msg	False
GC-LIT-0470-0663773	03/27/2020 03:11:47 PM				Revised SEC edits - Summary Compilation - [B5] assessment template (3-27 draft).docx		Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.	.docx	True
GC-LIT-0470-0663798	04/14/2020 04:20:12 PM	Treasury staff	Szczepanik, Valerie	Treasury staff	RE Comments on FATF [B5] Assessment.msg	Exemption 5 (deliberative process privilege) Exemption 6	The withheld email thread and attachment are inter-agency and consist of SEC and Treasury staff discussion about the development of a draft digital-assets-related "assessment template." The withheld records are deliberative because they reflect discussion, analysis, and questions about the development of a draft document. The withheld records are pre-decisional because the draft document was being developed and was not final.	.msg	False
GC-LIT-0470-0663799	04/14/2020 04:20:12 PM				202005 - May 2020 - FATF PDG - Draft [B5] assessment - Final.vs nits.docx		Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.	.docx	True

GC-LIT-0470-0663812	04/22/2020 09:45:05 AM	FATF member	Szczepanik, Valerie	Treasury staff	reportassessment suggestions.msg	Exemption 5 (deliberative process privilege)	The withheld email and attachments are inter-agency and consist of SEC staff discussion and comments about a draft digital-assets-related "assessment template" and report. The withheld records are deliberative because they reflect discussion and analysis about the development of draft documents. The withheld records are pre-decisional because the draft documents were being developed and were not final.	.msg	False
GC-LIT-0470-0663813	04/22/2020 09:45:05 AM				202005 - May 2020 - FATF PDG - Draft [B5] G20 report - v.4 (003)_US 4-21-2020.docx	Exemption 6	Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.	.docx	True
GC-LIT-0470-0663814	04/22/2020 09:45:05 AM				202005 - May 2020 - FATF PDG - Draft [B5] assessment - Final - v.3_US 4-21-2020.docx			.docx	True
GC-LIT-0470-0663817	04/28/2020 05:35:30 PM	FATF member	Szczepanik, Valerie	Treasury staff	RE Swiss comments on [B5] assessment.msg	Exemption 5 (deliberative process privilege)	The withheld email thread and attachment are inter-agency and consist of SEC and Treasury staff discussion about a draft digital-assets-related "assessment template." The withheld records are deliberative because they reflect discussion, comments, and questions about the development of a draft document. The withheld records are pre-decisional because the draft document was being developed and was not final.	.msg	False
GC-LIT-0470-0663818	04/28/2020 05:35:30 PM				202005 - may 2020 - fatf pdg - draft [B5] assessment - final - v.2 (2) comments Switzerland - US response.docx	Exemption 6	Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.	.docx	True
GC-LIT-0470-0663821	04/30/2020 12:51:11 PM	Treasury staff	Szczepanik, Valerie		FW Swiss comments on [B5] assessment.msg	Exemption 5 (deliberative process privilege)	The withheld email thread and attachment are inter-agency and consist of SEC and Treasury staff discussion about a draft digital-assets-related "assessment template." The withheld records are deliberative because they reflect discussion, comments, and questions about the development of a draft document. The withheld records are pre-decisional because the draft document was being developed and was not final.	.msg	False
GC-LIT-0470-0663822	04/30/2020 12:51:11 PM				202005 - may 2020 - fatf pdg - draft [B5] assessment - final - v.2 (2) comments Switzerland - US response - KM.VS.docx	Exemption 6	Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.	.docx	True

GC-LIT-0470-0696987	06/24/2020 08:52:27 PM	FBI staff	SEC ENF staff		smail 2 of 3.msg	Exemption 4	The withheld email and attachments consist of materials sent from SEC ENF staff to the FBI in connection with a pending ENF matter. Release of these records could interfere with ongoing enforcement proceedings.	.msg	False
GC-LIT-0470-0696996	06/24/2020 08:52:27 PM				[B5].pdf	Exemption 5 (attorney client privilege)		.pdf	True
						Exemption 6 Exemption 7(A) Exemption 7(C)	The withheld attachments consist of an external third party's analysis. The SEC's understanding is that these records have not been made publicly available. Should Plaintiff seek the release of the attachments, the SEC will move forward with the confidential treatment process pursuant to the SEC's FOIA regulations. Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. ENF and FBI staff have a privacy interest in not being associated with a law enforcement investigation, and the public interest in knowing this personal information is not outweighed by their privacy interests.		
GC-LIT-0470-0696997	06/24/2020 08:52:27 PM				[B5].pdf			.pdf	True
GC-LIT-0470-0696900	06/24/2020 08:55:56 PM	FBI staff	SEC ENF staff		smail 2 of 3 ([B5] submission 2).msg	Exemption 4	The withheld email and attachments consist of materials sent from SEC ENF staff to the FBI in connection with a pending ENF matter. Release of these records could interfere with ongoing enforcement proceedings.	.msg	False
GC-LIT-0470-0696903	06/24/2020 08:55:56 PM				[B5].pdf	Exemption 5 (attorney client privilege)		.pdf	True
						Exemption 6 Exemption 7(A) Exemption 7(C)	The withheld attachments consist of an external third party's analysis. The SEC's understanding is that these records have not been made publicly available. Should Plaintiff seek the release of the attachments, the SEC will move forward with the confidential treatment process pursuant to the SEC's FOIA regulations. Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. ENF and FBI staff have a privacy interest in not being associated with a law enforcement investigation, and the public interest in knowing this personal information is not outweighed by their privacy interests.		
GC-LIT-0470-0696907	06/24/2020 08:55:56 PM				[B5].pdf			.pdf	True

GC-LIT-0470-0700340	12/05/2020 01:12:37 PM	Paul Dowding	Maitra, Neelanjan		Call with Paul Dowding (Lab45).msg	Exemption 4 Exemption 6	The withheld responsive attachment consists of an external third party's analysis. Should Plaintiff seek the release of the attachment, the SEC will move forward with the confidential treatment process pursuant to the SEC's FOIA regulations.	.msg	False
GC-LIT-0470-0700344	12/05/2020 01:12:37 PM				The Unnecessary Consensus on Consensus 201712.pdf		Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Portions of this calendar invitation have been released.	.pdf	True
GC-LIT-0470-0701740	03/17/2021 09:25:04 AM	External third party	Jacobs, Elizabeth		IPM.Note.msg	Exemption 6	Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.	.msg	False
GC-LIT-0470-0701741	03/17/2021 09:25:04 AM				An-Investors-Perspective- March-2021.pdf		Portions of this email have been released.	.pdf	True
GC-LIT-0470-0686705	05/24/2021 02:19:13 PM	External third party	Smolar, Gregory		FW Money Stuff Merrill Lynch Puts Down the Phone.msg	Exemption 6	Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Portions of this email thread have been released.	.msg	False
GC-LIT-0470-0688736	06/08/2021 07:14:11 AM	External third party	Jacobs, Elizabeth		IPM.Note.msg	Exemption 6	Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.	.msg	False
GC-LIT-0470-0688737	06/08/2021 07:14:11 AM				WEF_DeFi_Policy_Maker_Tool kit_2021.pdf		Portions of this email have been released.	.pdf	True
GC-LIT-0470-0663946	06/29/2021 05:56:03 PM	Treasury staff	Szczepanik, Valerie		FW SECUST call re digital assets.msg	Exemption 5 (deliberative process privilege)	The withheld email thread and attachment are inter-agency and consist of SEC and Treasury staff discussion about a call concerning digital assets. The withheld records are deliberative because they reflect discussion about issues relating to digital assets. The withheld records are pre-decisional because no decisions had been made about the issues discussed in the referenced call. Additionally, the withheld attachment is a draft, non-public document prepared by FATF.	.msg	False
GC-LIT-0470-0663947	06/29/2021 05:56:03 PM				[B5].docx	Exemption 6	Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.	.docx	True

GC-LIT-0470-0703989	07/02/2021 08:13:26 AM	External third party	Jacobs, Elizabeth		IPM.Note.msg	Exemption 6 Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Portions of this email have been released.	.msg	False
GC-LIT-0470-0703990	07/02/2021 08:13:26 AM				work951.pdf		.pdf	True
GC-LIT-0470-0703991	07/02/2021 08:13:26 AM				WEF_Digital_Assets_Distributed_Ledger_Technology_2021.pdf		.pdf	True
GC-LIT-0470-0704115	07/14/2021 07:38:30 AM	External third party	Jacobs, Elizabeth		IPM.Note.msg	Exemption 6 Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Portions of this email have been released.	.msg	False
GC-LIT-0470-0704116	07/14/2021 07:38:30 AM				SSRN-id3866705 (1).pdf		.pdf	True
GC-LIT-0470-0705129	08/16/2021 08:56:44 AM		Harrington, James; Erb, Kasey; Bloch, David; Millman, Phillip		Nigro, Daniel Markets Daily Weakness Foreign Policy, Slowdown in Chinese Growth, COVID Variant Dampening Demand, Herd Immunity Concerns; Crypto Rallying - Ethereum Jettisoning Miners, Moving to Proof of Work.msg	Exemption 4 Exemption 6 The withheld attachments consist of Bloomberg articles. Should Plaintiff seek the release of the attachments, the SEC will move forward with the confidential treatment process pursuant to the SEC's FOIA regulations. Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Portions of this email have been released.	.msg	False
GC-LIT-0470-0705132	08/16/2021 08:56:44 AM				Bye-Bye, Miners! How Ethereum's Big Change Will Work.pdf		.pdf	True
GC-LIT-0470-0705133	08/16/2021 08:56:44 AM				Bye-Bye, Miners! How Ethereum's Big Change Will Work.pdf		.pdf	True
GC-LIT-0470-0687042	09/22/2021 02:00:27 PM	DOJ staff	Le, Tuongvy T		FW .msg	Exemption 6 Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Portions of this email have been released.	.msg	False
GC-LIT-0470-0687043	09/22/2021 02:00:27 PM				The TradFi to Crypto Pipeline (@VirtualElena).docx		.docx	True
GC-LIT-0470-0687524	10/01/2021 06:22:46 AM	External third party	Jacobs, Elizabeth		IPM.Note.msg	Exemption 6 Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Portions of this email have been released.	.msg	False
GC-LIT-0470-0687527	10/01/2021 06:22:46 AM				Will the next web be built on ethereum_ _ Financial Times.pdf		.pdf	True

GC-LIT-0470-0661514	11/03/2021 08:36:48 AM	European Commission staff	Jacobs, Elizabeth		RE ICYMI Europe's MiCA Crypto Rules Are Coming Soon. Here's Why They Matter — CoinDesk.msg	Exemption 5 (deliberative process privilege) Exemption 6	The email thread is inter-agency pursuant to the consultant corollary and contains discussion about possible policymaking. The withheld information is deliberative because it contains analysis of issues with policymaking and possible next steps in policy. The withheld information is pre-decisional because no decisions had been made about policymaking. Agency staff have a privacy interest in their contact information and details about their personal lives, and there is no public interest in knowing their contact information or details about their personal lives.	.msg	False
GC-LIT-0470-0661515	11/03/2021 08:36:48 AM				WEF_DeFi_Policy_Maker_Tool kit_2021.pdf		Portions of this email have been released.	.pdf	True
GC-LIT-0470-0707630	12/10/2021 02:59:01 PM	Federal Housing Finance Agency staff	Nigro, Daniel		FW Crypto Reference Piece.msg	Exemption 6	Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.	.msg	False
GC-LIT-0470-0707631	12/10/2021 02:59:01 PM				SP - Digitalization of Markets - Framing the Emerging Ecosystem - 09-2021.pdf		Portions of this email have been released.	.pdf	True
GC-LIT-0470-0707918	12/21/2021 09:13:02 AM	Bridget Lombardozi	SEC ENF staff		Ex-1.msg	Exemption 6	The withheld attachment consists of the confidential version of the expert report prepared by Professor Carol Osler in <i>SEC v. Ripple</i> . A publicly filed version of the attachment is available on the <i>SEC v. Ripple</i> docket (Dkt. No. 775-29).	.msg	False
GC-LIT-0470-0707919	12/21/2021 09:13:02 AM				Ex. 1.pdf	Exemption 7(C) Court protective order	Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. ENF staff have a privacy interest in not being associated with law enforcement, and the public interest in knowing this personal information is not outweighed by their privacy interests. Portions of this email have been released.	.pdf	True

GC-LIT-0470-0708645	01/19/2022 08:41:25 AM	Harrington, James; Bloch, David; Millman, Phillip	Nigro, Daniel		Markets Daily The Case for 2+% 10 Year Yields; Fed's Unprecedented Tightening Sows Uncertainty; Crypto.com Platform Halts Withdrawals After Suspicious Account Activity; Junk Slammed.msg	Exemption 6	Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Portions of this email have been released.	.msg	False
GC-LIT-0470-0708649	01/19/2022 08:41:25 AM				The race to dominate the DeFi ecosystem is on _ The Economist-1.pdf			.pdf	True
GC-LIT-0470-0687890	02/08/2022 03:04:59 PM	Bridget Lombardozi	SEC ENF staff		RE Ex 3.msg	Exemption 6	The withheld attachment consists of a confidential expert report prepared in <i>SEC v. Ripple</i> . A publicly filed version of the attachment is available on the <i>SEC v. Ripple</i> docket (Dkt. No. 775-7).	.msg	False
GC-LIT-0470-0687891	02/08/2022 03:04:59 PM				PA-3.pdf	Exemption 7(C) Court protective order	Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. ENF staff and third party experts have a privacy interest in not being associated with law enforcement investigations, and the public interest in knowing this personal information is not outweighed by their privacy interests. Portions of this email have been released.	.pdf	True
GC-LIT-0470-0687972	02/08/2022 07:06:17 PM	Bridget Lombardozi	Sylvester, Mark		Re 2-8-22 ROUGH DRAFT ONLY - ADRIAENS SEC v Ripple 220208BLO.msg	Exemption 6 Court protective order	The withheld attachment consists of a draft deposition transcript in <i>SEC v. Ripple</i> . A publicly filed version of the attachment is available on the <i>SEC v. Ripple</i> docket (Dkt. No. 796-32). Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.	.msg	False
GC-LIT-0470-0687973	02/08/2022 07:06:17 PM				2-8-22 SEC v Ripple (ROUGH DRAFT ONLY - ADRIAENS).txt		Portions of this email have been released.	.txt	True

GC-LIT-0470-0136681	03/15/2022 01:28:21 PM	DOJ staff	Buchholz, Steven		Fw Planning call for BaySEC Cyber and FinTech Update panel.msg	Exemption 5 (deliberative process privilege)	The email thread and withheld attachment are inter-agency and consist of discussion about an upcoming government staff only training. The withheld information is deliberative because it reflects discussion about proposed topics for the training and draft material to share at the training. The withheld information is pre-decisional because the subjects and material for the training were not yet final.	.msg	False
						Exemption 6 Exemption 7(C)	Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. FBI staff have a privacy interest in not being associated with law enforcement, and the public interest in knowing this personal information is not outweighed by their privacy interests. Portions of this email thread have been released.		
GC-LIT-0470-0136682	03/15/2022 01:28:21 PM				BaySEC 2022 Cyber panel draft outline.docx			.docx	True
						Exemption 5 (deliberative process privilege) Exemption 6 Exemption 7(C)	The email thread is inter-agency and consists of discussion about an upcoming government staff only training. The withheld information is deliberative because it reflects discussion about proposed topics and questions for the training. The withheld information is pre-decisional because the subjects and material for the training were not yet final. Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. FBI staff have a privacy interest in not being associated with law enforcement, and the public interest in knowing this personal information is not outweighed by their privacy interests. Portions of this email thread have been released.		
GC-LIT-0470-0136696	03/15/2022 02:04:58 PM	DOJ staff	Buchholz, Steven		Re Planning call for BaySEC Cyber and FinTech Update panel.msg			.msg	False
						Exemption 4 Exemption 6	The withheld attachment consists of a Bloomberg article. Should Plaintiff seek the release of the attachment, the SEC will move forward with the confidential treatment process pursuant to the SEC's FOIA regulations. Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Portions of this email have been released.		
GC-LIT-0470-0713769	04/12/2022 09:04:33 AM	Harrington, James; Hansen, Lars; Bloch, David; Millman, Phillip	Nigro, Daniel		Markets Daily Despite 8.5% Inflation Print, Markets Breathe Sigh of Relief & Rally Sharply as Traders Focus on Core CPI - Increase Moderates;.msg			.msg	False

GC-LIT-0470-0713777	04/12/2022 09:04:33 AM				Ethereum Undergoes Another Stress Test Ahead of Software Change.pdf			.pdf	True
GC-LIT-0470-0713746	04/19/2022 08:49:47 AM	Harrington, James; Hansen, Lars; Bloch, David; Millman, Phillip	Nigro, Daniel		Markets Daily Hot Economy, Rising Inflation The Fed Has Never Successfully Fixed a Problem Like This; Billions Are Being Wagered on Breakthrough Ethereum Revamping; Oil May Hit \$185 if EU Speedily Bans Russian Oil, JPMorgan Says .msg	Exemption 4 Exemption 6	The withheld attachment consists of a Bloomberg article. Should Plaintiff seek the release of the attachment, the SEC will move forward with the confidential treatment process pursuant to the SEC's FOIA regulations. Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Portions of this email have been released.	.msg	False
GC-LIT-0470-0713747	04/19/2022 08:49:47 AM				Billions Are Being Wagered on Breakthrough Ethereum Revamping 4-15-22.pdf			.pdf	True
GC-LIT-0470-0066557	05/09/2022 12:47:41 PM	FBI staff	Brannon, Nadia P		Training at SEC.msg	Exemption 5 (deliberative process privilege)	The withheld email and attachments are inter-agency and consist of discussion about and materials for discussion for an upcoming government staff only training. The withheld information is deliberative because it reflects discussion about proposed topics and materials for the training. The withheld information is pre-decisional because the subjects and material for the training were not yet final.	.msg	False
GC-LIT-0470-0066558	05/09/2022 12:47:41 PM				DeeperDiveSeriesDraft6.pptx	Exemption 6 Exemption 7(C)	Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. FBI staff have a privacy interest in not being associated with law enforcement, and the public interest in knowing this personal information is not outweighed by their privacy interests. Portions of this email thread have been released.	.pptx	True
GC-LIT-0470-0066559	05/09/2022 12:47:41 PM				[B5] Introduction.pptx			.pptx	True

GC-LIT-0470-0662444	05/31/2022 09:02:42 AM	Harrington, James; Hansen, Lars; Bloch, David; Millman, Phillip	Nigro, Daniel		Markets Daily Treasuries Sell Off, Risk Assets Lower as EU Union Committed to a Partial Ban on Russian Oil - Crude up 3.5%; Zombie Firms Face Slow Death in the US as Easy-Credit Era Ends.msg	Exemption 4 Exemption 6	The withheld attachment consists of a Bloomberg article. Should Plaintiff seek the release of the attachment, the SEC will move forward with the confidential treatment process pursuant to the SEC's FOIA regulations. Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Portions of this email have been released.	.msg	False
GC-LIT-0470-0662448	05/31/2022 09:02:42 AM				Battered DeFi Investors Put Their Hopes in Ethereum Revamp.pdf			.pdf	True
GC-LIT-0470-0713807	06/14/2022 08:52:35 AM	Harrington, James; Hansen, Lars; Bloch, David; Millman, Phillip	Nigro, Daniel		Markets Daily Bear Market Blues US Rates Have Biggest Two Days Since 1987; Crypto Sinks to \$22K; S&P in Bear Market; Junk Bonds See Biggest Decline in 2 Years; Loan Prices Drop Most Since 320.msg	Exemption 4 Exemption 6	The withheld attachment consists of a Bloomberg article. Should Plaintiff seek the release of the attachment, the SEC will move forward with the confidential treatment process pursuant to the SEC's FOIA regulations. Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Portions of this email have been released.	.msg	False
GC-LIT-0470-0713808	06/14/2022 08:52:35 AM				Crypto Staking Brawl Breaks Out in Middle of Ethereum Upgrade.pdf			.pdf	True
GC-LIT-0470-0713823	06/21/2022 04:21:30 PM	Bank for International Settlements staff	Kozhanov, Igor	Financial Stability Board staff	RE Note by team 1.msg	Exemption 5 (deliberative process privilege)	The withheld email thread and attachment are inter-agency pursuant to the consultant corollary. The withheld email thread reflects discussion concerning the drafting of part of a report about decentralized finance. The withheld information is deliberative because it reflects discussion about SEC staff's comments on the draft report, proposed edits to language in the report, and the process of drafting and editing the report. The withheld information is pre-decisional because staff were in the process of drafting the report.	.msg	False
GC-LIT-0470-0713824	06/21/2022 04:21:30 PM				DeFi202205 Team 1 Note on DeFi taxonomy BIS+SEC.docx	Exemption 6	The withheld attachment consists of a draft of a portion of the report. The draft report section is deliberative because it differs from the final report and reflects comments and proposed edits from SEC staff. The document is pre-decisional because it is a draft that was not adopted as final. Staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.	.docx	True

GC-LIT-0470-0709971	07/14/2022 09:17:54 PM	Samuels, Rachel S.	Juzenas, Eric	Samaras, Costa T.	RE FEEDBACK on v1 Crypto Climate Report.msg	Exemption 5 (deliberative process privilege)	The withheld email thread and attachment are inter-agency and consist of discussion about a draft White House report. The withheld information is deliberative because it reflects discussion about SEC staff's comments on the draft report, proposed edits to language in the report, and the process of drafting and editing the report. The withheld information is pre-decisional because staff were in the process of drafting the report.	.msg	False
						Exemption 6	The withheld attachment consists of a draft of the report. The draft report is deliberative because it differs from the final report and reflect comments and proposed edits from SEC staff. The document is pre-decisional because it is a draft that was not adopted as final. Staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.		
GC-LIT-0470-0709972	07/14/2022 09:17:54 PM				Compiled Feedback Version 1 070722 240pm ej 2.docx			.docx	True
GC-LIT-0470-0660819	07/21/2022 08:47:24 AM	Harrington, James; Hansen, Lars; Bloch, David; Millman, Phillip	Nigro, Daniel		Markets Daily ECB +50bp in 1st Hike Since 2011; Nordstream Gas Pipeline - Partial Re-Open; Housing Sales Down, But Prices Rise; HY 4 Day Rally Puts Yields at Lowest in 6 Weeks.msg	Exemption 6	Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Portions of this email have been released.	.msg	False
GC-LIT-0470-0709969	07/25/2022 05:44:46 PM	Samaras, Costa T.	Juzenas, Eric	Samuels, Rachel S.; Matt Aks	RE Section 4 of crypto report.msg	Exemption 5 (deliberative process privilege)	The withheld email thread and attachment are inter-agency and consist of discussion about a draft White House report. The withheld information is deliberative because it reflects discussion about SEC staff's comments on the draft report, proposed edits to language in the report, and the process of drafting and editing the report. The withheld information is pre-decisional because staff were in the process of drafting the report.	.msg	False
						Exemption 6	The withheld attachment consists of a draft of the report. The draft report is deliberative because it differs from the final report and reflects comments and proposed edits from SEC staff. The document is pre-decisional because it is a draft that was not adopted as final. Staff have a privacy interest in their contact information and details about their personal lives, and there is no public interest in knowing their contact information or details about their personal lives.		
GC-LIT-0470-0709970	07/25/2022 05:44:46 PM				072522 Crypto Exec Summary.docx			.docx	True

GC-LIT-0470-0760947	07/28/2022 03:29:27 PM	lamele, Stacy	Hartz, Dana M		RE Crypto Webinar from David Holt.msg	Exemption 6	Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Portions of this email have been released.	.msg	False
GC-LIT-0470-0760958	07/29/2022 11:03:37 AM	lamele, Stacy	Hartz, Dana M		RE Crypto Webinar from David Holt.msg	Exemption 6	Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Portions of this email have been released.	.msg	False
GC-LIT-0470-0113022	07/29/2022 05:28:17 PM	FBI staff	Brannon, Nadia P		RE Digital Assets Prep Call.msg	Exemption 5 (deliberative process privilege)	The email thread and withheld attachments are inter-agency and consist of discussion about and draft materials for discussion for an upcoming government staff only training. The withheld information is deliberative because it reflects discussion about proposed topics and draft materials for the training. The withheld information is pre-decisional because the subjects and draft materials for the training were not yet final. Agency staff have a privacy interest in their contact information and details about their private lives, and there is no public interest in knowing their contact information or details about their private lives. FBI staff have a privacy interest in not being associated with law enforcement, and the public interest in knowing this personal information is not outweighed by their privacy interests. Portions of the email thread have been released.	.msg	False
GC-LIT-0470-0113023	07/29/2022 05:28:17 PM				Crypto Basics SEC training Aug 2022 Day 2.pptx	Exemption 6		.pptx	True
GC-LIT-0470-0113024	07/29/2022 05:28:17 PM				Crypto Basics SEC training Aug 2022 Day 3.pptx	Exemption 7(C)		.pptx	True
GC-LIT-0470-0113025	07/29/2022 05:28:17 PM				pptembeddingsMicrosoft_Excel_Worksheet.xlsx			.xlsx	True
GC-LIT-0470-0113026	07/29/2022 05:28:17 PM				pptembeddingsMicrosoft_Excel_Worksheet1.xlsx			.xlsx	True
GC-LIT-0470-0113027	07/29/2022 05:28:17 PM				Crypto Basics SEC training Aug 2022 Day 1.pptx			.pptx	True
GC-LIT-0470-0113005	07/29/2022 07:07:43 PM	FBI staff	Brannon, Nadia P		FW Digital Assets Prep Call.msg	Exemption 5 (deliberative process privilege)	The withheld email thread and attachment are inter-agency and consist of discussion about and draft materials for discussion for an upcoming government staff only training. The withheld information is deliberative because it reflects discussion about proposed topics and draft materials for the training. The withheld information is pre-decisional because the subjects and draft materials for the training were not yet final.	.msg	False
GC-LIT-0470-0113006	07/29/2022 07:07:43 PM				Crypto Basics SEC training Aug 2022 Day 1.pptx	Exemption 6 Exemption 7(C)	Agency staff have a privacy interest in their contact information and details about their private lives, and there is no public interest in knowing their contact information or details about their private lives. FBI staff have a privacy interest in not being associated with law enforcement, and the public interest in knowing this personal information is not outweighed by their privacy interests. Portions of this email thread have been released.	.pptx	True

GC-LIT-0470-0113016	08/08/2022 04:46:45 PM	Thompson, Andrew S	Brannon, Nadia P	Thompson, Angela; FBI staff	Slides for tomorrow's training on Digital Assets.msg	Exemption 5 (deliberative process privilege)	The withheld information from the email and the withheld attachment are inter-agency and consist of discussion about and materials for an upcoming government staff only training. The withheld information is deliberative because it reflects discussion and analysis by SEC and FBI staff about certain issues relating to digital assets. The withheld information is pre-decisional because decisions had not been made about issues discussed in the training.	.msg	False
GC-LIT-0470-0113017	08/08/2022 04:46:45 PM				Crypto Basics SEC training Aug 2022 Day 1.pptx	Exemption 6 Exemption 7(C)	Agency staff have a privacy interest in their contact information and details about their private lives, and there is no public interest in knowing their contact information or details about their private lives. FBI staff have a privacy interest in not being associated with law enforcement, and the public interest in knowing this personal information is not outweighed by their privacy interests. Portions of this email have been released.	.pptx	True
GC-LIT-0470-0709507	08/19/2022 08:53:25 AM	Harrington, James; Hansen, Lars; Bloch, David; Millman, Phillip	Nigro, Daniel		Markets Daily Housing - In Recession Already; \$2 Trillion Options Deadline Today Is Make-Or-Break Moment for Bulls; Jackson Hole Next Week Looming Hawkish .msg	Exemption 6	Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Portions of this email have been released.	.msg	False
GC-LIT-0470-0761360	08/20/2022 02:58:11 PM	Barbon, Andrea	Kozhanov, Igor		Re CEBRA 2022 - Latest version of our paper.msg	Exemption 4 Exemption 6	The withheld attachment consists of a draft article. Should Plaintiff seek the release of the attachment, the SEC will move forward with the confidential treatment process pursuant to the SEC's FOIA regulations. Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Portions of this email have been released.	.msg	False
GC-LIT-0470-0761368	08/20/2022 02:58:11 PM				Barbon and Rinaldo 19-08-2022.pdf			.pdf	True
GC-LIT-0470-0761440	08/23/2022 08:38:31 AM	Harrington, James; Hansen, Lars; Bloch, David; Millman, Phillip	Nigro, Daniel		Markets Daily Wall St. Swings From Greed to Fear Before Jackson Hole; Saudis Make a Push for \$100 Oil; Nat Gas Trades at Equiv. of \$470barrel Oil in Europe.msg	Exemption 6	Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Portions of this email have been released.	.msg	False

GC-LIT-0470-0761536	08/29/2022 08:46:19 AM	Harrington, James; Hansen, Lars; Bloch, David; Millman, Phillip	Nigro, Daniel		Markets Daily Powell's Speech Leads to More Risk-Off, Higher Yields - Higher Rates For Longer Bitcoin Back Below \$20K; Credit Spreads Wider - at 4 Week High.msg	Exemption 4 Exemption 6	The withheld attachment consists of a Bloomberg article. Should Plaintiff seek the release of the attachment, the SEC will move forward with the confidential treatment process pursuant to the SEC's FOIA regulations. Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Portions of this email have been released.	.msg	False
GC-LIT-0470-0761542	08/29/2022 08:46:19 AM				Bitcoin Back Down Below \$20,000 as Hawkish Fed Weighs on Crypto.pdf			.pdf	True
GC-LIT-0470-0659977	08/29/2022 09:19:20 AM	Goldstein, Alexis (CFPB)	Frayner, Corey		Commerce Comments SMAIL.msg	Exemption 5 (deliberative process privilege)	The withheld attachment is inter-agency and consists of a draft report. The withheld attachment is deliberative because it reflects edits and comments by SEC staff on the draft report. The withheld attachment is pre-decisional because it is a non-final draft.	.msg	False
GC-LIT-0470-0659978	08/29/2022 09:19:20 AM				Digital Assets Competitiveness Report 8.22 - for IPC.SEC staff cmnts FINAL.docx	Exemption 6	Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Portions of this email have been released.	.docx	True
GC-LIT-0470-0761616	08/30/2022 09:25:35 AM	External third party	CF Office of Finance		SEC Comment Letter Bit Digital, Inc F-3.msg		These records have been released in full.	.msg	False
GC-LIT-0470-0761617	08/30/2022 09:25:35 AM				Bit Digital, Inc F-3 Letter.pdf			.pdf	True
GC-LIT-0470-0761614	08/30/2022 09:25:37 AM	External third party	CF Office of Finance		SEC Comment Letter Bit Digital, Inc F-3.msg		These records have been released in full.	.msg	False
GC-LIT-0470-0761615	08/30/2022 09:25:37 AM				Bit Digital, Inc F-3 Letter.pdf			.pdf	True

GC-LIT-0470-0660986	09/02/2022 12:56:43 AM	FSB staff, BIS staff	Kozhanov, Igor		RE DeFi report.msg	Exemption 5 (deliberative process privilege) Exemption 6	The withheld email thread and attachment are inter-agency pursuant to the consultant corollary. The withheld email thread reflects discussion concerning the drafting of a report about decentralized finance. The withheld information is deliberative because it reflects discussion about SEC staff's comments and questions on the draft report, proposed edits to language in the report, and the process of drafting and editing the report. The withheld information is pre-decisional because staff were in the process of drafting the report. The withheld attachment consists of a draft of the report. The draft report is deliberative because it differs from the final report and reflect comments and proposed edits from SEC staff. The document is pre-decisional because it is a draft that was not adopted as final. Staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.	.msg	False
GC-LIT-0470-0660987	09/02/2022 12:56:43 AM				Preliminary findings report - Draft to Igor 1 Sept - IK.docx			.docx	True
GC-LIT-0470-0661060	09/07/2022 08:48:01 AM	Harrington, James; Hansen, Lars; Bloch, David; Millman, Phillip	Nigro, Daniel		Markets Daily Dollar Screams Higher, Stocks Aim to 8th Straight Lower Day, 1st MoM Decline in Housing Prices Since '11; Bitcoin \$19K Reflects Lower Risk Appetite Across Sectors.msg	Exemption 6	Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Portions of this email have been released.	.msg	False
GC-LIT-0470-0661061	09/07/2022 08:48:01 AM				Ethereum Aims to Become the Internet of Crypto With 'The Merge' _ Barron's.pdf			.pdf	True
GC-LIT-0470-0761760	09/07/2022 05:35:42 PM	Melissa Montanez	Dent, Denene		RE CoinDesk TV Media Request X Hester Pierce X July 28th at 900 AM ET.msg	Exemption 6	Agency staff and external third parties have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Portions of this email have been released.	.msg	False
GC-LIT-0470-0713984	09/13/2022 09:02:51 AM	Harrington, James; Hansen, Lars; Bloch, David; Millman, Phillip	Nigro, Daniel		Markets Daily CPI Report Disappoints, Equity Futures Plunge, Rates Up - The Fed's Work Isn't Over.msg	Exemption 4 Exemption 6	The withheld attachment consists of a Bloomberg article. Should Plaintiff seek the release of the attachment, the SEC will move forward with the confidential treatment process pursuant to the SEC's FOIA regulations. Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.	.msg	False

GC-LIT-0470-0713992	09/13/2022 09:02:51 AM				The Ethereum Merge Ups the Stakes—and Reshapes Crypto's Universe.pdf		Portions of this email have been released.	.pdf	True
GC-LIT-0470-0761888	09/13/2022 09:21:11 AM	Cynthia Baughman	Rosenberg, Michael		RE ProShares Ether Strategy ETF - Draft Prospectus .msg	Exemption 6	Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Portions of the email thread have been released.	.msg	False
GC-LIT-0470-0761938	09/15/2022 11:04:57 AM	Passman, Allison	Wells, Michael D.		Accepted FW Today at 11 - Session re the Ethereum Merge.msg	Exemption 6	Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Portions of the calendar invitation have been released.	.msg	False
GC-LIT-0470-0661026	09/19/2022 03:22:04 PM	Isaac Arnold; Kimberly Manherz	Harmon, Florence E.		FW 16 Sep 2022 SEC Daily News Clips (if available and same, can we use free version of Bloomberg.com and not Bloomberg Law version).msg	Exemption 6	Agency staff and external third party individuals have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Portions of the email thread have been released.	.msg	False
GC-LIT-0470-0762127	09/27/2022 07:34:58 PM	International Organization of Securities Commissions ("IOSCO") staff	Boone, Sherman G.		RE CER Risk Outlook 2023 - for fatal flaw review by close Tuesday, 27 September..msg	Exemption 5 (deliberative process privilege) Exemption 6	The withheld email thread is inter-agency pursuant to the consultant corollary. The withheld email thread reflects discussion concerning the drafting of an internal IOSCO report. The withheld information is deliberative because it reflects discussion about staff's comments, proposals, and questions on the draft report and the process of drafting and editing the report. The withheld information is pre-decisional because staff were in the process of drafting the report. The withheld attachment consists of a draft report. The draft report is deliberative because it reflects staff comments and proposed edits. The draft is pre-decisional because it is a non-final draft. Staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.	.msg	False
GC-LIT-0470-0762128	09/27/2022 07:34:58 PM				IOSCO CER Risk Outlook 2023 - for fatal flaw review+SEC redlines.docx			.docx	True

GC-LIT-0470-0762186	09/28/2022 08:57:38 AM	Harrington, James; Hansen, Lars; Bloch, David; Millman, Phillip	Nigro, Daniel		Markets Daily BOE Warns of Material Risk to Financial Stability - Steps Into Gilt Market to Avoid Cash Crash; UST Market Rallies, Futures Rise - Will Global Turmoil Slow Demand Enough to Reduce Fed Actions.msg	Exemption 4 Exemption 6	The withheld attachment consists of a Financial Times article. Should Plaintiff seek the release of the attachment, the SEC will move forward with the confidential treatment process pursuant to the SEC's FOIA regulations. Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Portions of this email have been released.	.msg	False
GC-LIT-0470-0762196	09/28/2022 08:57:38 AM				FT -'Volatility vortex' slams into \$24tn US government bond market - 09-28-2022.pdf			.pdf	True
GC-LIT-0470-0663533	10/13/2022 05:17:50 PM	Monetary Authority of Singapore staff	Szczepanik, Valerie	IOSCO staff, Financial Conduct Authority staff, Monetary Authority of Singapore staff	Re FTF Chair's IOSCO Board Update on FTF.msg	Exemption 5 (deliberative process privilege) Exemption 6	The email thread and withheld attachment are inter-agency pursuant to the consultant corollary. The withheld attachment consists of a draft deck for an upcoming IOSCO meeting. The attachment is deliberative because it is a draft deck, and it is pre-decisional because it is a non-final draft. Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Portions of this email thread have been released.	.msg	False
GC-LIT-0470-0663534	10/13/2022 05:17:50 PM				2022-10-18 IOSCO Board FTF Update deck.pptx			.pptx	True
GC-LIT-0470-0762349	10/14/2022 12:58:39 PM	Passman, Allison; Tveiten-Rifman, Jennifer	Diamantopoulos, Tina		RE [EXTERNAL] RE Speaker for Crypto Panel.msg	Exemption 5 (deliberative process privilege) Exemption 6 Exemption 7(C)	The withheld language is contained in an inter-agency email and reflects a draft summary and proposed discussion for the panel. The withheld language is deliberative because it reflects proposed language for discussion and a proposed approach for the panel, and it is pre-decisional because it contains edits to draft language and reflects non-final discussion about the panel. Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Federal Reserve examination staff have a privacy interest in not being associated with law enforcement, and the public interest in knowing this personal information is not outweighed by their privacy interests. Portions of this email have been released.	.msg	False

GC-LIT-0470-0762348	10/14/2022 12:59:11 PM	Tveiten-Rifman, Jennifer; Passman, Allison	Diamantopoulos, Tina		RE [EXTERNAL] RE Speaker for Crypto Panel.msg	Exemption 5 (deliberative process privilege) Exemption 6 Exemption 7(C)	The withheld language is contained in an inter-agency email and reflects a draft summary and proposed discussion for the panel. The withheld language is deliberative because it reflects proposed language for discussion and a proposed approach for the panel, and it is pre-decisional because it contains edits to draft language and reflects non-final discussion about the panel. Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Federal Reserve examination staff have a privacy interest in not being associated with law enforcement, and the public interest in knowing this personal information is not outweighed by their privacy interests. Portions of this email have been released.	.msg	False
GC-LIT-0470-0713896	10/14/2022 04:00:15 PM	External third party	CF Office of Finance		SEC Comment Letter Social Leverage Acquisition Corp I PREM14A.msg		These records have been released in full.	.msg	False
GC-LIT-0470-0713897	10/14/2022 04:00:15 PM				Social Leverage Acquisition Corp I PREM14A Letter.pdf			.pdf	True
GC-LIT-0470-0762547	10/16/2022 08:02:10 PM	Tveiten-Rifman, Jennifer	Diamantopoulos, Tina	[B6, B7(C)]; Passman, Allison	Re MWIA- Supervision Working Group-.msg	Exemption 5 (deliberative process privilege) Exemption 6 Exemption 7(C)	The withheld language is contained in an inter-agency email and reflects draft language. The withheld language is deliberative because it reflects proposed language for discussion, and it is pre-decisional because it contains edits to draft language. Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Federal Reserve examination staff have a privacy interest in not being associated with law enforcement, and the public interest in knowing this personal information is not outweighed by their privacy interests. Portions of this email have been released.	.msg	False
GC-LIT-0470-0661259	10/24/2022 09:00:03 AM	Harrington, James; Hansen, Lars; Bloch, David; Millman, Phillip	Nigro, Daniel		Markets Daily Signs That the Fed May Pause After Jan Has Equities Rallying - If the UK & Emerging Markets' Debt Markets are at Risk in Response to \$ Strength & Higher Rates.....msg	Exemption 4 Exemption 6	The withheld attachment consists of a Bloomberg article. Should Plaintiff seek the release of the attachment, the SEC will move forward with the confidential treatment process pursuant to the SEC's FOIA regulations. Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Portions of this email have been released.	.msg	False

GC-LIT-0470-0661262	10/24/2022 09:00:03 AM				Crypto Is More Attractive as SEC Gets Aggressive - Bloomberg MLIV Pulse.pdf			.pdf	True
GC-LIT-0470-0762654	10/26/2022 03:45:58 PM	B3	CF Office of Finance		SEC Comment Letter [B3] DRSA.msg	Exemption 3 Exemption 4	The withheld transmittal email and attachment consist of a non-public comment letter concerning a draft registration statement submitted by a third party. Section 106 of the JOBS Act requires the Commission to protect the confidentiality of an emerging growth company's draft registration statements during the Commission's nonpublic review of the statements (prior to the company's initial public offering). The letter and attachment contain confidential commercial and financial information obtained from a person.	.msg	False
GC-LIT-0470-0762655	10/26/2022 03:45:58 PM				[B3] Letter.pdf			.pdf	True
GC-LIT-0470-0762656	10/26/2022 03:46:00 PM	B3	CF Office of Finance		SEC Comment Letter [B3] DRSA.msg	Exemption 3 Exemption 4	The withheld transmittal email and attachment consist of a non-public comment letter concerning a draft registration statement submitted by a third party. Section 106 of the JOBS Act requires the Commission to protect the confidentiality of an emerging growth company's draft registration statements during the Commission's nonpublic review of the statements (prior to the company's initial public offering). The letter and attachment contain confidential commercial and financial information obtained from a person.	.msg	False
GC-LIT-0470-0762657	10/26/2022 03:46:00 PM				[B3] Letter.pdf			.pdf	True
GC-LIT-0470-0713905	10/27/2022 09:34:00 AM	External third party	CF Office of Finance		SEC Comment Letter Lion Group Holding Ltd F-1A.msg		These records have been released in full.	.msg	False
GC-LIT-0470-0713906	10/27/2022 09:34:00 AM				Lion Group Holding Ltd F-1A Letter.pdf			.pdf	True
GC-LIT-0470-0762725	11/02/2022 10:51:32 AM	External third party	CF Office of Finance		SEC Comment Letter Global-Smart.Tech Inc. S-1.msg		These records have been released in full.	.msg	False
GC-LIT-0470-0762726	11/02/2022 10:51:32 AM				Global-Smart.Tech Inc. S-1 Letter.pdf			.pdf	True
GC-LIT-0470-0762723	11/02/2022 10:51:34 AM	External third party	CF Office of Finance		SEC Comment Letter Global-Smart.Tech Inc. S-1.msg		These records have been released in full.	.msg	False
GC-LIT-0470-0762724	11/02/2022 10:51:34 AM				Global-Smart.Tech Inc. S-1 Letter.pdf			.pdf	True

GC-LIT-0470-0762749	11/03/2022 08:48:54 AM	Harrington, James; Hansen, Lars; Bloch, David; Millman, Phillip	Nigro, Daniel		Markets Daily Powell Re-Frames - From Size of Hikes, to Terminal Rate & Duration - Markets Pivot to No Pivot - Hawkishness Leaves Markets Worldwide to Reflect, Reconsider.msg	Exemption 6	Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Portions of this email have been released.	.msg	False
GC-LIT-0470-0762761	11/03/2022 08:48:54 AM				FT -Crypto miners hit hard in digital asset industry's downturn - 11-03-2022.pdf			.pdf	True
GC-LIT-0470-0762787	11/06/2022 08:40:34 PM	Passman, Allison; Tveiten-Rifman, Jennifer	Diamantopoulos, Tina		RE Tomorrow!.msg	Exemption 5 (deliberative process privilege) Exemption 6 Exemption 7(C)	The withheld language is contained in an inter-agency email and reflects draft language. The withheld language is deliberative because it reflects proposed language for discussion, and it is pre-decisional because it contains edits to draft language. Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Federal Reserve examination staff have a privacy interest in not being associated with law enforcement, and the public interest in knowing this personal information is not outweighed by their privacy interests. Portions of this email have been released.	.msg	False
GC-LIT-0470-0762925	11/07/2022 08:42:27 AM	Harrington, James; Hansen, Lars; Bloch, David; Millman, Phillip	Nigro, Daniel		Markets Daily Inflation Watch Week; SCOTUS to Hear Arguments Today to Rein in Regulators; Fed warns sharply higher interest rates could spark financial distress .msg	Exemption 4 Exemption 6	The withheld attachment consists of a Bloomberg article. Should Plaintiff seek the release of the attachment, the SEC will move forward with the confidential treatment process pursuant to the SEC's FOIA regulations. Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Portions of this email have been released.	.msg	False
GC-LIT-0470-0762930	11/07/2022 08:42:27 AM				Ethereum Insiders to Get Fee Cuts That Others Won't in Upgrade.pdf			.pdf	True
GC-LIT-0470-0762871	11/08/2022 02:27:17 PM	External third party	CF Office of Finance		SEC Comment Letter Bit Digital, Inc F-3A.msg		These records have been released in full.	.msg	False
GC-LIT-0470-0762872	11/08/2022 02:27:17 PM				Bit Digital, Inc F-3A Letter.pdf			.pdf	True

GC-LIT-0470-0762873	11/08/2022 02:27:19 PM	External third party	CF Office of Finance		SEC Comment Letter Bit Digital, Inc F-3A.msg		These records have been released in full.	.msg	False
GC-LIT-0470-0762874	11/08/2022 02:27:19 PM				Bit Digital, Inc F-3A Letter.pdf			.pdf	True
GC-LIT-0470-0762897	11/08/2022 06:16:36 PM	External third party	CF Office of Finance		SEC Comment Letter GSR II Meteora Acquisition Corp. PREM14A.msg		These records have been released in full.	.msg	False
GC-LIT-0470-0762898	11/08/2022 06:16:36 PM				GSR II Meteora Acquisition Corp. PREM14A Letter.pdf			.pdf	True
GC-LIT-0470-0762895	11/08/2022 06:16:38 PM	External third party	CF Office of Finance		SEC Comment Letter GSR II Meteora Acquisition Corp. PREM14A.msg		These records have been released in full.	.msg	False
GC-LIT-0470-0762896	11/08/2022 06:16:38 PM				GSR II Meteora Acquisition Corp. PREM14A Letter.pdf			.pdf	True
GC-LIT-0470-0763376	11/29/2022 09:22:44 AM	Bank of England staff	Hutchinson, Kathleen		RE [EXTERNAL] Meeting.msg	Exemption 5 (deliberative process privilege) Exemption 6	The withheld email is inter-agency pursuant to the consultant corollary and consists of the proposed subjects of a draft note. The withheld information is deliberative because it reflects topics of proposed analysis, and it is pre-decisional because the note was still in draft form. Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Bank of England staff have a privacy interest in their identities, and there is no public interest in knowing their names. Portions of the email thread have been released.	.msg	False
GC-LIT-0470-0763377	11/29/2022 09:34:50 AM	Bank of England staff	Hutchinson, Kathleen		FW SEC-BoE call on Ethereum Merge note.msg	Exemption 6	Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Portions of the calendar invitation have been released.	.msg	False
GC-LIT-0470-0713925	12/19/2022 02:43:21 PM	External third party	CF Office of Finance		SEC Comment Letter Social Leverage Acquisition Corp I PRER14A.msg		These records have been released in full.	.msg	False
GC-LIT-0470-0713926	12/19/2022 02:43:21 PM				Social Leverage Acquisition Corp I PRER14A Letter.pdf			.pdf	True

GC-LIT-0470-0711419	01/03/2023 08:44:08 AM	Harrington, James; Hansen, Lars; Bloch, David; Millman, Phillip	Nigro, Daniel		Markets Daily What Will the Economy Look Like in 2023 Big Banks Predict Recession, Fed Pivot in 2023; IMF's Georgieva Expects Third of World to Suffer Recession; Law 360 Trends to Watch.msg	Exemption 4 Exemption 6	The withheld attachment consists of an Ignites article. Should Plaintiff seek the release of the attachment, the SEC will move forward with the confidential treatment process pursuant to the SEC's FOIA regulations. Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Portions of this email have been released.	.msg	False
GC-LIT-0470-0711432	01/03/2023 08:44:08 AM				Ignites - Steady Sales for Bitcoin Futures ETFs amid 'Crypto Winter' - 01-03-2023.pdf			.pdf	True
GC-LIT-0470-0714014	01/31/2023 01:25:26 PM	External third party	CF Office of Finance		SEC Comment Letter XP Inc. CORRESP.msg		These records have been released in full.	.msg	False
GC-LIT-0470-0714015	01/31/2023 01:25:26 PM				XP Inc. CORRESP Letter.pdf			.pdf	True
GC-LIT-0470-0710361	01/31/2023 05:04:40 PM	IOSCO staff	Marchak, Margaret		FW docs.msg	Exemption 5 (deliberative process privilege) Exemption 6	The withheld attachment is inter-agency pursuant to the consultant corollary and consists of proposed topics of discussion at a panel at an IOSCO meeting. The withheld attachment is deliberative because it contains proposed topics of discussion for a panel as well as questions about possible approaches in regulatory agendas. The withheld attachment is pre-decisional because no decisions had been made about the issues discussed in the proposed topics overview. Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Portions of this email have been released.	.msg	False
GC-LIT-0470-0710362	01/31/2023 05:04:40 PM				FTF SG - IOSCO DeFi WG Roundtable- Panelist questions and timing.docx			.docx	True
GC-LIT-0470-0765223	02/15/2023 02:24:39 PM	External third party	CF Office of Crypto Assets		SEC Comment Letter Social Leverage Acquisition Corp I CORRESP.msg		These records have been released in full.	.msg	False
GC-LIT-0470-0765224	02/15/2023 02:24:39 PM				Social Leverage Acquisition Corp I CORRESP Letter.pdf			.pdf	True
GC-LIT-0470-0765227	02/15/2023 02:24:41 PM	External third party	CF Office of Crypto Assets		SEC Comment Letter Social Leverage Acquisition Corp I CORRESP.msg		These records have been released in full.	.msg	False
GC-LIT-0470-0765228	02/15/2023 02:24:41 PM				Social Leverage Acquisition Corp I CORRESP Letter.pdf			.pdf	True

GC-LIT-0470-0709942	02/15/2023 06:40:21 PM	IOSCO staff	Szczepanik, Valerie		Fwd [B5] Paper.msg	Exemption 4	The withheld attachment consists of a research paper prepared by a third-party individual. The SEC's understanding is that this paper has not been published and is not otherwise publicly available. Should Plaintiff seek the release of the attachment, the SEC will move forward with the confidential treatment process pursuant to the SEC's FOIA regulations.	.msg	False
						Exemption 5 (deliberative process privilege)	Additionally, the email thread is inter-agency pursuant to the consultant corollary and reflects the subject matter of discussion between the SEC and IOSCO members. The withheld attachment is deliberative because it reflects discussion about what issues the SEC proposed that the IOSCO should focus on. It is pre-decisional because a decision had not been made about the issues discussed in the paper.		
						Exemption 6	Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Additionally, individuals outside of the SEC who provide information to the SEC have a privacy interest in their names and contact information, and there is no public interest in knowing their names or contact information. Portions of the email thread have been released.		
GC-LIT-0470-0709943	02/15/2023 06:40:21 PM				[B5]Paper.docx			.docx	True
						Exemption 6	Agency staff and external third parties have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Portions of the email thread have been released.		
GC-LIT-0470-0765470	02/24/2023 04:44:33 PM	Bo Howell	Foor, Jeffrey A.		RE Ethereum Fund.msg			.msg	False
GC-LIT-0470-0714030	03/23/2023 11:13:37 AM	External third party	CF Office of Crypto Assets		SEC Comment Letter Hut 8 Corp. S-4.msg		These records have been released in full.	.msg	False
GC-LIT-0470-0714031	03/23/2023 11:13:37 AM				Hut 8 Corp. S-4 Letter.pdf			.pdf	True

GC-LIT-0470-0714048	04/04/2023 02:12:40 PM	Alethea Bard	IOSCO staff		FW IARC-COSRA Virtual Meeting - 9 March 2023 - PPT slide decks.msg	Exemption 5 (deliberative process privilege)	The withheld attachment is inter-agency pursuant to the consultant corollary and consists of a deck regarding the then-ongoing work of an IOSCO working group. The attachment is deliberative because it reflects policymaking processes and recommendations, and it is pre-decisional because decisions had not been made about the policy issues that the group focused on.	.msg	False
GC-LIT-0470-0714049	04/04/2023 02:12:40 PM				Ag item 3 - FTF work - Tuang Lee Lim - IARC-COSRA meeting 9 March 2023.pdf	Exemption 6	Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Additionally, IOSCO staff have a privacy interest in their names and contact information, and there is no public interest in knowing their names or contact information. Portions of the email thread have been released.	.pdf	True
GC-LIT-0470-0123392	04/12/2023 10:01:49 AM	DOJ staff	Hirsch, David L		Congrats!.msg	Exemption 6	Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Additionally, DOJ staff have a privacy interest in their names, contact information, and other identifying information, and there is no public interest in knowing this information. Portions of the email thread have been released.	.msg	False
GC-LIT-0470-0123394	04/12/2023 10:01:49 AM				SSRN-id4187752.pdf			.pdf	True
GC-LIT-0470-0711657	04/19/2023 05:19:46 PM	Treasury staff	Pierce, Lauren		FW Money Stuff Betterment Missed Some Tax Trades.msg	Exemption 6	Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Portions of the email thread have been released.	.msg	False
GC-LIT-0470-0767563	05/03/2023 12:55:07 PM	External third party	CF Office of Crypto Assets		SEC Comment Letter Global-Smart.Tech Inc. S-1A.msg		These records have been released in full.	.msg	False
GC-LIT-0470-0767564	05/03/2023 12:55:07 PM				Global-Smart.Tech Inc. S-1A Letter.pdf			.pdf	True
GC-LIT-0470-0767537	05/03/2023 12:55:24 PM	External third party	CF Office of Crypto Assets		SEC Comment Letter Global-Smart.Tech Inc. S-1A.msg		These records have been released in full.	.msg	False
GC-LIT-0470-0767538	05/03/2023 12:55:24 PM				Global-Smart.Tech Inc. S-1A Letter.pdf			.pdf	True

GC-LIT-0470-0768171	05/22/2023 08:44:09 AM	James Harrington, Lars Hansen, David Bloch, Philip Millman	Nigro, Daniel		Markets Daily Use AI to tackle financial crime Zero-Day Options Are Reordering the Way the Stock Market Behaves; Private Credit Offers About the Only Path to Funding LBOs Now; Allen & Overy to Merge With Shearman & Sterling.msg	Exemption 6	Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Portions of the email have been released.	.msg	False
GC-LIT-0470-0768181	05/22/2023 08:44:09 AM				Law360 - Expert Analysis - Gov_t Backtrack On Ether As Security May Spur Crypto Clash - 05-19-2023.pdf			.pdf	True
GC-LIT-0470-0768712	06/01/2023 09:47:05 AM	External third party	CF Office of Crypto Assets		SEC Comment Letter Social Leverage Acquisition Corp I CORRESP.msg		These records have been released in full.	.msg	False
GC-LIT-0470-0768713	06/01/2023 09:47:05 AM				Social Leverage Acquisition Corp I CORRESP Letter.pdf			.pdf	True
GC-LIT-0470-0768714	06/01/2023 09:47:16 AM	External third party	CF Office of Crypto Assets		SEC Comment Letter Social Leverage Acquisition Corp I CORRESP.msg		These records have been released in full.	.msg	False
GC-LIT-0470-0768715	06/01/2023 09:47:16 AM				Social Leverage Acquisition Corp I CORRESP Letter.pdf			.pdf	True

GC-LIT-0470-0663581	06/02/2023 02:43:32 PM	IOSCO staff	Szczepanik, Valerie		FW DeFi Report Draft.msg	Exemption 5 (deliberative process privilege)	The withheld email thread and attachments are inter-agency pursuant to the consultant corollary. The withheld email thread reflects SEC comments concerning the drafting of the attached draft report about decentralized finance. The withheld information is deliberative because it reflects discussion about SEC staff's comments and the process of drafting and editing the report. The withheld information is pre-decisional because staff were in the process of drafting the report.	.msg	False
GC-LIT-0470-0663582	06/02/2023 02:43:32 PM				IOSCO FTF DeFi WG - Draft Consultative Report 2 JUNE 2023.docx	Exemption 6		.docx	True
GC-LIT-0470-0663583	06/02/2023 02:43:32 PM				IOSCO FTF DeFi WG - Draft Consultative Report 2 JUNE 2023 ANNEXES.docx		The withheld attachments consist of a draft of an IOSCO report and an annex to that report. The draft attachments are deliberative because they reflect comments and proposed edits from SEC staff. The documents are pre-decisional because they are non-final drafts. Staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.	.docx	True
GC-LIT-0470-0714099	06/12/2023 10:19:41 AM	External third party	CF Office of Crypto Assets		SEC Comment Letter Bakkt Holdings, Inc. S-3.msg		These records have been released in full.	.msg	False
GC-LIT-0470-0714100	06/12/2023 10:19:41 AM				Bakkt Holdings, Inc. S-3 Letter.pdf			.pdf	True
GC-LIT-0470-0714109	06/12/2023 10:22:10 AM	External third party	CF Office of Crypto Assets		SEC Comment Letter Bakkt Holdings, Inc. POS AM.msg		These records have been released in full.	.msg	False
GC-LIT-0470-0714110	06/12/2023 10:22:10 AM				Bakkt Holdings, Inc. POS AM Letter.pdf			.pdf	True
GC-LIT-0470-0714105	06/12/2023 10:22:11 AM	External third party	CF Office of Crypto Assets		SEC Comment Letter Bakkt Holdings, Inc. POS AM.msg		These records have been released in full.	.msg	False
GC-LIT-0470-0714106	06/12/2023 10:22:11 AM				Bakkt Holdings, Inc. POS AM Letter.pdf			.pdf	True
GC-LIT-0470-0714115	06/26/2023 08:43:11 AM	Lars Hansen; David Bloch; Phillip Millman	Nigro, Daniel		Markets Daily Wagner Fallout Still Unknown; Why Economies Haven't Slowed More Since Central Banks Hit the Brakes; Junk-Rated Companies Accept Tougher Terms to Borrow .msg	Exemption 4 Exemption 6	The withheld attachment consists of a Bloomberg article. Should Plaintiff seek the release of the attachment, the SEC will move forward with the confidential treatment process pursuant to the SEC's FOIA regulations. Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Portions of this email have been released.	.msg	False
GC-LIT-0470-0714116	06/26/2023 08:43:11 AM				Ether's Hazy Status at SEC Leaves Token Trailing Bitcoin's Surge.pdf			.pdf	True

GC-LIT-0470-0663598	07/07/2023 08:22:56 AM	IOSCO staff	Szczepanik, Valerie	FCA staff	FW DeFi Report.msg	Exemption 5 (deliberative process privilege)	The withheld email thread and attachments are inter-agency pursuant to the consultant corollary. The withheld email thread reflects SEC comments concerning the drafting of the attached reports about decentralized finance. The withheld information is deliberative because it reflects discussion about SEC staff's comments and the process of drafting and editing the reports. The withheld information is pre-decisional because staff were in the process of drafting the reports.	.msg	False
GC-LIT-0470-0663599	07/07/2023 08:22:56 AM				Recommendations and Guidance for Decentralized Finance Redline.docx	Exemption 6	The withheld attachments consist of drafts of an IOSCO report. The draft attachments are deliberative because they reflect comments and proposed edits from SEC staff. The documents are pre-decisional because they are non-final drafts.	.docx	True
GC-LIT-0470-0663600	07/07/2023 08:22:56 AM				IOSCO FTF DeFi WG - WORKING DRAFT JULY 2023.docx		Staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.	.docx	True
GC-LIT-0470-0663627	07/24/2023 08:10:16 AM	IOSCO staff, Australian Securities and Investment Commission staff	Szczepanik, Valerie		FW DeFi Consultation Report Working Draft and FTF SG Meeting [SEC=OFFICIAL].msg	Exemption 5 (deliberative process privilege) Exemption 6	The withheld email thread and attachment are inter-agency pursuant the consultant corollary. The withheld email thread reflects staff comments concerning the drafting of the attached report about decentralized finance. The withheld information is deliberative because it reflects discussion about staff comments and the process of drafting and editing the report. The withheld information is pre-decisional because staff were in the process of drafting the report.	.msg	False
GC-LIT-0470-0663628	07/24/2023 08:10:16 AM				IOSCO DeFi Consultation Report Working Draft 21 July 2023_ma.docx		The withheld attachment consists of a draft of an IOSCO report. The draft attachment is deliberative because it reflects comments and proposed edits from staff. The document is pre-decisional because it is a non-final draft. Staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.	.docx	True

GC-LIT-0470-0663631	07/27/2023 01:26:22 PM	IOSCO staff	Szczepanik, Valerie		FW DeFi Report - working draft.msg	Exemption 5 (deliberative process privilege) Exemption 6	The withheld email thread and attachment are inter-agency pursuant to the consultant corollary. The withheld email thread reflects staff comments concerning the drafting of the attached report about decentralized finance. The withheld information is deliberative because it reflects discussion about the process of drafting and editing the report. The withheld information is pre-decisional because staff were in the process of drafting the report. The withheld attachment consists of a draft of an IOSCO report. The draft attachment is deliberative because it reflects comments and edits from staff. The document is pre-decisional because it is a non-final draft. Staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.	.msg	False
GC-LIT-0470-0663632	07/27/2023 01:26:22 PM				IOSCO DeFi Consultation Report Working Draft 27 July 2023.docx			.docx	True
GC-LIT-0470-0663629	08/04/2023 04:30:01 PM	IOSCO staff	Szczepanik, Valerie	IOSCO staff	RE DeFi report - Monday fatal flaw circulation.msg	Exemption 5 (deliberative process privilege) Exemption 6	The withheld email thread and attachment are inter-agency pursuant to the consultant corollary. The withheld email thread reflects staff comments concerning the drafting of the attached report about decentralized finance. The withheld information is deliberative because it reflects discussion about staff comments and the process of drafting and editing the report. The withheld information is pre-decisional because staff were in the process of drafting the report. The withheld attachment consists of a draft of an IOSCO report. The draft attachment is deliberative because it reflects comments and proposed edits from staff. The document is pre-decisional because it is a non-final draft. Staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.	.msg	False
GC-LIT-0470-0663630	08/04/2023 04:30:01 PM				IOSCO DeFi Consultation Report Working Draft 4 Aug 2023.docx			.docx	True
GC-LIT-0470-0714159	08/21/2023 07:49:56 AM	foia@foia.com	Taylor, Felecia		FOIA Response - 23-01540-FOIA.msg	Exemption 6	Staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.	.msg	False
GC-LIT-0470-0714160	08/21/2023 07:49:56 AM				FOIA Response.pdf		Portions of the email have been released.	.pdf	True

GC-LIT-0470-0771339	08/21/2023 02:55:34 PM	Third party expert	SEC ENF staff		FW Draft with comments.msg	Exemption 5 (deliberative process privilege; attorney work product) Exemption 6 Exemption 7(C)	The withheld email thread and attachment are intra-agency pursuant to the consultant corollary. The withheld email thread consists of discussion between SEC ENF staff and third party experts about a draft expert report for an ENF litigation. The withheld email thread is deliberative because it reflects comments and proposed edits to the draft expert report. The thread is pre-decisional because the draft report was not yet final. The withheld attachment consists of a draft expert report. The withheld draft report is deliberative because it reflects comments and edits by SEC staff and the third party experts. The draft is pre-decisional because it was not yet final. The withheld records were prepared by SEC ENF attorneys and their retained experts in connection with litigation. Staff and third parties have a privacy interest in their contact information, and there is no public interest in knowing their contact information. ENF staff have a privacy interest in not being associated with a law enforcement investigation, and the public interest in knowing this personal information is not outweighed by their privacy interests.	.msg	False
GC-LIT-0470-0771340	08/21/2023 02:55:34 PM				[B6] 2023.08.21 comments [B6] draft.docx			.docx	True
GC-LIT-0470-0714171	08/23/2023 09:12:17 AM	foia@foia.com	Taylor, Felecia		RE Acknowledgement Letter FOIA-PA - 23-01540-FOIA.msg	Exemption 6	Staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Portions of the email have been released.	.msg	False
GC-LIT-0470-0714172	08/23/2023 09:12:17 AM				FOIA Response 23-01540- FOIA.pdf			.pdf	True
GC-LIT-0470-0118066	09/08/2023 08:00:59 AM	Mairs, Christopher Thomas	Rundquist, Paul	Elliott, Steven; Gabert, Kasimir Georg; Johnson, Curtis Martin	RE Penstemon SEC .msg	Exemption 6	Staff have a privacy interest in their contact information and names, and there is no public interest in knowing this information. Portions of the email have been released.	.msg	False
GC-LIT-0470-0118067	09/08/2023 08:00:59 AM				IOSCOPD744.pdf			.pdf	True

GC-LIT-0470-0712872	09/25/2023 07:01:30 PM	FSB staff, BIS staff, Monetary Authority of Singapore staff	Kozhanov, Igor		RE FIN WST draft note for meeting.msg	Exemption 5 (deliberative process privilege) Exemption 6	The withheld email thread and attachment are inter-agency pursuant to the consultant corollary. The withheld email thread reflects discussion concerning the drafting of a report relating to digital assets as well as proposed discussion topics. The withheld information is deliberative because it reflects discussion about the process of drafting and editing the report. The withheld information is pre-decisional because staff were in the process of drafting the report.	.msg	False
GC-LIT-0470-0712873	09/25/2023 07:01:30 PM				WST202304 [B5] - preliminary findings note - draft - SEC.docx		The withheld attachment consists of a draft of the report. The draft report is deliberative because it differs from the final report and reflects comments and proposed edits from SEC staff. The document is pre-decisional because it is a draft that was not adopted as final. Staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.	.docx	True
GC-LIT-0470-0712910	10/05/2023 07:28:44 AM	External third party	CF Office of Crypto Assets		SEC Comment Letter MarsProtocol Inc. CORRESP.msg		These records have been released in full.	.msg	False
GC-LIT-0470-0712911	10/05/2023 07:28:44 AM				MarsProtocol Inc. CORRESP Letter.pdf			.pdf	True
GC-LIT-0470-0712959	10/10/2023 01:23:08 PM	DOJ staff	SEC ENF staff		RE [B5].msg	Exemption 5 (attorney work-product doctrine)	The withheld attachment consists of a deposition transcript in a matter unrelated to the Ethereum 2.0 investigation in anticipation of litigation.	.msg	False
GC-LIT-0470-0712961	10/10/2023 01:23:08 PM				[B6;B7(C)] - Vol. II.20230922.467747-HQ.pdf	Exemption 6 Exemption 7(C)	Agency staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. ENF staff, DOJ staff, and third parties have a privacy interest in not being associated with a law enforcement investigation, and the public interest in knowing this personal information is not outweighed by their privacy interests. Portions of the email thread have been released.	.pdf	True

GC-LIT-0470-0712891	04/08/2024 09:55:47 AM	Behuniak, Allison	Asher, Taylor	Hite, Tim; Webb, Kevin; Balzano, Paul	RE Technical Assistance .msg	Exemption 5 (deliberative process privilege)	The withheld email thread and attachments are inter-agency and consist of discussion between SEC staff and House Committee on Financial Services staff. The withheld information is deliberative because it reflects discussion about caselaw and an attached article about investment contracts in connection with possible policymaking. The withheld information is deliberative because no policymaking decisions had been made.	.msg	False
GC-LIT-0470-0712892	04/08/2024 09:55:47 AM				[B5]	Exemption 6		.pdf	True
GC-LIT-0470-0712893	04/08/2024 09:55:47 AM				[B5]		Staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.	.pdf	True
GC-LIT-0470-0724683	04/12/2024 03:57:53 PM	Jazmin Scott; Michael Brier	SEC ENF staff		RE Correspondence Regarding Subpoena C-08950.msg	Exemption 6 Exemption 7(C)	Staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. ENF staff have a privacy interest in not being associated with a law enforcement investigation, and the public interest in knowing this personal information is not outweighed by their privacy interests. Portions of the email thread have been released.	.msg	False
GC-LIT-0470-0725547	04/29/2024 03:59:59 PM	Gottlieb, Jason; Upadhyaya, Vani T.; Isaacs, Daniel C.	SEC ENF staff		RE C-08950 - On behalf of [B6, B7(C)].msg	Exemption 6 Exemption 7(C)	Staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. ENF staff and certain third parties have a privacy interest in not being associated with a law enforcement investigation, and the public interest in knowing this personal information is not outweighed by their privacy interests. Portions of the email thread have been released.	.msg	False
GC-LIT-0470-0725563	04/30/2024 02:50:07 PM	Jennifer Saunier	SEC ENF staff	Michael Brier; Jazmin Scott	RE Correspondence Regarding Subpoena C-08950.msg	Exemption 6 Exemption 7(C)	Staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. ENF staff have a privacy interest in not being associated with a law enforcement investigation, and the public interest in knowing this personal information is not outweighed by their privacy interests. Portions of the email thread have been released.	.msg	False
GC-LIT-0470-0712797	05/20/2024 11:28:57 AM	Brett Kitt	Schandler, Sarah	Alison Doyle	RE File Nos. Nasdaq-2023-045 and Nasdaq-2023-035.msg	Exemption 6	Staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Portions of the email thread have been released.	.msg	False

GC-LIT-0470-0149471	05/23/2024 05:17:52 PM	Treasury staff	Frayner, Corey		ETH ETP Order.msg	Exemption 6 Staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Portions of the email thread have been released.	.msg	False
GC-LIT-0470-0149472	05/23/2024 05:17:52 PM				lk87adfs99.pdf		.pdf	True
GC-LIT-0470-0713551	05/23/2024 05:20:46 PM	Mark Hays	Frayner, Corey		Ethereum ETP Order.msg	Exemption 6 Staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information. Portions of the email thread have been released.	.msg	False
GC-LIT-0470-0713552	05/23/2024 05:20:46 PM				lk87adfs99.pdf		.pdf	True
GC-LIT-0470-0712955	06/14/2024 11:55:27 AM	External third party	Office of Crypto Assets		SEC Comment Letter Fidelity Ethereum Fund S-1A.msg	These records have been released in full.	.msg	False
GC-LIT-0470-0712956	06/14/2024 11:55:27 AM				Fidelity Ethereum Fund S-1_A Letter.pdf		.pdf	True
GC-LIT-0470-0712971	06/14/2024 11:56:14 AM	External third party	Office of Crypto Assets		SEC Comment Letter 21Shares Core Ethereum ETF S-1A.msg	These records have been released in full.	.msg	False
GC-LIT-0470-0712972	06/14/2024 11:56:14 AM				21Shares Core Ethereum ETF S-1_A Letter.pdf		.pdf	True
GC-LIT-0470-0713573	06/14/2024 11:56:16 AM	External third party	Office of Crypto Assets		SEC Comment Letter 21Shares Core Ethereum ETF S-1A.msg	These records have been released in full.	.msg	False
GC-LIT-0470-0713574	06/14/2024 11:56:16 AM				21Shares Core Ethereum ETF S-1_A Letter.pdf		.pdf	True
GC-LIT-0470-0754143	08/20/2024 06:09:19 PM	External third party	Office of Crypto Assets		SEC Comment Letter Hashdex Nasdaq Crypto Index US ETF S-1.msg	These records have been released in full.	.msg	False
GC-LIT-0470-0754144	08/20/2024 06:09:19 PM				Hashdex Nasdaq Crypto Index US ETF S-1 Letter.pdf		.pdf	True

GC-LIT-0470-0713032	09/06/2024 09:03:58 AM	IOSCO staff	Wilson, Katrina		RE Risk Outlook, second draft.msg	Exemption 5 (deliberative process privilege) Exemption 6	The withheld email thread and attachment are inter-agency pursuant to the consultant corollary. The withheld email thread reflects staff comments concerning the drafting of the attached IOSCO report. The withheld information is deliberative because it reflects discussion about the process of drafting and editing the report. The withheld information is pre-decisional because staff were in the process of drafting the report. The withheld attachment consists of a draft of an IOSCO report. The draft attachment is deliberative because it reflects comments and edits from SEC staff. The document is pre-decisional because it is a non-final draft. Staff have a privacy interest in their contact information, and there is no public interest in knowing their contact information.	.msg	False
GC-LIT-0470-0713036	09/06/2024 09:03:58 AM				Consolidated Risk Outlook Draft 2024-08-29 (SEC CryptoAI comments only).docx			.docx	True