UNSW Law & Justice Research Series

The Financialization of Crypto

Douglas W. Arner, Dirk A. Zetzsche, Ross P. Buckley and Jamieson M. Kirkwood

[2023] *UNSWLRS* 32

UNSW Law & Justice
UNSW Sydney NSW 2052 Australia

E: LAW-Research@unsw.edu.au
W: http://www.law.unsw.edu.au/research/faculty-publications
AustLII: http://www.austlii.edu.au/au/journals/UNSWLRS/
SSRN: http://www.ssrn.com/link/UNSW-LEG.html

The Financialization of Crypto

Douglas W. Arner*
Douglas.arner@hku.hk
Dirk A. Zetzsche**
Dirk.zetzsche@uni.lu
Ross P. Buckley***
Ross.buckley@unsw.edu.au.
Jamieson M. Kirkwood****
Jamieson.kirkwood@hku.hk

Cryptocurrencies, blockchain and decentralized finance were designed to address weaknesses in traditional finance, such as the systemic risk and government profligacy at the heart of many financial crises. Yet, failures of prominent crypto firms highlight the flaws in this argument. Crypto is neither special nor immune and has come to feature all the classic problems of traditional finance. As the crypto ecosystem has evolved, the market failures and externalities of traditional finance have emerged — a process we term the "financialization" of crypto. These include conflict of interests, information asymmetries, centralization and interconnections, large numbers of poorly informed, over-enthusiastic market participants, plus agency, operational and financial risks. We argue that the regulation of crypto needs to learn from the centuries of experience of traditional finance: in order to function properly, crypto requires appropriate regulation and supervision to address market failures and externalities, and to support transparency and efficiency. While it appears the "Crypto Winter" of 2022-2023 has prompted the world's financial regulators to act, policymakers need to overcome the difficulties posed by decentralization as the underlying paradigm of the crypto industry, which results in a multi-jurisdictional environment of crypto markets, participants, infrastructure and intermediaries. We argue that regulatory systems can (and must) now be instituted to ensure the proper functioning of crypto and its interconnections with traditional finance.

* Douglas W. Arner, Kerry Holdings Professor in Law and RGC Senior Fellow in Digital Finance and Sustainable Development, Senior Fellow, Asia Global Insitute and Associate Director, HKU-Standard Chartered Foundation FinTech Academy, University of Hong Kong.
** Dirk A. Zetzsche, Professor in Financial Law, ADA Chair in Financial Law (Inclusive Finance), and Coordinator, House of Sustainable Governance & Markets, Faculty of Law, Economics and Finance, University of Luxembourg.
*** Ross P. Buckley, Australian Research Council Laureate Fellow, KPMG Law – King & Wood Mallesons Chair of Disruptive Innovation and Scientia Professor, UNSW Sydney.
**** Jamieson M. Kirkwood, Postdoctoral Fellow in Finance, Technology, Regulation and Sustainable Development, The University of Hong Kong.

The authors gratefully acknowledge the financial support of the Hong Kong Research Grants Council Senior Research Fellowship program, and the Australian Research Council Laureate Fellowship (FL200100007). We are also grateful for the excellent research assistance of Georgia Fink-Brigg and Jarrod Li. The views herein are solely the authors and not necessarily the views of these funding bodies.

Keywords: financialization, Crypto Winter, financial regulation, FTX, crypto assets, cryptocurrencies, financial stability, decentralised finance, DeFi

I. Introduction

The year 2022 was an *annus horribilis* for the crypto ecosystem even before the collapse of the FTX group.[1] In one year, crypto lost about USD 2 trillion in market value.[2] Following the failure of FTX, one of the biggest corporate or financial failures since the 2008 global financial crisis, the urgent need for a global and coordinated approach to crypto regulation has become clear.[3]

The irony inherent in what has come to be called the "Crypto Winter" of 2022-2023 is the fundamental premise of this paper.[4] Bitcoin, cryptocurrencies and decentralized finance (which for these purposes we refer to collectively by the shorthand "crypto") were presented as an alternative to the failures of traditional finance as demonstrated in centuries of financial crises and culminating in the 2008 Global Financial Crisis. Through a transparent technological framework, crypto was precisely designed to avoid the downsides of traditional finance: conflicts of interest from many powerful intermediaries, information asymmetries, centralization of crucial functions and markets, control by a few large and often interconnected intermediaries, an abundance of poorly informed over-enthusiastic market participants ("irrational behavior"), as well as agency, operational and financial risks, and of course fraud, manipulation and misconduct. Financial regulation and supervision have evolved over centuries, seeking to enhance financial stability, ensure adequate investor, depositor and consumer protection, further market fairness, efficiency and integrity, and steer the financial system towards economic growth, financial inclusion and sustainable development.

We argue that crypto – despite its intention and technological design as decentralized finance[5] ('DeFi') – has in less than 15 years evolved to display the classic market failures and

---

1 *See*, *e.g.*, Peter Fitzgerald & Amalia Neenan, *Annus Horribilis 2022: Regulation May Be the Only Way out of Crypto's 'Horrible Year'*, CITY AM (Dec. 5, 2022), https://www.cityam.com/annus-horribilis-2022-regulation-may-be-the-only-way-out-of-cryptos-horrible-year.

2 *See* Damian Fantato, *Crypto and Digital Assets Summit*, FINANCIAL TIMES EVENTS (Nov. 28, 2022), https://www.ftadviser.com/events-awards/2022/11/28/crypto-digital-assets-summit.

3 *See, e.g.*, Tom Burroughes, *FTX Collapse May Prompt Big Regulatory Crackdown – Lawyer*, WEALTH BRIEFING ASIA (Nov. 18, 2022), https://www.wealthbriefingasia.com/article.php?id=196248.

4 This crypto winter is said to be different from former crypto winters – *see* Arjun Khapal & Ryan Browne, *This 'Crypto Winter' Is Unlike Any Downturn in the History of Digital Currencies. Here's Why*, CNBC (Jul. 13, 2022), https://www.cnbc.com/2022/07/14/why-the-2022-crypto-winter-is-unlike-previous-bear-markets.html. Further, crypto winters are estimated to last an average of four years – *see* Forbes Digital Assets, *Will Crypto Ever Recover or Will Winter Last Forever?*, FORBES (Sept. 8, 2022), https://www.forbes.com/sites/qai/2022/09/08/will-crypto-ever-recover-or-will-winter-last-forever/.

5 DeFi strictu sensu is characterized by peer-to-peer transactions and an absence of a centralized intermediary. With DeFi smart contracts should execute transactions between supply and demand automatically, and all servers that support the operation of the protocols ('nodes'), or token holders, as the case may be, have equal access to data and equal governance rights (or the technological equivalent of governance rights). Such a set-up can also be referred to as Decentralized Autonomous Organization (DAO). If a trading platform is governed by a DAO, the crypto jargon speaks of Decentralized Exchanges (DEX). However, throughout the crypto industry, centralized intermediaries often deliver important functions to the DeFi ecosystem. For instance, Binance, Coinbase, FTX and others are operated by centralized entities and are thus dubbed Centralized Exchanges

externalities that characterize traditional finance. Together with the duplication of traditional financial products and services in the crypto ecosystem, we call this evolutionary process the "financialization" of crypto. Where the market failures and externalities as well as economic motivations and objectives of participants mirror traditional finance, so does our proposed solution: the crypto ecosystem, to function properly, requires regulatory and supervisory systems designed to address its market failures and externalities. Similar risks and activities require regulatory approaches to support proper market functioning and reduce regulatory arbitrage.

The question is whether crypto can survive the 2022-23 crypto winter. We argue that to survive and thrive, appropriately designed regulation is essential. Such financial regulation must address the range of market failures, externalities and inefficiencies that have arisen in the crypto ecosystem.

This question is currently a major focus of the regulatory agenda. The Financial Stability Board (FSB),[6] International Monetary Fund (IMF)[7] and Bank for International Settlements (BIS)[8] have issued position papers as the Group of 20 (G20) considers an internationally coordinated approach. Major jurisdictions are implementing or designing new measures. For instance, Singapore, which has had a vigorous licensing regime for crypto since enacting the Payment Services Act in January 2020, is again tightening its regulations.[9] Hong Kong will also

---

(CEXs). From the perspective of the DeFi sector, these constitute a type of Centralized Finance (CeFi). Nevertheless, these CEXs allow for a) the initial investment of fiat currency into tokens, and b) cross-chain bridge operations, that is the swap of one crypto asset with another, ie. Trading of tokens. In turn, CEXs provide most trading volume for tokens issued under alleged DeFi protocols and influence the valuation of crypto assets which may then be relied upon by DeFi protocols. We here use the term crypto for both CeFi and DeFi services that deal with crypto assets.

6 *See* FINANCIAL STABILITY BOARD, REGULATION, SUPERVISION AND OVERSIGHT OF CRYPTO-ASSET ACTIVITIES AND MARKETS: CONSULTATIVE DOCUMENT (Oct. 11, 2022), https://www.fsb.org/wp-content/uploads/P111022-3.pdf.

7 *See* INTERNATIONAL MONETARY FUND, IMF POLICY PAPER ELEMENTS OF EFFECTIVE POLICIES FOR CRYPTO ASSETS (No 2023/004, Feb. 23, 2023), https://www.imf.org/en/Publications/Policy-Papers/Issues/2023/02/23/Elements-of-Effective-Policies-for-Crypto-Assets-530092; *See also* Parma Bains et al., *Regulating the Crypto Ecosystem: The Case of Unbacked Crypto Assets*, IMF (Sept. 26, 2022), https://www.imf.org/en/Publications/fintech-notes/Issues/2022/09/26/Regulating-the-Crypto-Ecosystem-The-Case-of-Unbacked-Crypto-Assets-523715. The IMF also proposed regulations for stablecoins on the same day – *see* Parma Bains et al., *Regulating the Crypto Ecosystem: The Case of Stablecoins and Arrangements*, IMF (Sept. 26, 2022), https://www.imf.org/en/Publications/fintech-notes/Issues/2022/09/26/Regulating-the-Crypto-Ecosystem-The-Case-of-Stablecoins-and-Arrangements-523724. In a related paper the IMF reported on capital flow management measures in crypto – *see* Dong He et al., *Capital Flow Management Measures in the Digital Age: Challenges of Crypto Assets*, IMF (May 10, 2022), https://www.imf.org/en/Publications/fintech-notes/Issues/2022/05/09/Capital-Flow-Management-Measures-in-the-Digital-Age-516671. *See also* Cristina Cuervo, Anastasiia Morozova & Nobuyasu Sugimoto, *Regulation of Crypto Assets*, IMF (Jan. 10, 2020) https://www.imf.org/en/Publications/fintech-notes/Issues/2020/01/09/Regulation-of-Crypto-Assets-48810.

8 *See* Matteo Aquilina, Jon Frost & Andreas Schrimpf, *Addressing the Risks in Crypto: Laying out the Options*, BANK FOR INTERNATIONAL SETTLEMENTS (Jan. 12, 2023) https://www.bis.org/publ/bisbull66.htm; Raphael Auer & Stijn Claessens, Regulating Cryptocurrencies: Assessing Market Reactions, BANK FOR INTERNATIONAL SETTLEMENTS (Sept. 23, 2018) https://www.bis.org/publ/qtrpdf/r_qt1809f.htm.

9 *See*, *e.g.*, *Singapore Launches Licensing for Cryptocurrency Firms*, EJINSIGHT (Jan 30, 2020) https://www.ejinsight.com/eji/article/id/2364700/20200130-singapore-launches-licensing-for-cryptocurrency-firms; Lena Ng, *Singapore to Tighten Rules on Cryptocurrency Trading*, CLIFFORD CHANCE TALKING TECH (Nov. 30, 2022) https://www.cliffordchance.com/insights/resources/blogs/talking-tech/en/articles/2022/11/singapore-to-tighten-rules-on-cryptocurrency-trading.html.

implement a licensing system for crypto intermediaries: by application to Hong Kong's Securities and Futures Commission for a license (the next phase expected to be from 1 March 2023).[10] In the EU, the Market in Crypto-assets Regulation (MiCA) was adopted on 19 April 2023 and will come into force in 2024.[11] MiCA introduces a licensing scheme for crypto intermediaries, prospectus rules, anti-market abuse and insider trading rules as well as bespoke legislation for stablecoins. The UK government is planning to implement new regulations soon, releasing a consultation paper in February 2023.[12] In the US, although no specific cryptocurrency regulations exist, President Biden signalled that the US government plans to do so by executive order on 9 March 2022,[13] and by releasing an actual regulatory *framework* on 17 September 2022.[14] US crypto has typically been *regulated* via different regulatory bodies (chiefly the Securities and Exchange Commission [SEC] and Commodities Futures Trading Commission [CFTC]), which largely employ a "regulation by enforcement" approach.[15] For example, the SEC launch investigations into various aspects of crypto, including recent crypto "exchange" selling of unregistered securities (e.g. the examples of SEC investigations into Genesis and BlockFi).[16]

This paper proceeds as follows. In Part II we consider FTX and other crypto collapses, referred to collectively today as the Crypto Winter of 2022-23.[17] These collapses are contextualised with earlier crises including Mt. Gox in 2014 and the ICO bubble of 2017-2019.

---

10 *See*, *e.g.*, *Hong Kong Licensing Regime for Virtual Asset Exchanges to Take Effect on 1 March 2023*, CHARLTONS LAW (Jul. 2022), https://www.charltonslaw.com/hong-kong-licensing-regime-for-virtual-asset-exchanges-to-take-effect-on-1-march-2023.

11 For a good overview of MiCA, *see* Kai Zhang, Philip J. Morgan, Jeremy M. McLaughlin, *MICA – Overview of the New EU Crypto-Asset Regulatory Framework (Part 1)*, K & L GATES HUB (Nov, 15 2022), https://www.klgates.com/mica-overview-of-the-new-eu-crypto-asset-regulatory-framework-part-1-11-15-2022; Press Release, European Council & the Council of the European Union, Digital finance: agreement reached on European crypto-assets regulation (MiCA) (Jun. 30, 2022), https://www.consilium.europa.eu/en/press/press-releases/2022/06/30/digital-finance-agreement-reached-on-european-crypto-assets-regulation-mica; David Carlisle, *Crypto 2023 Predictions: MiCA Will be the Blueprint For Regulation Globally*, ELLIPTIC CONNECT (Dec. 14, 2022), https://hub.elliptic.co/analysis/crypto-2023-predictions-mica-will-be-the-blueprint-for-regulation-globally.

12 HM Treasury, *Future financial services regulatory regime for cryptoassets: Consultation and call for evidence*, (Report PU 3273, Feb. 2023), https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1133404/TR_Privacy_edits_Future_financial_services_regulatory_regime_for_cryptoassets_vP.pdf.

13 Ryan Browne, 'Biden just put out an executive order on cryptocurrencies — here's everything that's in it', CNBC (Web Page, Mar. 9, 2022), <https://www.cnbc.com/2022/03/09/heres-whats-in-bidens-executive-order-on-crypto.html>.

14 MacKenzie Sigalos, *Biden White House just put out a framework on regulating crypto — here's what's in it*, CNBC (Sept. 18, 2022), https://www.cnbc.com/2022/09/16/heres-whats-in-biden-framework-to-regulate-crypto.html.

15 As regards "regulation by enforcement" in the US, Chris Brummer's view, which we endorse, is that, "In the absence of clear guidelines, regulation by enforcement is becoming increasingly likely as a clarity-inducing tool". Chris Brummer, *Disclosure, Dapps and DeFi*, 5:2 STAN. J. BLOCKCHAIN L. & POL'Y 137 at 146 (2022).

16 For a comprehensive overview, *see* Program on International Financial Systems, *A Review on Cryptoasset Market Structure and Regulation in the U.S. PIFS International* (Feb. 2023), https://www.pifsinternational.org/cryptoasset-market-structure-and-regulation-in-the-u-s.

17 *See*, *e.g.*, Russell Wong, *Why Stablecoins Fail: An Economist's Post-Mortem on Terra*, 22:24 FED. RES. BANK RICH. ECON. BRIEF (2022). *See also* Hilary J. Allen, *The Superficial Allure of Crypto*, 59:3 FIN & DEV. 27 (2022).

Part III argues that these crises are characterized by what we term the financialization of crypto. This process of financialization has included the rise of Systemically Important Crypto Intermediaries (SICIs) that, contrary to the philosophy of DeFi, dominate the ecosystem. Due to lack of regulation and transparency, we classify these as forms of "shadow finance", which, in the formal banking sector, was a precipitant of the Global Financial Crisis of 2008.[18] Against this background, we present a macro perspective of crypto and argue that, despite its potentially transformative underlying technology, crypto is *not immune* from conflicts of interests, information asymmetries, centralisation of crucial functions, interconnections of principal actors, irrational behaviour, criminal conduct, and a wider range of agency, operational and financial risks. Any assessment of the major crypto "exchanges"[19] – a term we strongly argue should only be used for appropriately licensed firms operating according to well-recognised principles and requirements appropriate for the designation – suggests the crypto industry is even more centralized in many aspects than traditional financial markets. Several non-transparent crypto intermediaries and crypto conglomerates drive these centralised financial systems, not dissimilar to those in traditional finance which have proven historically problematic.

Part IV distinguishes between risks where crypto exhibits features of traditional finance, and those where idiosyncrasies justify bespoke regulation. We then propose regulatory solutions to address the financialization of crypto: (1) business licensing and supervision and appropriate balanced proportional risk-based prudential regulation of intermediaries, (2) disclosure and transparency requirements, (3) segregation and custody rules, (4) market abuse regulation and enforcement, (5) restructuring and resolution legislation, and (6) cross-border harmonization and coordination.

Part V concludes.

II. The Crypto Winter of 2022-23

Turning to consider the Crypto Winter (most prominently the failure of FTX), we highlight how it reflects the emergence of market failures and externalities similar to those which characterize traditional finance.[20] We characterize this as the "financialization" of crypto: as crypto has become functionally more like traditional finance, it also displays similar market failures and externalities, necessitating regulation.[21] We highlight analogies between elements

---

18 We use "shadow finance" rather than "shadow banking" because these activities were largely beyond the regulatory perimeter (and hence in the shadows) but not conducted by traditional lending businesses.

19 In this paper we generally do not differentiate between centralized exchanges and decentralized exchanges in our use of the term "exchange" although we do acknowledge that decentralized exchanges have to date been more resilient to stress and thus offer promising potential, if structured upon appropriate design principles that address the realities of financialisation.

20 Although financialisation is a process that has been going on for thousands of years, it has accelerated since the 1990s – *see* Mario Seccareccia, *Understanding Financialization: History, Theory, and Institutional Analysis: Editor's Introduction*, 42:4 INT'L J. POL. ECON. 3 (2013). *See also* Malcolm Sawyer, *What Is Financialization?*, 42:4 INT'L J. POL. ECON. 5 (2013). IRIS H-Y CHIU, REGULATING THE CRYPTO ECONOMY: BUSINESS TRANSFORMATIONS AND FINANCIALISATION (1st ed, 2021).

21 There is also talk of the *cryptoization* of finance – *see* Bo Li and Nobuyasu Sugimoto, *Crypto Contagion Underscores Why Global Regulators Must Act Fast to Stem Risk*, IMF (Jan. 18, 2023) https://www.imf.org/en/Blogs/Articles/2023/01/18/crypto-contagion-underscores-why-global-regulators-must-act-fast-to-stem-risk. The *cryptoization* of finance refers to when crypto "assets are substituted for domestic

of the crypto ecosystem and the problem of "shadow finance", regulatory arbitrage, concentration and interconnection at the heart of the 2008 financial crisis. Given that a central *raison d'etre* of crypto was to make such problems impossible, this is exquisitely ironic.

A. FTX: The Lehman and Enron Moments for Crypto

FTX was valued at USD 32 billion in its January 2021 funding round.[22] In early 2022, FTX was one of the world's largest so-called cryptocurrency intermediaries, labelling itself an "exchange" but rather being a complex conglomerate. FTX's revenue grew exponentially from USD 90 million in 2020 to over USD 1 billion in 2021[23] – astonishing growth of over 1,000 per cent in one year. Although these figures are significantly smaller than, say, Coinbase, which posted revenue of over USD 7 billion in 2021,[24] and the market leader Binance, with revenues of over USD 20 billion in 2021,[25] FTX was one of the strongest growing major crypto firms, ranking high in transaction volumes.[26]

1. FTX as a Liquidity Crisis

The FTX failure was a classic liquidity crisis that turned into a solvency crisis, like that of Lehmann Brothers in 2008. When a financial intermediary is unable to access sufficient liquidity to continue its business, this liquidity crisis will often turn into a solvency crisis which can trigger wider losses of confidence in the entire sector, and potentially a financial crisis, as we observed in the second half of 2022 in the crypto ecosystem (although importantly not in the wider financial system).

2. Liquidity Provider of Last Resort?

Similar to 2008, this led to the question of whether there needs to be a "Lender of Last Resort" (LoLR) – a "liquidity provider of last resort" in the post-2008 formulation. In the FTX case, the prospect arose briefly of Binance perhaps providing an emergency liquidity facility, or even taking over FTX (as JP Morgan did with Bear Stearns early in the 2008 crisis or indeed as JP Morgan and a range of others had done in a series of previous crises including successfully in the Panic of 1907).

---

currency and assets, and circumvent exchange and capital control restrictions". However, this is not discussed in this paper.

22 *Id*.

23 *See* Kate Rooney, *FTX grew revenue 1,000% during the crypto craze, leaked financials show*, CNBC (Aug. 20, 2022), https://www.cnbc.com/2022/08/20/ftx-grew-revenue-1000percent-during-the-crypto-craze-leaked-financials.html.

24 *See* Shareholder Letter, Fourth Quarter and Full-Year 2021, *Coinbase* (Feb. 24, 2022) https://s27.q4cdn.com/397450999/files/doc_financials/2021/q4/Coinbase-Q421-Shareholder-Letter.pdf.

25 *See* Tom Maloney, Yueqi Yang & Ben Bartenstein, *World's Biggest Crypto Fortune Began With a Friendly Poker Game*, BLOOMBERG CRYPTO (Jan. 11, 2022) https://www.bloomberg.com/news/features/2022-01-09/binance-ceo-cz-s-net-worth-billionaire-holds-world-s-biggest-crypto-fortune.

26 Lehman Brothers was reputed to be in the "Too Big To Fail" category with 2007 revenues of USD$59 Billion – with the list of the biggest companies in the US in 2008, *see Fortune 500*, CNN MONEY (May 5, 2008) https://money.cnn.com/magazines/fortune/fortune500/2008/snapshots/10312.html. Ultimately however, Lehman Brothers was allowed to fail in 2008 – *see*, *e.g.*, OONAGH MCDONALD, LEHMAN BROTHERS (2016); BANK FAILURE: LESSONS FROM LEHMAN BROTHERS (Dennis Faber & Niels Erwin Vermunt eds., 2017).

Despite FTX's efforts to secure a solution in the form of emergency liquidity or otherwise maintain the trust and confidence of market participants (including by reaching out to Binance for emergency assistance),[27] ultimately it was forced to file for insolvency. The result today is a range of insolvency actions in major jurisdictions and regulatory, investor and customer actions spread around the world.[28]

The role of Binance as FTX's largest competitor, deserves a closer look, as the FTX difficulties first became known to the world through Binance's publicly aired concerns of the (apparently) excessive exposures of its investment vehicle to Alameda, a part of the FTX conglomerate, and FTT, an FTX-issued crypto token.[29] That announcement was made *after* Binance had *sold* about USD 500 million in FTT, thereby frontrunning the FTT liquidity crisis and preserving its balance sheet from the announcement imposed on other crypto investors only able to sell *after* the announcement undermined trust in FTX.[30] Binance's role was unlike that of regulated intermediaries in similar situations that have acted primarily in coordinated efforts to maintain the overall trust in financial markets. After posing as a potential "white knight" (thereby delaying bankruptcy for roughly a week and allowing time to execute many – possibly dubious – transactions), Binance opted out with another public statement that effectively thwarted other third-party restructuring efforts.

3. Regulation vs Technology: The Roots of Trust

In traditional finance, market abuse regulations largely prevent a regulated entity's public declaration of mistrust from causing liquidity crises – as in the case of FTX. And when liquidity crises occur, the remedy is sourcing liquidity from an external source. We have seen other market participants (such as JP Morgan in the above examples) or – occasionally – central banks or governments (as in 2008, 2020 and many other financial crises, with the classic framework dating to Bagehot at the end of the 19th century). Consequently, FTX's inability to source liquidity was the same as in traditional finance: insolvency resulting from an inability to meet customer/creditor/investor calls when they become due.

Crypto market trust and confidence were meant to flow from the underlying technology, rather than regulation and supervision. Cryptocurrencies are based on decentralized peer-to-peer money exchange, designed to avoid liquidity and solvency crises. Questions arise as to whether the original design for cryptocurrencies as a decentralised peer-to-peer transaction recording system is flawed or whether too many players have been allowed to circumvent it. In any event, any workable reform agenda for the crypto industry requires balancing the original decentralized design with an urgent need for centralized market protection.

Traditionally, liquidity and solvency crises bring firm and customer-specific consequences and risks of negative externalities like contagion and systemic crises and failures. Yet, we will

---

27 *Id*.

28 Arner, Zetzsche and Buckley in 2018 identified that decentralized may not mean you're not subject to suit anywhere, but rather mean you are subject to suit everywhere! – *see* Dirk A. Zetzsche, Ross P. Buckley & Douglas W. Arner, *The Distributed Liability of Distributed Ledgers*, 4 U. ILL. L. REV. 1361 (2018).

29 *See* Fitzgerald, *supra* note.

30 *See* Olga Kharif, *Binance To Sell $529 Million of Bankman-Fried's FTT Token*, BLOOMBERG TECHNOLOGY (Nov. 7, 2022) https://www.bloomberg.com/news/articles/2022-11-06/binance-to-sell-529-million-of-ftt-token-amids-revelations; *see* Ortenca Aliaj et al., *Binance Ditches Deal to Rescue Rival Crypto Exchange FTX*, FINANCIAL TIMES (Nov. 10, 2022), https://www.ft.com/content/ad440b22-00e2-44e9-b95d-449bb89fd504.

argue crypto lacked both the *preventative* measures (particularly risk management and market abuse rules, and broader regulation and supervision both to maintain market trust and confidence and to maintain sufficient resources to meet customer, investor, and depositor demands) *and* the *restructuring and resolution* measures characteristic of traditional finance (generally implemented in the wake of the 2008 crisis), facilitating crisis support or intervention today. Both prevention and resolution in traditional finance rest on what crypto enthusiasts deem superfluous due to technological design: regulation.

4. More than a Liquidity Crisis?

However, there is the wider question about exactly why FTX had financial problems and whether FTX was not only a liquidity crisis but instead a solvency crisis. The answer to this question, given the accusations of fraud, potentially makes this an *Enron moment* for the crypto industry, rather than a *Lehman moment* (or a *Minsky moment)*.[31] .

The FTX group comprised four main elements. First, the exchange, an entity licensed in the United States which focused on US customers, was the second-largest US crypto exchange before the group's collapse. Second, the global "exchange", which acted as an intermediary or trading venue, and was a market maker and broker-dealer for cryptocurrency trading. Third, a trading fund called Alameda, and finally, a variety of venture capital investments.[32] The global exchange moved its headquarters from Hong Kong to the Bahamas in September 2021, registering with the Securities Commission of the Bahamas under the Bahamas Digital Assets and Registered Exchanges Act 2020.[33]

FTX group was commonly called an "exchange", yet it largely functioned as a financial conglomerate (more like Lehman or Enron) than an exchange bringing together buyers and sellers. The lack of transparency involved also led to widespread accusations of fraud, denied by FTX founder Sam Bankman-Fried (SBF).[34] SBF was extradited to the US following his

---

31 *See*, *e.g.*, Steve Mollman, *'A lot of people have compared this to Lehman. I would compare it to Enron': Larry Summers has some choice words for Sam Bankman-Fried and FTX*, FORTUNE (Nov. 12, 2022), https://fortune.com/2022/11/11/larry-summers-ftx-crypto-collapse-more-like-enron-than-lehman. A *Minsky moment*, named after the Economist Hyman Minsky, is the moment in a liquidity crisis when the entity becomes insolvent – *see*, *e.g.*, Jan A. Kregel, *Is this the Minsky Moment for Reform of Financial Regulation?*, (Levy Economics Institute Working Paper No. 586, Feb. 25, 2010).

32 *See*, *e.g.*, Alex Hern & Dan Milmo, *What do we know so far about collapse of crypto exchange FTX?*, THE GUARDIAN (Nov. 18, 2022), https://www.theguardian.com/technology/2022/nov/18/how-did-crypto-firm-ftx-collapse.

33 Sam Bankman-Fried had claimed that the greater regularity clarity in the Bahamas was the principal reason for the move – *see* Shalini Nagarajan, *Sam Bankman-Fried says FTX has moved its HQ from Hong Kong to the Bahamas because of its crypto framework*, MARKETS INSIDER (Sept. 27, 2021) https://markets.businessinsider.com/news/currencies/sam-bankman-fried-ftx-crypto-hong-kong-bahamas-relocates-headquarters-2021-9. As regards the Bahamas Digital Assets and Registered Exchanges Act 2020, *see* Aliya Allen & Sean McWeeney Jr., *15 FAQ's on the Digital Assets and Registered Exchanges (DARE) Act, 2020*, GRAHAM THOMPSON INSIGHTS (2021), https://grahamthompson.com/wp-content/uploads/2021/01/GT-News-Insights-Vol-3-Issue-1-DARE.pdf.

34 *See*, *e.g.*, Rohan Goswami & MacKenzie Douglas, *In defensive interview, Sam Bankman-Fried claims he's broke and committed no fraud*, CNBC (Nov. 30, 2022), https://www.cnbc.com/2022/11/30/former-ftx-ceo-sam-bankman-fried-says-i-didnt-ever-try-to-commit-fraud.html. *See also* Camomile Shumba, *US Justice Department Wants FTX Fraud Allegations to Be Investigated*, COINDESK (Dec. 2, 2022) https://www.coindesk.com/policy/2022/12/02/us-justice-department-wants-ftx-fraud-allegations-to-be-investigated.

arrest in the Bahamas in late 2022, and was charged with eight counts of fraud and conspiracy.[35] SBF has now been released on USD 250 million bail, and faces additional charges from the US SEC for his alleged participation in a "scheme to conceal material information from FTX investors".[36]

As in other financial crises, it appears problems arose in Alameda, FTX group's trading arm and funds, particularly customer funds, were transferred from the cryptocurrency trading venue to cover Alameda's trading and investment losses.[37] Determining what precisely happened is severely hampered by the complete lack of internal controls, proper accounting systems, and even systems for keeping track of customer accounts. As John Ray III, the restructuring expert appointed to lead FTX, stated, he has never in his entire career seen "such a complete failure of corporate controls".[38] So, what truly happened is at the time of writing still being deciphered.[39]

What seems clear is that while FTX portrayed itself as an exchange, it was functioning as a broker-dealer and proprietary trader in assets whose issuance it controlled. Ultimately, when in financial difficulty, reports suggest FTX lent its customers' funds to other parts of its corporate group[40] – behavior utterly different from that expected of a *bona fide* exchange, or any regulated entity in traditional finance.

B. Capacity to Steer Financial Firms

A single snowflake does not a winter make, and many collapses beyond FTX together comprise the Crypto Winter of 2022-23. Figure 1 shows the crypto bankruptcies of 2022-23 by gross liabilities.

Figure 1: Crypto Bankruptcies (by gross liabilities)[41]

---

35 *See*, *e.g.*, David Yaffe-Bellany, William K. Rashbaum & Matthew Goldstein, *FTX's Sam Bankman-Fried Is Arrested in the Bahamas*, N. Y. TIMES (Dec. 12, 2022) https://www.nytimes.com/2022/12/12/business/ftx-sam-bankman-fried-bahamas.html.

36 *See*, *e.g.*, Michael Race & Monica Miller, *FTX boss Sam Bankman-Fried arrives in US to face charges*, BBC (Dec. 22, 2022), https://www.bbc.com/news/business-64036615; David Yaffe-Bellany, William K. Rashbaum & Matthew Goldstein, *Sam Bankman-Fried Pleads Not Guilty to Fraud and Other Charges*, N. Y. TIMES (Jan. 3, 2022), https://www.nytimes.com/2023/01/03/technology/sam-bankman-fried-pleads-not-guilty.html.

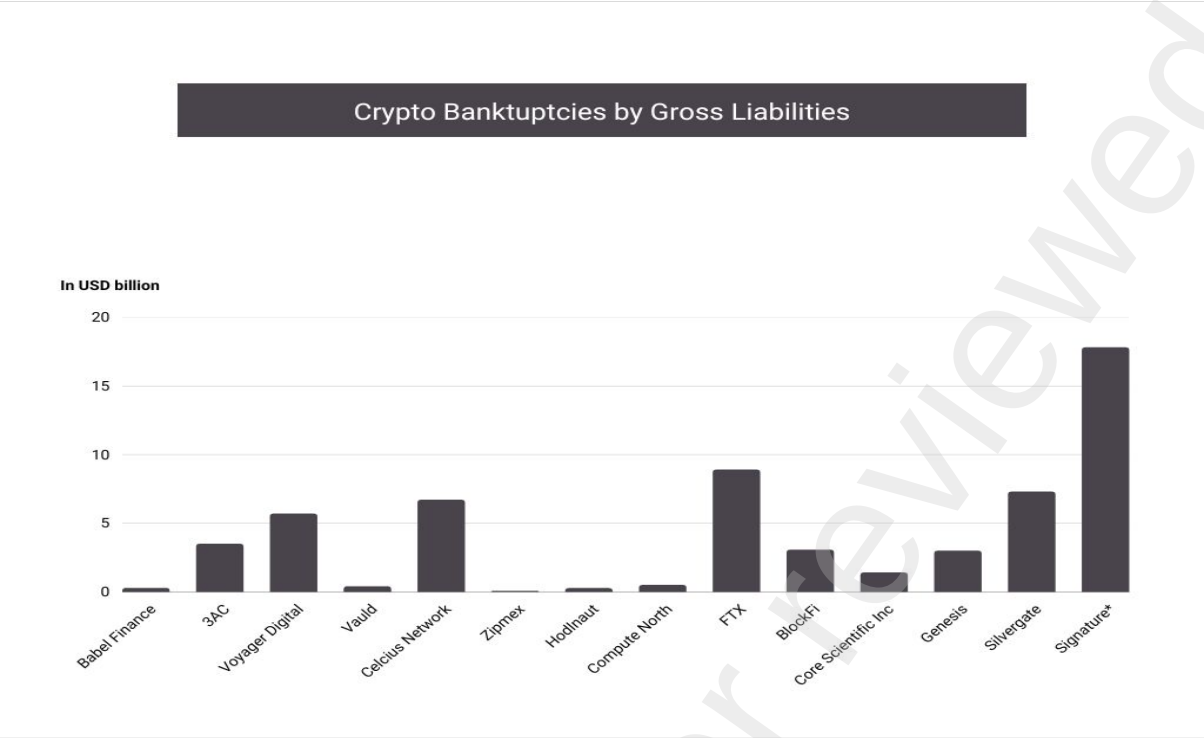
37 *See* Angus Berwick & Tom Wilson, *Exclusive: Behind FTX's fall, battling billionaires and a failed bid to save crypto*, REUTERS (Nov. 11, 2022) https://www.reuters.com/technology/exclusive-behind-ftxs-fall-battling-billionaires-failed-bid-save-crypto-2022-11-10.

38 *Id*.

39 *Id*. *See also* Kadim Shubba, Joshua Oliver & Sujeet Indap, *New FTX chief says crypto group's lack of control worse than Enron*, FINANCIAL TIMES (Nov. 18, 2022) https://www.ft.com/content/7e81ed85-8849-4070-a4e4-450195df08d7.

40 Vicky Ge Huang, Alexander Osipovich & Patricia Kowsmann, *FTX Tapped Into Customer Accounts to Fund Risky Bets, Setting Up Its Downfall*, WALL STREET JOURNAL (Nov. 11, 2022), https://www.wsj.com/articles/ftx-tapped-into-customer-accounts-to-fund-risky-bets-setting-up-its-downfall-11668093732.

41 Source: Research by ADA Chair in Financial Law (inclusive finance), University of Luxembourg. Note that the Signature numbers refer to Signature's crypto business only and leave out traditional banking business.



As for trading platforms, Vauld and Zipmex filed for creditor protection on July 22, Hodlnaut followed in August 2022,[42] and FTX and BlockFi in November 2022.[43] Babel Finance, Celcius Network, BlockFi and Genesis were more crypto lending firms; although we note the business models are not clear cut, as both Hodlnaut and FTX also ran crypto lending programmes. Further, Core Scientific and Compute North are Bitcoin mining firms, the Terra algorithmic crash concerned a stablecoin system, while Three Arrows Capital (3AC) acted as a crypto hedge fund (ie. a proprietary trader on its own and its investor's account). These issues echoed into eventual deposit withdrawals and losses at Silvergate Bank in the US, leading to its failure. Concerns about other tech-exposed banks led to the failure of Signature and Silicon Valley Bank all early in 2023.

While this shows widespread institutional instability throughout the crypto industry notwithstanding the business models, close examination confirms each collapse's pattern of significant interconnected centralised crypto intermediaries becoming unstable due to mismanagement, malfeasance, fraud, theft and a general lack of transparency.[44]

---

42 Rebecca Oi, *Top 10 Biggest Crypto Failures of 2022*, (Dec. 20, 2022), https://fintechnews.sg/67859/crypto/top-10-biggest-crypto-failures-of-2022/.

43 Press Release, United States Securities Exchange Commission, BlockFi Agrees to Pay $100 Million in Penalties and Pursue Registration of its Crypto Lending Product (Feb. 14, 2022), https://www.sec.gov/news/press-release/2022-26; Greg Iacurci, *As BlockFi files for bankruptcy, what to know about crypto investor protections*, CNBC (Nov. 28, 2022) https://www.cnbc.com/2022/11/28/what-to-know-about-crypto-investor-protections-as-blockfi-files-for-bankruptcy.html.

44 *See*, *e.g.*, Dietrich Knauth, *Factbox: Crypto companies crash into bankruptcy*, REUTERS (Dec. 2, 2022), https://www.reuters.com/technology/crypto-companies-crash-into-bankruptcy-2022-12-01; Julian Mark, *The Companies That Helped Create 2022's 'Crypto Winter'*, WASHINGTON POST (Dec. 5, 2022), https://www.washingtonpost.com/business/2022/12/05/crypto-ftx-collapse-bankruptcy-companies.

1. *Stablecoin projects*

Before crashing in May 2022, Terra's UST stablecoin was the fourth-largest stablecoin with USD 18 billion in market capitalisation (behind only Tether (USDT), USD Coin (USDC) and Binance USD (BUSD)).[45] The Terra project collapsed because of its algorithmic design relying on a two-coin system). Terra's UST coin was pegged to the underlying fiat currency via Terra's LUNA token, designed to stabilise the supply and demand of UST through arbitrage (i.e., contracting (or expanding) the UST pool by using the LUNA pool as a counterweight). Additionally, arbitrage opportunities were expected to quickly correct any slight movements away from the peg (since Terra allowed arbitrageurs to trade USD 1 worth of LUNA for 1 UST, and vice versa, at any time).[46]

This algorithmic mechanism could not handle Terra's growth and ultimately failed. Terra's algorithmic stabilization mechanism probably became overwhelmed because its Anchor protocol offered a hefty, and probably overly-ambitious, 20 per cent return for staking UST (since UST holders often sold en masse if they feared LUNA would fail).[47] Additionally, it is speculated that a coordinated attack on Terra broke the link, thereby profiting those on the other side (similar to the 2021 IronFinance algorithmic stablecoin project).[48] Terra's failure sent shockwaves through the entire crypto industry and the fall-out damaged or destroyed many other market participants (described below).

2. *Crypto investment funds*

The once respected crypto Singaporean hedge fund 3AC filed for bankruptcy protection on 1 July 2022 (a few days before Voyager and Celsius – see below).[49] 3AC went from over USD 10 billion in assets to collapse in a few months. After its failure, the Monetary Authority of Singapore accused 3AC of exceeding its assets threshold and providing false information.[50] 3AC, which has been called "the crypto version of Long-Term Capital Management" (LTCM)

---

45 *See Historical data for TerraClassicUSD*, COINMARKETCAP (Dec. 6, 2022), https://coinmarketcap.com/currencies/terrausd/historical-data.

46 Antonio Briola et al., *Anatomy of a Stablecoin's failure: The Terra-Luna case*, 51 FIN RES. LETTERS (2023).

47 *See*, *e.g.*, Elizabeth Lopatto, *How the Anchor protocol helped sink Terra*, THE VERGE (May 20, 2022), https://www.theverge.com/2022/5/20/23131647/terra-luna-do-kwon-stablecoin-anchor.

48 *See*, *e.g.*, Taylor Locke, *Did a 'concerted attack' cause Terra's UST to crash below $1? An exec behind the largest stablecoin and experts agree it's suspicious*, FORTUNE (May 14, 2022), https://fortune.com/2022/05/13/terra-ust-stablecoin-crash-suspicious-potential-attack-george-soros. *See also* Austin Adams & Markus Ibert, *Runs on Algorithmic Stablecoins: Evidence from Iron, Titan, and Steel*, *Federal Reserve*, FEDS NOTES (Jun. 2, 2022), https://www.federalreserve.gov/econres/notes/feds-notes/runs-on-algorithmic-stablecoins-evidence-from-iron-titan-and-steel-20220602.html.

49 *See* Arjun Khapal, *Crypto hedge fund Three Arrows files for Chapter 15 bankruptcy*, CNBC (Jul. 2, 2022), https://www.cnbc.com/2022/07/02/crypto-hedge-fund-three-arrows-files-for-chapter-15-bankruptcy.html; MacKenzie Sigalos, *From $10 billion to zero: How a crypto hedge fund collapsed and dragged many investors down with it*, CNBC (Jul. 12, 2022), https://www.cnbc.com/2022/07/11/how-the-fall-of-three-arrows-or-3ac-dragged-down-crypto-investors.html. *See also* Alex Hern & Dan Milmo, *Three Arrows Capital to become latest casualty of crypto crash*, THE GUARDIAN (Jun. 29, 2022), https://www.theguardian.com/technology/2022/jun/29/three-arrows-capital-to-become-latest-casualty-of-crypto-crash.

50 *See* Tom Westbrook & Jason Neely, *Singapore regulator rebukes crypto fund Three Arrows Capital*, REUTERS (Jun. 30, 2022), https://www.reuters.com/business/finance/singapore-regulator-rebukes-crypto-fund-three-arrows-capital-2022-06-30.

used high levels of leverage to make a series of large directional trades in Grayscale Bitcoin Trust (GBTC), Luna Classic (LUNC) and Staked Ether (stETH).[51] The consequences of losses on its positions spread throughout the ecosystem because it was trading funds primarily borrowed from over 20 other institutions. The concentration of risk in one point of failure and the resultant impact on a range of other significant market participants echoes LTCM's situation in the aftermath of Russia's August 1998 default. 3AC's founders Su Zhu and Kyle Davies quickly disappeared after filing for bankruptcy, prompting liquidators to serve subpoenas via Twitter.[52] The founders have since resurfaced as founders of Open Exchange, a new crypto investment vehicle, focusing on claims against failed crypto firms.[53]

The 3AC failure appears to reinforce the view, that "crypto is a game of creating virtual fortunes out of thin air and convincing other humans with traditional forms of money that those virtual fortunes deserve to be real-world ones".[54]

3. Crypto lenders

Celsius was meant to operate as a safe and secure mechanism to generate attractive returns for crypto holders. It filed for bankruptcy protection on 13 July 2022, losing some USD 5 billion in customer funds.[55] It has been alleged (in a civil lawsuit) that Celsius was running a "Ponzi scheme" by offering depositors rates for staking of up to 17 per cent, while also loaning these funds out. The lawsuit claims Celsius, "artificially inflated the price of its digital coin, failed to hedge risk and engaged in activities that amounted to fraud".[56]

Voyager was a crypto lender like Celsius (and suffered the same fate). Voyager filed for bankruptcy protection on 5 July 2022, being unable to repay (or even account for) customer deposits.[57] Voyager did not keep customer deposits in designated wallets but mixed deposited crypto, and then lent deposits to third parties (like 3AC and FTX/Alameda) to pay interest to

---

51 Jacob Wollinsky, *How Hedge Fund Three Arrows Capital Was Crypto's Long-Term Capital Management*, FORBES (Aug. 24, 2022), https://www.forbes.com/sites/jacobwolinsky/2022/08/24/how-hedge-fund-three-arrows-capital-was-cryptos-long-term-capital-management.

52 Muyao Shen & Jeremy Hill, *Three Arrows Capital Liquidators Demand Documents Via Twitter*, BLOOMBERG CRYPTO (Jan. 6, 2023), https://www.bloomberg.com/news/articles/2023-01-05/3ac-liquidators-demand-documents-from-founders-via-twitter.

53 Aaryamann Shrivastava, *Bankrupt 3AC founders Kyle Davies and Zhu Su launch new exchange for crypto claims trading*, FXSTREET (Feb. 10, 2023), https://www.fxstreet.com/cryptocurrencies/news/bankrupt-3ac-founders-kyle-davies-and-zhu-su-launch-new-exchange-for-crypto-claims-trading-202302100000.

54 Jen Wieczner, *The Money Game: The Crypto Geniuses Who Vaporized a Trillion Dollars*, NY MAG (Aug. 15, 2022), https://nymag.com/intelligencer/article/three-arrows-capital-kyle-davies-su-zhu-crash.html.

55 *See* Wayne Duggan & Farran Powell, *Celsius Crypto Meltdown: A Crypto Lender In Crisis*, FORBES (Oct. 4, 2022), https://www.forbes.com/advisor/investing/cryptocurrency/what-is-celsius.

56 *See* Arjun Kharpal, *Embattled crypto lender Celsius is a 'fraud' and 'Ponzi scheme,' lawsuit alleges*, CNBC (Jul. 8, 2022), https://www.cnbc.com/2022/07/08/crypto-lender-celsius-is-a-fraud-and-ponzi-scheme-lawsuit-claims.html.

57 *See* Jeremy Hill, *Voyager Account Holders Likely Won't Get all Their Crypto Back*, BLOOMBERG CRYPTO (Jul. 6, 2022), https://www.bloomberg.com/news/articles/2022-07-06/voyager-account-holders-likely-won-t-get-all-their-crypto-back.

customers. Allegations that Voyager was involved in illegal conduct have also been made in, inter alia, an investigation by the US Federal Deposit Insurance Company.[58]

Crypto lender Genesis similarly filed for bankruptcy protection in January 2023, shortly after the US SEC charged it with selling unregistered securities.[59] Genesis operated within the Digital Currency Group, in which other companies operated various trading businesses (which continue) and had been borrowing from Genesis.[60]

It is probable that many other crypto firms, including FTX, were destabilized by these other failures earlier in 2022 (especially as FTX was involved in attempted restructuring activity). [61] This should not happen if crypto is truly decentralized as DeFi was designed to avoid the interlinkages of traditional finance.

C. Operational Instability: Not an Exception, but the Norm

While the former largely demonstrates crypto management's incapacity to steer financial firms well, the Crypto Winter 2022-23 is further characterized by the capacity of outsiders to exploit a system's weaknesses and divert assets.

Figure 2 lists some high-volume asset diversions in the DeFi sector. Strikingly, several large-scale asset diversions occurred in 2022-23, thereby undermining much of the trust remaining in the general institutional stability of DeFi business models.

Figure 2: Major DeFi Asset Diversions[62]

Date	Platform	Assets diverted	Method
Jul 05	Mt. Gox	$ 473 000 000	Inside job / bad business conduct
Jan 18	Coincheck	$ 534 000 000	Inadequate security
Feb 21	CreamFinance	$ 38 000 000	Flash loan attack
Mrz 21	PAID Network	$ 7 000 000	Compromised private keys

58 *See*, *e.g.*, Allyson Versprille, *FDIC probing how bankrupt crypto lender Voyager marketed itself*, BLOOMBERG CRYPTO (Jul. 8, 2022), https://www.bloomberg.com/news/articles/2022-07-07/fdic-probing-how-bankrupt-crypto-broker-voyager-marketed-itself.

59 *See* Rohan Goswami & MacKenzie Sigalos, *Crypto lender Genesis files for bankruptcy in latest blow to Barry Silbert's DCG empire*, CNBC (Jan. 20, 2023), https://www.cnbc.com/2023/01/20/crypto-lender-genesis-trading-files-for-bankruptcy-barry-silbert-digital-currency-group.html; Rohan Goswami, *Crypto firms Genesis and Gemini charged by SEC with selling unregistered securities*, CNBC (Jan. 12, 2023), https://www.cnbc.com/2023/01/12/sec-charges-genesis-and-gemini-with-selling-unregistered-securities.html.

60 Sonali Basak et al., *Genesis Balance Sheet Reveals Web of Loans Across Silbert Empire*, BLOOMBERG TECHNOLOGY (Nov. 23, 2022), https://www.bloomberg.com/news/articles/2022-11-22/genesis-balance-sheet-reveals-web-of-loans-across-silbert-empire-dcg.

61 *See*, *e.g.*, Olga Kharif, *Crypto Billionaire Bankman-Fried Eyeing Bid for Celsius Assets*, BLOOMBERG (Sept. 28, 2022), https://www.bloomberg.com/news/articles/2022-09-27/crypto-billionaire-bankman-fried-eyeing-bid-for-celsius-assets. *See also* Steven Church, *FTX's $1.4 Billion Deal for Bankrupt Lender Voyager Is Cancelled*, BLOOMBERG CRYPTO (Nov. 16, 2022), https://www.bloomberg.com/news/articles/2022-11-15/ftx-s-1-4-billion-deal-for-bankrupt-crypto-lender-voyager-void.

62 Research by ADA Chair in Financial Law (inclusive finance), University of Luxembourg.

Aug 21	CreamFinance	$ 25 000 000	Flash loan attack
Aug 21	Poly Network	$ 611 000 000	Software bug
Oct 21	CreamFinance	$ 130 000 000	Flash loan attack
Oct 21	Compound	$ 150 000 000	Software bug
Nov 21	bZx Protocol	$ 55 000 000	Compromised private keys
Dec 21	Bitmart	$ 196 000 000	Stolen private keys
Dec 21	VulcanForged	$ 140 000 000	Stolen private keys
Dec 21	BadgerDAO	$ 120 000 000	Governance attack
Feb 22	Wormhole	$ 325 000 000	Bridge exploit
Feb 22	Qubit Finance (X-Bridge)	$ 40 000 000	Bridge exploit
Mrz 22	Ronin Network	$ 625 000 000	Stolen private keys
Apr 22	Beanstalk	$ 182 000 000	Governance attack
Aug 22	Nomad Bridge	$ 190 000 000	Software bug
Sep 22	Wintermute	$ 162 000 000	Software bug
Okt 22	Binance	$ 570 000 000	Bridge exploit
Nov 22	FTX	$ 477 000 000	Inside job / bad business conduct

In some instances, private keys were stolen through hacks of crypto custodians wallets and exchanges ('Hot Wallet Hacks'),[63] in others attackers hacked the governance mechanism, acquiring control over the platform's protocols ('Governance Hacks') which allowed them to divert assets.[64] Several platforms experienced in 2022 the same type of earlier attacks, casting doubt on the industry's ability to learn and improve cyber security.

In hindsight, the crypto winter is not exceptional as elements including concentration, institutional instability and misconduct, feature prominently. For instance, before Mt. Gox's[65] failure in early 2014, it dealt with some 70 percent of Bitcoin transactions worldwide. Mt. Gox was a systemically important intermediary for the Bitcoin ecosystem. As in the Crypto Winter, a mix of incompetence, lack of risk management and unrealistic promises met a mass of over-enthusiastic crypto clients searching for high returns. Once the capacity and resources of the system were overly stretched, vulnerabilities emerged to theft and fraud: in the case of Mt. Gox this eventuated in the infamous 2011 hot wallet hack. That this hack was undetected for three years demonstrates severe internal deficiencies in accounting and auditing – these critical functions were not compliant with the standards prescribed for regulated financial intermediaries or even reasonable business behaviour, particularly when dealing with other people's money (the classic agency risk in finance).

63 On Mt. Gox *see*, *e.g.*, Robert McMillan, *The Inside Story of Mt. Gox, Bitcoin's $460 Million Disaster*, WIRED (Mar. 3, 2014), https://www.wired.com/2014/03/bitcoin-exchange.

64 On Beanstalk *see*, *e.g.*, Corin Faife, *Beanstalk Cryptocurrency Project Robbed after Hacker Votes to Send Themself $182 Million*, THE VERGE (Apr. 19, 2022), https://www.theverge.com/2022/4/18/23030754/beanstalk-cryptocurrency-hack-182-million-dao-voting.

65 *See* on Mt. Gox, Robin Sidel, Michael J. Casey & Eleanor Warnock, *Shutdown of Mt. Gox Rattles Bitcoin Market*, WALL STREET JOURNAL (Feb. 26, 2014), https://www.wsj.com/articles/SB10001424052702304834704579404101502619422.

A lack of appropriate risk-management and analysis combined with fraud and misconduct also characterised the ICO (Initial Coin Offering) bubble of 2017-19:[66] the common denominator of many crypto projects was (1) the emergence of one dominant crypto token, paired with (2) utterly inadequate disclosure of information, supported by (3) over-enthusiastic promises and announcements, and (4) the avoidance of financial regulation through generous self-classification of crypto assets, skirting existing financial regulation and facilitating institutional instability.

The issue with the ICO bubble lay not in the failure of innovative projects – failures are part of innovative ventures and losses are inherent in venture investing. The issue was that institutional failures and weaknesses prompted many failed crypto projects, resulting in operational malfeasance that facilitated fraud and theft, all while information technology (IT) infrastructure locked in investors' and customers' funds, without appropriate systems of transparency and investor protection.

III. Financialization of Crypto and the Rise of Systemically Important Crypto Intermediaries (SICIs)

A. Concentration and Interconnection in the Crypto Ecosystem

The Crypto Winter's central element was centralization in Systemically Important Crypto Intermediaries (SICIs) that are both too-big-to-fail and too-connected-to-fail in their ecosystem. While issues in the crypto ecosystem have historically had limited impact on traditional financial stability, the crypto ecosystem has produced its version of crypto concentration risk, similar to traditional finance's systemically important financial institutions and infrastructure. This concentration typically arises because a single crypto intermediary – often the entity controlling the issuance of a fashionable token – assumes a powerful role within its ecosystem and a *de facto* monopoly in supply and demand.

We have argued in the context of traditional finance that economies of scope and scale combined with technology's network effects facilitate the rapid emergence of new systemically important financial institutions; a trend we have characterized as FinTech 4.0.[67] Emerging systemically important crypto conglomerates, intermediaries and infrastructure illustrates this process in crypto. SICIs tend to arise out of a dependence between transactions of a crypto asset and an intermediaries' continued existence. Within *their ecosystem*, many crypto intermediaries are classic examples of systemically significant non-bank financial institutions, known as "shadow banks" or "non-bank financial intermediaries", that have been key in many financial crises and are a major on-going focus of major regulators and policymakers globally.[68]

---

66 *See* Dirk A. Zetzsche et al., *The ICO Gold Rush: It's a Scam, It's a Bubble, It's a Super Challenge for Regulators*, 60:2 HARV. INT'L L.J. 267 (2019).

67 D.W. Arner et al., *BigTech and Platform Finance: Governing FinTech 4.0 for Sustainable Development*, 27:1 FORDHAM J. CORP. & FIN L. 1 (2022).

68 The term "shadow bank" was coined by economist Paul McCulley in a speech at the 2007 annual financial symposium hosted by the Kansas City Federal Reserve Bank in Jackson Hole, Wyoming. McCulley focused on the US and referred primarily to nonbank financial institutions that engaged in maturity transformation – *see* Laura Kodres, *Shadow Banks: Out of the Eyes of Regulators*, IMF (Feb. 27, 2023), https://www.imf.org/en/Publications/fandd/issues/Series/Back-to-Basics/Shadow-Banks.

As we analyse elsewhere, many so-called DeFi business models have centralised elements of set-up and governance.[69] In a purely DeFi market structure, the systems' development and maintenance is free. Thus, "true DeFi" is an unreal dream, and the market has accepted concentration in practice, with the consequential governance and agency risks seen in traditional finance.[70] FTX's collapse evidences this insight: FTX's operations were decentralized. The original Bitcoin white paper's design is very different to how FTX was run.[71] For instance, Bitcoin was formulated with peer-to-peer transactions and without intermediaries. By contrast, FTX processed transactions centrally and acted as an intermediary. However, FTX was not a cryptocurrency and so Bitcoin is not a directly appropriate comparison. But the comparison does highlight FTX's departure from DeFi in its business models and operating procedures. FTX demonstrates the evolution of centralised crypto services, and its attendant market failures and negative externalities, with which regulation has not kept pace.

Concentration in crypto runs counter to DeFi's philosophy: Crypto aimed to eliminate traditional financial intermediaries that concentrate flows of supply and demand in financial products. Decentralization is supposed to eliminate the market failures, negative externalities and misbehaviour characteristic of traditional finance. Crypto was designed to maximise the potential for positive externalities, such as democratization, inclusion, transparency, permanence and innovation via technological trust infrastructure. Ironically, what crypto was designed to prevent has come to characterize its ecosystem: the economies of scope and scale of finance combined with the network effects of technology have resulted in large complex crypto conglomerates of systemic importance for their users.

B. Bundled Intermediary Functions

The opacity and complexity of crypto conglomerates also carry connotations of shadow banking, shadow finance and regulatory arbitrage. We are interested in the cause of this opacity and complexity, identifying two drivers: a combination of a range of economic functions paired with the lack of transparency regarding actual operations and risks, as well as the regulation requiring appropriate management of these various economic functions. Both elements become obvious when compared to the five main models of intermediaries in traditional finance. In this section, we consider four types of these intermediaries, but not the fifth (insurance companies).

First are **exchanges**, or marketplaces at large. The main examples are stock exchanges, which after centuries of crises and scandals,[72] are now subject to strict securities regulation requiring segregated accounts for all customers. This ensures that in the event of exchange insolvency, customer assets are segregated and able to be returned. Segregation and custody requirements, and a range of operational controls promoting safety and soundness, are all central to exchange

---

69 *See* Linn Anker-Sørensen & Dirk A. Zetzsche, *From CEFI to DEFI: The Issue of Fake DeFI*, (U. of Luxembourg Working Paper 12, 2021).

70 *Id*.

71 Satoshi Nakamoto, *Bitcoin: A Peer-to-Peer Electronic Cash System*, BITCOIN.ORG (Oct. 31, 2008), https://bitcoin.org/bitcoin.pdf.

72 THE FINANCIAL CRISIS INQUIRY COMMISSION, THE FINANCIAL CRISIS INQUIRY REPORT: FINAL REPORT OF THE NATIONAL COMMISSION ON THE CAUSES OF THE FINANCIAL AND ECONOMIC CRISIS IN THE UNITED STATES (Jan. 2011), http://fcic-static.law.stanford.edu/cdn_media/fcic-reports/fcic_final_report_full.pdf.

regulation. Cryptocurrency intermediaries often describe themselves as exchanges, but beyond a few regulated Instances, very rarely behave like exchanges by segregating accounts and assets.[73] Notably, there are three or four times more firms claiming to be exchanges in the crypto industry than in traditional finance for a far lower number and volume of transactions and the number of users, suggesting these firms are also engaging in other functions.[74] Therefore, further consolidation is expected bringing increased concentration risks and systemically significant financial infrastructures in crypto.

Second are **investment firms**, including broker-dealers and market makers. Investment firms take client assets, engage in trading, and offer finance and a range of repo and other collateralised services. Investment firms, and their clients, are typically exposed to counter-party risk, yet segregated client accounts provide considerable bankruptcy protection. Broker-dealer regulation involves custody, settlement and other forms of risk management measures to benefit clients.

Third are **collective investment vehicles**, such as investment funds, mutual funds and pension funds. These are pools of assets that are invested, under the investment policy, to the benefit of the collective investors. Assets of the pooled investment vehicles are held in custody and segregated from other assets held by involved intermediaries. For any investment decision, the collective investors' interest as defined in the constituent documents should be the sole guiding consideration, identified in the investment policy, and strictly distinct from the interests of any intermediary involved. Any investment in a crypto asset should be made only if that asset seems to be a good investment from the perspective of the fund's investor. Asset managers making investment decisions on behalf of the fund (e.g., for the sake of argument only, Alameda) must not take into account the benefits the acquisition or disposal of certain crypto assets (e.g. FTT) creates for a related entity (e.g. FTX exchange). Moreover, conflicts of interest rules resulting in information barriers should actively prevent these considerations from being operative, blinding asset managers to the needs and wishes of other parts of the conglomerate and avoiding anticipatory obedience.

Fourth are **banks**. A bank takes in funds as deposits, loaning or investing most of the funds to other parties. Banks are subject to a range of prudential regulatory requirements to enhance their safety and soundness and maintain market trust and confidence both to support their core roles in payments and finance (a positive externality) and reduce contagion risks (a negative externality). For crypto, investors may have used the "cryptoderivatives" (i.e. forwards and options on crypto assets) as cash substitutes. The crypto industry may have furthered the misunderstanding of an investment as cash, already in the term cryptocurrency. Many crypto entities thus appear to function more as a bank than an exchange (and to some extent as a broker-dealer, as stated above).[75]

---

73 Dennis Chu, *Broker-Dealers for Virtual Currency: Regulating Cryptocurrency Wallets and Exchanges*, 118:8 COLUM. L. REV. 2323 (2018).

74 Forbes puts the number of crypto exchanges at around 500 – *see* Farran Powell, *10 Best Crypto Apps & Exchanges Of 2023*, FORBES (Feb. 1, 2023), https://www.forbes.com/advisor/investing/cryptocurrency/best-crypto-exchanges, and there are estimates of up to 1000 additional decentralized exchanges. Conversely Deloitte states there are only around 130 traditional securities exchanges – *see* David Myers, *The future of global securities exchanges*, DELOITTE (Jan. 2023), https://www.deloitte.com/global/en/Industries/financial-services/perspectives/gx-future-of-global-securities-exchanges.html.

75 Chu, *supra* note 74; William D. O'Connell, *Crypto platforms say they're exchanges, but they're more like banks*, THE CONVERSATION (Aug. 12, 2022), https://theconversation.com/crypto-platforms-say-theyre-exchanges-but-theyre-more-like-banks-188339; George Selgin, *Bank and Crypto Runs: F(ac)TX vs fiction*,

These crypto intermediaries operating (functionally) as a bank were not subject to traditional bank regulation and did not have access to protections such as deposit insurance, restructuring frameworks and eventually the central bank as a liquidity provider of last resort. Such measures aim at avoiding liquidity and confidence crises but none, including mandated capital levels and liquidity, apply to crypto.

In short, we experienced something similar to bank runs in the case of several SICIs (e.g. FTX, Mt. Gox and others), exacerbated by an absence of measures designed to prevent these runs. The abrupt exit of customers fuelled the liquidity crisis inherent in each crypto insolvency.

C. Implications: The Financialization of Crypto

This crypto intermediation concentration; this rise of oligopoly or monopoly powers in markets following the mantra of decentralisation; we term the financialisation of crypto. Where financialization happens, neither decentralization nor free market forces counter the control of the SICI as a central intermediary.

Given financialization and the rise of SICIs, the crypto failures of 2022 are highly unlikely to be the last; others will surely follow. The crypto winter confirms that crypto intermediaries and conglomerates are exposed to the classic financial and operational risks, market failures and negative externalities.[76]

Traditional finance addressed these issues through regulation, which raises the question, we now address, of how best to regulate crypto?

IV. Regulating Crypto

While crypto was presented as a new type of finance that avoided traditional financial risks, the ecosystem's operational and financial risks have evolved to evidence all of the traditional financial risks. Centuries of financial evolution illustrate that market trust requires transparency, comparable information, and protection from fraud and abuse. Trust in financial institutions follows risk mitigation, and is indispensable for efficient markets and market development. Therefore, we argue that where problems have similar causes, they require similar remedies: financialization requires crypto regulation. While others argue the best approach is to isolate crypto from finance, leaving it largely unregulated as a non-connected ecosystem,[77] we

---

CATO INSTITUTE (Nov. 21, 2022), https://www.cato.org/blog/bank-crypto-runs-factx-vs-fiction.

76 *See*, *e.g.*, Cornelius Christian, *FTX collapse could mean 'cascade' of failures in crypto sector - Ran Neuner*, KITCO NEWS (Nov. 11, 2022), https://www.kitco.com/news/2022-11-11/FTX-collapse-could-mean-cascade-of-failures-in-crypto-sector-Ran-Neuner.html; Jack Denton, *Exchanges Seek to Calm Users as Trust in Crypto World Wavers*, BARRON'S (Nov. 14, 2022), https://www.barrons.com/articles/ftx-crypto-exchange-reserves-51668457984.

77 *CryptoSprint outputs*, FINANCIAL CONDUCT AUTHORITY (May 11, 2022) https://www.fca.org.uk/firms/cryptoassets/cryptosprint. *See also* Todd H. Baker, *Let's Stop Treating Crypto Trading as If It Were Finance*, THE CLS BLUE SKY BLOG (Nov. 29, 2022), https://clsbluesky.law.columbia.edu/2022/11/29/lets-stop-treating-crypto-as-if-it-were-finance/.

highlight how crypto has financialized, both in terms of what is being offered and in market failures and other weaknesses.[78]

Financial regulation largely targets improved market functioning and efficiency. Crypto's biggest risk is that financialization erodes trust and confidence such that the market collapses, or legislators feel pressed to shut crypto markets down permanently. We argue that an approach recognising and addressing market failures and externalities (both positive and negative) through regulation, enforcement and supervision, as well as international cooperation and coordination, is necessary for crypto to survive (and to thrive). We outline the need for regulation in the context of traditional risks of finance in Section A.

The idiosyncrasies of crypto require certain bespoke approaches. We highlight the most important of such aspects and considerations in Section B. Section C then combines these insights and sets out detailed policy proposals.

A. Financialization, Shadow Finance and Regulatory Arbitrage: "Same Risks, Same Rules"

Financial regulation seeks to enhance market transparency and efficiency, ensure financial stability, market fairness and integrity, and provide adequate customer, depositor and investor protection. Financial regulation also seeks recently to support market development, economic growth, and further financial inclusion and sustainable development.[79] We will show each of these regulatory objectives to also be relevant to the crypto regulation.

1. Financial stability

Financial regulation is about seeking to prevent or reduce the most significant externality which arises in the context of finance: systemic financial crises. Financial stability regulation – both macroprudential and microprudential – is designed to achieve this objective.[80]

While crypto has not yet reached the financial dimension that warrants intervention to ensure whole financial system stability, financial technology usually grows very fast, due to the scale and scope economies inherent in IT and network effects.[81] Crypto models often quickly bypass the stages of "too small to care" and "too large to ignore" and enter the stage of "too big to fail".

In particular we are concerned with the crypto industry's spill-over effects into traditional finance. One regulatory response is to ring-fence cryptoassets and insulate crypto from traditional finance, and vice versa. For preventative measures, regulators will require information on counterparties, exposures and interconnectivity both across the crypto industry, and with traditional finance.

---

78 KATHARINA PISTOR, THE CODE OF CAPITAL: HOW THE LAW CREATES WEALTH AND INEQUALITY (2018).

79 Douglas W. Arner et al., *Sustainability, FinTech and Financial Inclusion* 21 EUR. BUS. ORG. L. REV. 7 (2020).

80 Franklin Allen & Xian Gu, *The Interplay between Regulations and Financial Stability* 53:2 J. FIN SER. RES. 233 (2018).

81 Michael L. Katz & Carl Shapiro, *Network Externalities, Competition, and Compatibility* 75:3 AM. ECON. REV. 424 (1985).

2. Market efficiency and transparency

Beyond stability, financial regulation focuses on promoting market functioning, transparency and efficiency.[82] Market efficiency seeks a semi-strong form of informationally efficient markets, that is markets in which prices reflect all publicly available information.[83]

Market efficiency is a concern for crypto for three reasons. First, information is available in a non-structured, unorganized manner, made available through various private and unregulated channels. Professional and retail investors are thus unable to properly evaluate investment opportunities and related risks. Second, a combination of erratic disclosure and unregulated, non-standardized, information streams as well as opaque and complex intermediary structures, cause unclear information and transaction costs while liquidity in most crypto assets is limited. With some notable exceptions for some large volume cryptoassets like ETH, arbitrage is thus unable to push asset prices towards the "right price" using publicly available information.

Third, crypto is characterized by non-financial information about the IT architecture, systems design and stability, which are often central to project evaluation. While white papers and project descriptions usually show some features of the IT design, few crypto customers fully understand *both* the technical side of crypto and their financial implications, to understand and manage the risks. Developers, and in the case of SICIs, the crypto conglomerate developing and operating the system have significant informational advantages.

As the principal traditional tool to further market efficiency,[84] disclosure should be adopted and supported by standardization of crypto protocols and transparency on crypto asset supply and demand. Crypto disclosure could focus on the standardization of information disclosure requirements and information quality assurance mechanisms. These include accounting and auditing standards, technical details of projects, supply and demand in markets and assets, as well as valuation methods and algorithms. Further, microprudential regulation enhancing crypto intermediaries' operational safety and soundness would reduce fraud and theft, and promote trust while reducing the need for costly self-protective measures.

3. Customer, depositor and investor protection

The third central objective of financial regulation focuses on customer, investor and client protection.[85] This focuses on less informed but sometimes overly enthusiastic market participants that lack the means to protect themselves. It also seeks to maximize rational behaviour while recognizing that rationality is often not the dominant characteristic of human behaviour. Consumer protection also forms a part of the client and investor protection rationale. Despite the expectations of crypto consumers, the secret or hidden centralization and monopolization of market segments run contrary to DeFi principles.

---

82 AUSTRALIAN GOVERNMENT DEPARTMENT OF THE TREASURY, APPROACHES TO FINANCIAL REGULATION (Nov. 1, 1996), <https://treasury.gov.au/sites/default/files/2019-03/p1996-fsi-dp-07-chapt04.pdf>.

83 Eugene F. Fama, *Efficient Capital Markets: A Review Of Theory and Empirical Work* 25:2 J. FIN 383 (1970).

84 Charles R. Korsmo, *The Audience for Corporate Disclosure*, 102:4 IOWA L. REV. 1581 (2017).

85 CHARLES GOODHART ET AL., *The rationale for regulation* in FINANCIAL REGULATION: WHY, HOW AND WHERE NOW? 1 (1998).

Investor protection includes disclosure to enable informed decisions (as discussed vis-a-vis market functioning and efficiency), enforcement to address misconduct, and prudential mechanisms to reduce losses from intermediary or infrastructure failures while allowing exit to support market discipline (thus reinforcing financial stability regulation).

Like traditional finance, conflicts of interest stemming from the bundled intermediary functions need to be addressed. Unbundling and separation of functions and information barriers are of particular importance.

4. Fairness and market integrity

Fairness and market integrity focus on preventing both criminal use of the financial system and fraud and misconduct. Market integrity mainly focuses on issues relating to various forms of sanctions, money laundering and terrorist financing. Market fairness mainly focuses on criminal behaviour and financial misconduct, including insider trading and market manipulation, thus relating also to customer protection.

The crypto winter provides touches upon both dimensions of market fairness and integrity.

With market fairness, some report that FTX's fund Almeda traded primarily in FTX's main crypto-asset, equivalent to trading in a regulated entity's own security. Similarly, Binance publicly cast doubt on the financial reliability of FTX, their most serious competitor. Such a statement would enliven market abuse and market manipulation legislation in the regulated finance industry.

Additionally, some crypto intermediaries are seemingly not following AML/CTF requirements, accepting funds without KYC checks. There are two possible explanations for this. First, some intermediaries operate from jurisdictions where they are beyond the scope, or there is no enforcement, of AML/CTF legislation. Second, where there are enforced crypto AML/CTF rules, some intermediaries characterise their services to circumvent existing rules. For instance, they may characterize cryptoassets as utility assets where only investment and payment cryptoassets are subject to regulation.[86]

5. Growth, inclusion and sustainable development

While economic growth features strongly in financial regulation and regulatory policy, recently many other aspects have been added including innovation, inclusion and sustainable development.[87] Innovation, development and inclusion objectives have provided the strongest support for taking a permissive approach to crypto regulation.[88] While current views are increasingly sceptical about the technology potential, we think it important to highlight its great success in supporting fundraising efforts.[89] Further, an increasing range of successful

86 Dirk A Zetzsche et al., *supra* note 67.

87 Douglas Arner et al., *Digital Finance, Financial Inclusion, and Sustainable Development: Building Better Financial Systems* in FINTECH AND COVID-19 IMPACTS CHALLENGES AND POLICY PRIORITIES FOR ASIA 176 (John Beirne, James Villafuerte, and Bryan Zhang eds., 2022).

88 Christine Moy and Jill Carlson, *Cryptocurrencies can enable financial inclusion. Will you participate?*, WEFORUM (Jun. 9, 2021), https://www.weforum.org/agenda/2021/06/cryptocurrencies-financial-inclusion-help-shape-it.

89 Nareg Essaghoolian, *Initial Coin Offerings: Emerging Technology's Fundraising Innovation*, 66:1 UCLA L.

applications are emerging in the context of traditional finance.[90] However, this reinforces our financialization argument and its implications necessitating appropriate regulation to support market development.

Additionally, some systems' designs raise energy issues.[91] Some crypto models waste energy and are exclusive, while others are highly energy efficient and inclusive, providing access to customers with low degrees of financial and technical literacy. For instance, developers claim that the Ethereum Merge, a major software upgrade to the Ethereum blockchain in September 2023, will reduce the Ethereum blockchain's energy usage by 99.95 percent. Moreover, another upgrade dubbed "the Surge" will reduce costs, enhance speed and system stability.[92]

While these upgrades show the potential of technological innovation, the absence of similar upgrades to the Bitcoin blockchain is deeply regrettable, as it is estimated it uses as much energy as the Netherlands, a country with some 18 million people.[93] One reason for this is Bitcoin's lack of a centralized governance mechanism to design and implement upgrades (a necessary feature if one is to follow the principles of DeFi and its aversion to centralized external regulation).

We suggest in the context of DeFi the usefulness of embedding regulatory principles – including sustainability – into system design.

B. Decentralization: "New Risks, New Rules"

While crypto is exposed to traditional financial risks, it is somewhat different to traditional finance, especially in its decentralization of financial functions. For instance, many DeFi systems follow the Bitcoin model where token holding is decentralized.[94] In DeFi exchanges, the liquidity pool is disintermediated: liquidity is generated by multiple users willing to hand over two types of tokens to the pool, in return for a reward. Upon a trading event, the trading algorithm allocates these tokens to the parties.[95] This partial decentralization is seen in many other functions of the DeFi stack, from valuation over crypto lending to crypto staking.[96]

REV. 294 (2019).

90 Bain & Company, *Web3 and Blockchain*, BAIN (Jan. 31, 2023), https://www.bain.com/insights/management-tools-web3-and-blockchain.

91 Johannes Sedlmeir et al., *The Energy Consumption of Blockchain Technology: Beyond Myth*, 62:6 BUS & INFOR. SYS. ENGINEERING J. 599 (2020).

92 Reuters, *Crypto winter end in sight as Ethereum looks to shake the chills- analysts*, REUTERS (Dec. 13, 2022), https://www.reuters.com/markets/currencies/crypto-winter-end-sight-ethereum-looks-shake-chills-analysts-2022-12-12.

93 University of Cambridge, *Cambridge Bitcoin Electricity Consumption Index: Comparisons*, THE CAMBRIDGE CENTRE FOR ALTERNATIVE FINANCE (2023), https://ccaf.io/cbeci/index/comparisons.

94 Fabian Schär, *Decentralized Finance: On Blockchain- and Smart Contract-Based Financial Markets* 103:2 FED. RES. BANK ST. LOUIS REV. 153 (2021).

95 *Id*.

96 V. S. Anoop & Justin Goldston, *Decentralized finance to hybrid finance through blockchain: a case-study of acala and current*, 6 J. BANKING AND FIN TECH. 109 (2022).

This partial decentralization results in technical and financial complexity and often a cross-border situation, which renders regulation and enforcement a challenge.[97] While many functions are centralized, crypto, as part of DeFi, is often characterized by only *partial* decentralization of functions. Depending on the technology and set-up, there may be cases where many entities must function together to ensure the stack's proper functioning, and also to generally ensure compliance, cybersecurity, asset recovery, and investor protection. For instance, in the example above, several entities must act together to confirm ownership or provide liquidity; without them, neither the holding nor trading of a cryptoasset may take place. Similarly, the cooperation and coordination of several regulators may be required to enforce existing rules.

Partial decentralization has consequences for the design of regulation, as we show in this section using the examples of crypto custody, bundling of governance rights ("crypto staking") crypto lending and derivatives ("crypto stacking"), and finally, insolvency and resolution.

1. Custody in the context of Blockchain

The technical structure of segregation and custody is of particular concern to customer and investor protection. This takes the form of "hot" custody, leveraging omnibus accounts that are permanently online and linked to the distributed ledger from which the ownership in the token derives. Crypto intermediaries also often store their clients' private keys, the data confirming ownership of the clients' assets. Depending on the technology used, *some* crypto intermediaries represent a single point of failure contrary to the DeFi philosophy; cyberattacks, fraud or malfunctions could result in the public exposure of the private key, or prompt fraudulent transactions from the omnibus account to another one controlled by the attacker or fraudster.[98]

Several other concerns have been reported with custody. For instance, some crypto intermediaries re-used client assets held in custody without consent and proper governance. This is facilitated by a lack of transparency in the crypto ecosystem as to who acts as the contractual party, the liquidity provider, margin agent, and so on. Note that these functions can be provided also by a group of nodes on the stack, rather than the SICI running the ecosystem.

Further, the use of omnibus accounts results in the blending of an intermediary's own and third-party claims in cryptoassets. The industry seems to make little or no use of the tracing feature implicit in blockchain and distributed ledgers' endless chain of transactions. This happens at a time when the private law on competing claims stemming from re-use of assets is unsettled, to say the least, rendering any true assessment of who holds an asset in bankruptcy and fraud cases very difficult.

2. Crypto staking

Crypto staking is the bundling of governance rights to influence the outcome of the voting mechanism. For instance, users may "lend" their tokens or the governance rights attached to

---

97 Francesca Carapella et al., *Decentralized Finance (DeFi): Transformative Potential & Associated Risks*, FEDERAL RESERVE BOARD (2022), https://www.federalreserve.gov/econres/feds/decentralized-finance-defi-transformative-potential-and-associated-risks.htm.

98 Efpraxia Zamani, Ying He & Matthew Phillips, *On the Security Risks of the Blockchain*, 60:6 J. COMPUTER INFO. SYS. 495 (2020).

them, to other users, for a fee or altruistic motives.[99] Governance rights therefore remain decentralized in form, but not in function. A person, or group of persons, becomes a dominant stakeholder, contrary to the disclosed functioning of the ecosystem.

The situation is not unlike what was debated at length in the context of "vote buying" and "empty voting" in corporate law, yet without the mitigating effects of disclosure rules, corporate law-based collective redress, and in some countries fiduciary duties of large shareholders and "group law" (*Konzernrecht*).

Such staking practices have often been the focus of high returns, drawing customers who perceived the risks to be low. However, a lack of segregation and custody has instead often meant that – rather than a safe high-return investment (always a warning signal), investors were taking on high levels of risk via the providing crypto intermediary.[100]

3. Crypto stacking

Some DeFi ecosystems are connected to other ecosystems, both technically and financially. For instance, cryptoderivatives drawing on a basket of derivatives could connect multiple ecosystems financially, or one token type can integrate another token type in its algorithm, thus embedding the other token technically.[101]

Besides systemic risk concerns, this practice creates a type of leverage through contracts whose settlement is deferred (as in derivatives), and crypto lending arrangements, with cryptoassets as underlying or margin. We do not see why crypto derivatives are less risky for consumers than financial derivatives. Quite the opposite, given the often-missing regulation and absence of disclosure obligations around interconnections and exposures. While this is a dimension of traditional financial risk, the new dimension is the technical interlinkage which may trigger, and has triggered, operational malfunctions and system shut-downs.[102]

4. Insolvency and resolution

Partial decentralization poses difficulties in arranging business continuity in insolvency, as financial incentives to maintain the systems vanishes, while several entities must act together to maintain a systems' operation. For instance, where code maintenance requires the upload of an update on many nodes, an update is impossible where nodes stop operating as insolvency looms. Similarly, users will provide less liquidity, and developers will invest less in cyber defense in times where it becomes likely that their investments (in terms of time and intellectual

---

99 *See*, *e.g.*, Mildred Chidinma Okoye & Jeremy Clark, *Toward Cryptocurrency Lending* in FINANCIAL CRYPTOGRAPHY AND DATA SECURITY 367–380 (Aviv Zohar et al. eds., 2019). *See also* Hakwan Lau & Stephen Tse, *Decentralized Basic Income: Creating Wealth with On-Chain Staking and Fixed-Rate Protocols*, CORNELL UNIVERSITY (13 August 2021), https://arxiv.org/pdf/2107.14312.pdf.

100 *See*, *e.g.*, Adam J. Levitin, *Not Your Keys, Not Your Coins: Unpriced Credit Risk in Cryptocurrency*, 101 TEX. L. REV. (2022), https://ssrn.com/abstract=4107019, http://dx.doi.org/10.2139/ssrn.4107019.

101 *See* generally BLOCKCHAIN ECONOMICS AND FINANCIAL MARKET INNOVATION: FINANCIAL INNOVATIONS IN THE DIGITAL AGE (Umit Hacioglu ed., 2019).

102 For a more complete explanation *see* Ryan Surujnath, *Off The Chain! A Guide to Blockchain Derivatives Markets and the Implications on Systemic Risk*, 22:2 FORDHAM J. CORP. & FIN L. 256–304 (2017).

capacity) will be lost. How to incentivise and integrate these many actors in insolvency, resolution and restructuring proceedings will require new regulatory approaches.[103]

C. Designing Crypto Regulation

Both when crypto is akin to traditional finance, and when it poses new risks stemming from decentralisation, our earlier dictum applies that, "rather than eliminating the need for regulation, in fact DeFi requires regulation in order to achieve its core objective of decentralization".[104] Further, the current absence of proper regulation presents a real opportunity to reconceptualize regulation in the future. Our benchmark should not be what has worked well for traditional finance. The goal is suitable (and *in some respects* entirely novel) regulation for an immature industry that is technologically unlike what has gone before but which in many cases nonetheless exhibits similar market failures and externalities.

In the remainder of this section, we set out some relatively straightforward (in terms of implementation) regulatory approaches to the financialization of crypto, derived from an application of the main market failures and externalities characteristic of traditional finance that we set out in previous parts. These approaches seek to appropriately address the range of issues caused by the financialization of crypto.

1. Licensing, conduct of business, prudential regulation and supervision

A core requirement in our view for the future successful evolution of the crypto ecosystem is licensing, that is crypto services should be prohibited unless properly licensed. Several legal requirements attach to licensing: the definition and delineation of the services provided, proper organization and adequate and sufficient human and IT resources, fit and proper management, adequate conduct of business, and prudential regulatory rules (i.e. the maintenance of adequate capital and liquidity).[105]

With such licensing comes clear regulatory treatment and differentiation of services provided. For instance, the use of the term "exchange" should be reserved to entities that bring together third parties' supply and demand in crypto assets in an appropriately designed and managed environment, while broker-dealers, market makers, banks and asset managers should all be subject to tailored requirements.

When drafting licensing rules, regulators will have to define crypto-related services and activities. In the absence of a very clear or comprehensive regulatory approach, legal uncertainty will prevail and some crypto intermediaries may either remain, or seek to stay, outside of the scope of regulation. Uncertainty as to whether certain crypto conduct is within

---

103 *See*, *e.g.*, Janis Sarra & Louise Gullifer, *Crypto-claimants and Bitcoin Bankruptcy: Challenges for Recognition and Realization* 28:2 INT'L INSOLVENCY REV. 233–272 (2019). *See also* Renato Mangano, *The insolvency of cryptocurrency exchanges: Lessons from the BitGrail case - reification of coins, pari passu ranking, and nominalism*, 35:1 BANKING & FIN L. REV. 197-204 (2019); Jonathan Sears & Julian Ng, *Bit by Bit - the Future Direction of English Insolvency Law and Cryptocurrency*, 15:2 CORP. RESCUE & INSOLVENCY 53–55 (2022).

104 Zetzsche, Buckley & Arner, *supra* note 28 at 172.

105 *See* Saule T. Omarova, *Dealing with Disruption: Emerging Approaches to Fintech Regulation*, 61 WASH. J.L. & POL'Y 25 (2020). For a contrary view, *see* Hossein Nabilou, *The dark side of licensing cryptocurrency exchanges as payment institutions*, 14:1 L. & FIN MKTS REV. 39-47 (2020).

the regulatory perimeter will result in under-enforcement, as all enforcement bodies are resource-constrained. Legal certainty is paramount to ensure proper enforcement.[106]

Implementing a default rule would be the straight-forward solution. For instance, defining all crypto services as being within the scope of securities regulation (so that securities regulation always applies)[107] *unless* exempted by financial supervisory authorities following an application from the respective crypto intermediary in which the intermediary establishes the case for regulatory treatment as a payments token (following payments and/or banking regulation as appropriate) or a utility token (for which legislators may or may not implement bespoke regulation).[108] A default rule shifts the burden of activity and information gathering from the authorities (where it currently rests) to the crypto intermediaries. It also entitles financial supervisory authorities to order crypto firms to provide information to them. The outcome of such a default rule may, however, be proportional: while the crypto intermediaries must register and ensure proper disclosure to regulators of the categorisation of their offering as a precondition for selling crypto products, regulation may be designed to ensure that the issue itself is not automatically subject to licensing. Further, given that existing AML/CTF rules apply to all transactions involving securities, the default rule proposed herein ensures full compliance with such rules.

We acknowledge that this solution is rather simplistic. Deeming a crypto asset a "security" will not magically transport the crypto asset into a regime "ready built to provide proper or even efficient oversight or clarity", but instead may create "both a lack of clarity and inefficiency in compliance" – since securities regulation generally fails to account for critical aspects of the crypto asset ecosystem and may impose obligations with little to no relevance for crypto assets.[109] Nevertheless we suggest that this situation is preferable to the current converse situation where most crypto conglomerate businesses remain unregulated. Furthermore, exemptive powers granted to securities regulators in their dealings with crypto can rectify these inefficiencies.

2. *Disclosure and transparency*

Central to financial market functioning is information. This is the core of the efficient markets hypothesis and of much financial regulation. With crypto, mandatory disclosure has so far received insufficient attention from both market participants and regulators.[110]

---

106 *See* generally Joseph Lee & Florian L'heureux, *A Regulatory Framework for Cryptocurrency*, 31:3 Eur. Bus. L. Rev. 423 (2020). *See also* Tina van der Linden & Tina Shirazi, *Markets in Crypto-Assets Regulation: Does It Provide Legal Certainty and Increase Adoption of Crypto-Assets*, 9:1 FIN INNOVATION 9 (2023).

107 With securities we include securities under US securities regulation. For Europe, the term, "transferable securities" leads to the same result.

108 *See*, *e.g.*, Carol Goforth, *U.S. Law: Crypto Is Money, Property, A Commodity, And A Security, All At The Same Time*, 49 J. FIN TRANSFORMATION 102-109 (2019).

109 Written Testimony, Chris Brummer, *Written testimony before the US House of Representatives, Agricultural Committee, Subcommittee on Commodity Exchanges, Energy, and Credit The Future of Digital Asset Regulation* at 2 (Jun. 23, 2022), https://agriculture.house.gov/uploadedfiles/brummer_congressional_testimonythe_future_of_digital_asset_regulation.pdf.

110 *See*, *e.g.*, Jun Heng Chou, Prerana Agrawal & Jacqueline Birt, *Accounting for crypto-assets: stakeholders' perceptions*, 39:3 STUD. ECON. & FIN 471-489 (2022).

First, we see a need to provide financial information analogous to that which securities regulation entails. We would require from issuers initial documentation (such as a prospectus), and ongoing information through semi-annual and annual reports and material adverse change releases. Blockchain may be a much better system to do this and may – with appropriate design – provide to regulators real-time information.[111] This requires appropriate and consistent information and disclosure which is not yet required by regulation nor built into existing systems into blockchain environments by way of embedded regulation and supervision.

Second, certain intermediaries would need to provide information. Licensed crypto exchanges will have to provide pre and post trade information as well as comply with best execution duties. Furthermore, crypto intermediaries will need to provide information about group structure and activities so that counterparties can evaluate and understand risks. Coinbase, as a listed company, provides a most useful counterpoint in this regard to FTX.[112]

Beyond these disclosure rules that are part of the standard repertoire of regulators, we suggest issuers and crypto intermediaries should have to disclose the operational structure of the service and IT environment in which the cryptoasset is issued and traded. This would include explaining which functions are centralized and which decentralized. Some regulators have introduced obligations to submit a Programme of Operations that explain the systems architecture and ensure systems resilience.[113] Such an approach should be adequate given the unique features and architecture of many cryptoassets. It would also outline how decentralised functions would be maintained in times of insolvency. In this respect, we recommend IOSCO (the International Organisation of Securities Commissions) develops a uniform standard format for these operational details, to facilitate comparison of the information disclosed.

3. Segregation and custody

To ensure safekeeping of assets, we recommend the separation of custody from other intermediary activities (such as exchange, brokerage, market making and proprietary trading, i.e. trading on one's account) plus requirements for segregation of individual accounts, and subjecting crypto custody to licensing. As part of such a licensing scheme we would suggest clarity around the fiduciary duties of crypto custodians.[114] This may involve, on the one hand, a definition of what custody entails in this context, for instance the retention and administration

111 D.W. Arner, J. Barberis & R.P. Buckley, *FinTech, RegTech, and the Reconceptualization of Financial Regulation* 37 NW. J. INT'L L. & BUS. 371 (2017).

112 Coinbase has a reasonably sophisticated "Investor Relations" website - *see Investor Relations*, COINBASE, https://investor.coinbase.com/home/default.aspx. Additionally much other information is available from the NASDAQ stock exchange - *see Coinbase Global*, NASDAQ, https://www.nasdaq.com/market-activity/stocks/coin>, and from stockbrokers etc.

113 *See* Dirk A. Zetzsche, Linn Anker-Sørensen, Maria Lucia Passador & Andreas Wehrli, *DLT-based enhancement of cross-border payment efficiency – a legal and regulatory perspective*, 15:1-2 L. & FIN MKTS REV. 70 at 103-108 (2021), DOI: 10.1080/17521440.2022.2065809; Dirk A. Zetzsche & Jannik Woxholth, *The DLT sandbox under the Pilot-Regulation*, 17:2 CAP. MKTS L.J. 212–236 (2022), https://doi.org/10.1093/cmlj/kmac003 (citing the EU DLT Pilot Regulation).

114 *See, e.g.*, Geoffrey Cone, Nicholas S. Bjorklund & Gregory C. Dyekman, *Digital assets and property rights in insolvency*, 27:5 TR. & TRUSTEES 406 (2021). *See also* MATTEO SOLINAS, *'Trustless' distributed ledgers and custodial services* in ROUTLEDGE HANDBOOK OF FINANCIAL TECHNOLOGY AND LAW (Iris Chiu & Gudula Deipenbrock eds., 2021); Matthias Haentjens, Tycho De Graaf & Ilya Kokorin, *The Failed Hopes of Disintermediation: Crypto-Custodian Insolvency, Legal Risks and Howto Avoid Them*, 2 Singapore J. Legal Stud. 526 (2020).

of a private key. On the other hand, such regulation may ensure that assets, without the owner's consent, may neither be lent, traded or used as security in transactions on the intermediary's account. Any crypto-asset lending for the benefit of investors should be properly documented, earmarked, traced across the blockchain, and monitored by the crypto custodian, while counterparty risks during the transactions should be properly managed by way of required margins and the like.

Again, a default rule bringing crypto within the scope of securities regulation may well simplify matters, as custody of securities and segregation of accounts are already addressed within securities regimes.

Specifically with crypto, regulators should consider the additional technical complexity and exposure in multiple DeFi stacks in which cryptoassets are referenced or otherwise tied to other cryptoassets. This justifies additional requirements around technical and cyber resilience. We would propose additional description of custody practices in the Business Plan (see supra, Part IV.C.2.) and rules that reduce, as far as possible, "hot wallet" transactions and that mandate storage of disaggregated amounts of assets (the equivalent to omnibus accounts) in cold wallets.

The crypto industry has already taken the initiative in the last few years to initiate "Proof of Reserves (PoR)" protocols.[115] In this regard, the general idea is that a crypto exchange or other crypto project or intermediary subject its reserves to audit at regular intervals. We suggest licensed crypto exchanges and projects make their PoR public (and in real time). Then the regulators (and the public) can access and potentially audit the PoR statement as needed. Notwithstanding that it will be very difficult for most of the general public to perform the blockchain analytics required to audit the PoR, nevertheless, the fact that some users (and especially regulators) can do this (if they want to) should go a significant way to ensuring that the client funds held by a crypto exchange or project are stored safely and segregated properly.[116]

4. Fraud, market abuse and insider trading

To ensure market fairness and investor protection, regulators must implement and enforce effective rules against market abuses and insider trading.[117] If possible, these rules will need to be coordinated globally through cooperation mechanisms such as the IOSCO Multilateral Memorandum of Understanding, which could be extended explicitly to cover crypto.[118]

---

115 *See* Mark Maurer, *More Crypto Exchanges Verify Reserves, But Questions About Assets Remain*, WALL STREET JOURNAL (Dec. 5, 2022), https://www.wsj.com/articles/more-crypto-exchanges-verify-reserves-but-questions-about-assets-remain-11670153687.

116 *See also* the letter from Adrienne A. Harris, Superintendent of Financial Services to Entities Licensed Under 23 NYCRR Part 200 or Chartered as Limited Purpose Trust Companies Under the New York Banking Law That Custody Virtual Currency Assets, *RE: Guidance on Custodial Structures for Customer Protection in the Event of Insolvency*, (Jan. 23, 2023), https://www.dfs.ny.gov/industry_guidance/industry_letters/il20230123_guidance_custodial_structures.

117 *See* generally EDWARD J. SWAN & JOHN VIRGO, MARKET ABUSE REGULATION (2019). *See also* ESTER HERLIN-KARNELL & NICHOLAS RYDER, MARKET MANIPULATION AND INSIDER TRADING: REGULATORY CHALLENGES IN THE UNITED STATES OF AMERICA, THE EUROPEAN UNION AND THE UNITED KINGDOM (2019).

118 Memorandum, International Organization of Securities Commissions (IOSCO), *Multilateral Memorandum of Understanding Concerning Consultation and Cooperation and the Exchange of Information (MMoU)*, IOSCO (2020).

Core to market abuse regulations will be the definition of what constitutes market abuse. Again, securities regulation will provide important lessons and illuminative examples. Thus, our proposal – that securities regulation apply to crypto as a default rule – will avoid the need for bespoke regulation and often simply mimic existing securities regulation. Furthermore, to the extent of any divergence between securities regulation and crypto regulation bespoke regulation of crypto will encourage regulatory arbitrage because virtually all securities can be tokenized to bring them within a bespoke crypto regulatory regime if any advantages flow from doing so.

5. Restructuring and resolution legislation

At the height of the crypto collapses private market participant often shunned measures to preserve assets. While the reasons Binance did not provide liquidity to FTX when it was needed may be many, any resolution would have faced quite profound and likely disabling legal uncertainty, considering the uncertain qualification of crypto assets in insolvency. This uncertainty relates to very basic questions, for instance whether proprietary rights are assigned to crypto asset holders in insolvency and if so which ones and under which circumstances.[119]

While financial regulation alone cannot solve every legal issue surrounding crypto assets, resolution legislation would facilitate a clear line between an insolvent intermediary's assets subject to bankruptcy, and those that remain out of scope. Such a clear perimeter for assets subject to bankruptcy proceedings will be particularly crucial to a crypto insolvency or resolution, where IT systems in the DeFi stack are often proprietary and non-standardised, and depend on the interaction of many different actors. If the dissolution of the crypto system seems likely, these actors will become distinctly uninterested in the maintenance and defence against cyberattacks of the DeFi stack; which in turn will quickly erode any ability to restructure the crypto environment in times of stress. Resolution legislation is crucial to provide system continuity and incentivize the many (decentralized) support functions that characterize crypto ecosystems.

If incentives to continue operations in the event of a crisis are implemented, there should (theoretically and practically) be little need for a LoLR in *fully decentralized settings*. Furthermore, when a SICI has a dominant position within an ecosystem, as is typically the case, we do not recommend establishing a crypto LoLR due to the conflicts and moral hazards inherent in an LoLR in these markets.[120] Where ultimately necessary and warranted for the financial system or one of its segments, central banks will likely have the means to inject liquidity by regulated stablecoins, synthetic CBDCs, wholesale central bank digital currencies (CBDCs) or otherwise.

6. Crossborder harmonization and coordinated enforcement

119 *See* Woxholth, Zetzsche, Buckley & Arner, *Competing Claims to Cryptoassets*, (forthcoming).

120 While crypto intermediaries may play important roles in future restructuring (as JP Morgan did when Bear Stearns experienced difficutlies), the FTX-Binance example has shown that crypto intermediaries have their own interests and thus are not trustworthy LoLRs.

We have shown elsewhere that the decentralization of functions across borders further disincentives compliance.[121] To address this, regulators need to engage in close cross-border cooperation and coordination. This requires, first and foremost, the inclusion of crypto assets in existing MoUs, particularly the IOSCO MMoU. Again, the easiest solution would be to widen the scope of existing MoUs among securities regulators worldwide, with the IOSCO MMoU providing the most important mechanism. Second, we recommend expanding existing MoUs including the IOSCO MMoU to address the partial decentralization of functions that we have laid out as characteristic of crypto. Asset segregation, safekeeping, crypto staking and stacking, and in particular cross-border restructuring and administration in bankruptcy with related asset recoveries, may all require the joint action of several regulators across jurisdictions.

Industry associations may facilitate information flows in certain instances,[122] but where externalities are concerned, regulators are best equipped to pursue the public interest and act to provide requirements relating to public goods and externalities.

Crypto provides a suitable case for a global oversight coordination body. Yet, the organizational complexity of a global regulator starting with the question of where the body will be located, financed and equipped, how it will be able to enforce decisions, and to what extent it can override local decisions, will combine to make the establishment of any global oversight body a significant challenge. We encourage the regulatory coordinators of traditional finance, such as the FSB, BIS and IOSCO, to expand their expertise in, and reach out to embrace, the field of crypto. As we have shown throughout this paper, crypto regulation will benefit greatly from insights drawn from the regulation of traditional finance.

V. Conclusion

Crypto claimed many advantages which, with hindsight, have proven inaccurate. Many of the challenges revealed during the crypto winter are well-known in traditional finance. These include agency risks, conflicts of interests, lack of transparency, counterparty risks, operational risks, and the way individual crypto intermediaries often dominated trading and market making in certain cryptoassets. For these issues, we have good reason to apply the principle "same function, same risks, same rules".

In some respects, however, crypto's special features require bespoke regulation. The most important idiosyncrasy of crypto is its *partial* decentralization that requires many entities, rather than just one, to work together to deliver compliance, cybersecurity, asset recovery, and investor protection. Partial decentralization poses difficulties in ensuring business continuity in the event of insolvency, as with insolvency the financial incentives to maintain the system vanish. To address this consequence of partial decentralization we have recommended a combination of licensing and mandatory disclosure of details of the IT architecture and business continuity arrangements in a Business Plan approach. We also welcome the initiative from the crypto industry regarding "Proof of Reserves", although we feel this approach should go further and the information be available publicly and in real-time.

---

121 Dirk A. Zetzsche, Douglas W. Arner & Ross P. Buckley, *Decentralized Finance* 6:2 J. FIN REG. 172 (2020).

122 Such as the Crypto Market Integrity Coalition, *see* CMIC, <https://www.cmic.global>.

Due to its partially decentralized functions, crypto is, from a technical and financial perspective, complex. It requires additional expertise from intermediaries, gatekeepers including lawyers and auditors, and regulators. We have argued that the fit and proper test of most licensing regimes and the transparency ensured by a business plan approach in addition to standardized disclosure requirements are proper measures to enable market participants and regulators to understand this additional complexity.

Finally, partial decentralization often results in a cross-border situation that renders enforcement difficult and costly. Addressing this requires clear rules with crypto at the centre of their scope (e.g. a default rule that treats all cryptoassets as falling under securities regulation) and coordinated cross-border regulatory action facilitated by G20, BIS, IOSCO, FSB, IMF and Financial Action Taskforce (FATF) cooperation frameworks. A well-coordinated cross-border approach to regulation can also assist enforcement.

If regulators address in their forthcoming regulation the features of traditional finance that are apparent in crypto and develop adequate responses to its special features, crypto may well have a future as a regulated and supervised financial industry. At the same time, due to the continual rapid innovation in the markets and the difficulties of regulating decentralized algorithmic-based trading, lending and investment based somewhere in the cloud, ensuring proper crypto governance will remain a challenge. This makes the cross-border coordination proposed in this paper even more important, as it allows regulators to share knowledge regarding new practices and problems, and should enhance regulatory learning globally.

The Financialization of Crypto

Cryptocurrencies, blockchain and decentralized finance were designed to address weaknesses in traditional finance, such as the systemic risk and government profligacy at the heart of many financial crises. Yet, failures of prominent crypto firms highlight the flaws in this argument. Crypto is neither special nor immune and has come to feature all the classic problems of traditional finance. As the crypto ecosystem has evolved, the market failures and externalities of traditional finance have emerged — a process we term the "financialization" of crypto. These include conflict of interests, information asymmetries, centralization and interconnections, large numbers of poorly informed, over-enthusiastic market participants, plus agency, operational and financial risks. We argue that the regulation of crypto needs to learn from the centuries of experience of traditional finance: in order to function properly, crypto requires appropriate regulation and supervision to address market failures and externalities, and to support transparency and efficiency. While it appears the "Crypto Winter" of 2022-2023 has prompted the world's financial regulators to act, policymakers need to overcome the difficulties posed by decentralization as the underlying paradigm of the crypto industry, which results in a multi-jurisdictional environment of crypto markets, participants, infrastructure and intermediaries. We argue that regulatory systems can (and must) now be instituted to ensure the proper functioning of crypto and its interconnections with traditional finance.

Keywords: financialization, Crypto Winter, financial regulation, FTX, crypto assets, cryptocurrencies, financial stability, decentralised finance, DeFi

I. Introduction

The year 2022 was an *annus horribilis* for the crypto ecosystem even before the collapse of the FTX group.[1] In one year, crypto lost about USD 2 trillion in market value.[2] Following the failure of FTX, one of the biggest corporate or financial failures since the 2008 global financial crisis, the urgent need for a global and coordinated approach to crypto regulation has become clear.[3]

---

1 *See*, *e.g.*, Peter Fitzgerald & Amalia Neenan, *Annus Horribilis 2022: Regulation May Be the Only Way out of Crypto's 'Horrible Year'*, CITY AM (Dec. 5, 2022), https://www.cityam.com/annus-horribilis-2022-regulation-may-be-the-only-way-out-of-cryptos-horrible-year.

2 *See* Damian Fantato, *Crypto and Digital Assets Summit*, FINANCIAL TIMES EVENTS (Nov. 28, 2022), https://www.ftadviser.com/events-awards/2022/11/28/crypto-digital-assets-summit.

3 *See, e.g.*, Tom Burroughes, *FTX Collapse May Prompt Big Regulatory Crackdown – Lawyer*, WEALTH BRIEFING ASIA (Nov. 18, 2022), https://www.wealthbriefingasia.com/article.php?id=196248.

The irony inherent in what has come to be called the "Crypto Winter" of 2022-2023 is the fundamental premise of this paper.[4] Bitcoin, cryptocurrencies and decentralized finance (which for these purposes we refer to collectively by the shorthand "crypto") were presented as an alternative to the failures of traditional finance as demonstrated in centuries of financial crises and culminating in the 2008 Global Financial Crisis. Through a transparent technological framework, crypto was precisely designed to avoid the downsides of traditional finance: conflicts of interest from many powerful intermediaries, information asymmetries, centralization of crucial functions and markets, control by a few large and often interconnected intermediaries, an abundance of poorly informed over-enthusiastic market participants ("irrational behavior"), as well as agency, operational and financial risks, and of course fraud, manipulation and misconduct. Financial regulation and supervision have evolved over centuries, seeking to enhance financial stability, ensure adequate investor, depositor and consumer protection, further market fairness, efficiency and integrity, and steer the financial system towards economic growth, financial inclusion and sustainable development.

We argue that crypto – despite its intention and technological design as decentralized finance[5] ('DeFi') – has in less than 15 years evolved to display the classic market failures and externalities that characterize traditional finance. Together with the duplication of traditional financial products and services in the crypto ecosystem, we call this evolutionary process the "financialization" of crypto. Where the market failures and externalities as well as economic motivations and objectives of participants mirror traditional finance, so does our proposed solution: the crypto ecosystem, to function properly, requires regulatory and supervisory systems designed to address its market failures and externalities. Similar risks and activities require regulatory approaches to support proper market functioning and reduce regulatory arbitrage.

The question is whether crypto can survive the 2022-23 crypto winter. We argue that to survive and thrive, appropriately designed regulation is essential. Such financial regulation must address the range of market failures, externalities and inefficiencies that have arisen in the crypto ecosystem.

---

4 This crypto winter is said to be different from former crypto winters – *see* Arjun Khapal & Ryan Browne, *This 'Crypto Winter' Is Unlike Any Downturn in the History of Digital Currencies. Here's Why*, CNBC (Jul. 13, 2022), https://www.cnbc.com/2022/07/14/why-the-2022-crypto-winter-is-unlike-previous-bear-markets.html. Further, crypto winters are estimated to last an average of four years – *see* Forbes Digital Assets, *Will Crypto Ever Recover or Will Winter Last Forever?*, FORBES (Sept. 8, 2022), https://www.forbes.com/sites/qai/2022/09/08/will-crypto-ever-recover-or-will-winter-last-forever/.

5 DeFi strictu sensu is characterized by peer-to-peer transactions and an absence of a centralized intermediary. With DeFi smart contracts should execute transactions between supply and demand automatically, and all servers that support the operation of the protocols ('nodes'), or token holders, as the case may be, have equal access to data and equal governance rights (or the technological equivalent of governance rights). Such a set-up can also be referred to as Decentralized Autonomous Organization (DAO). If a trading platform is governed by a DAO, the crypto jargon speaks of Decentralized Exchanges (DEX). However, throughout the crypto industry, centralized intermediaries often deliver important functions to the DeFi ecosystem. For instance, Binance, Coinbase, FTX and others are operated by centralized entities and are thus dubbed Centralized Exchanges (CEXs). From the perspective of the DeFi sector, these constitute a type of Centralized Finance (CeFi). Nevertheless, these CEXs allow for a) the initial investment of fiat currency into tokens, and b) cross-chain bridge operations, that is the swap of one crypto asset with another, ie. Trading of tokens. In turn, CEXs provide most trading volume for tokens issued under alleged DeFi protocols and influence the valuation of crypto assets which may then be relied upon by DeFi protocols. We here use the term crypto for both CeFi and DeFi services that deal with crypto assets.

This question is currently a major focus of the regulatory agenda. The Financial Stability Board (FSB),[6] International Monetary Fund (IMF)[7] and Bank for International Settlements (BIS)[8] have issued position papers as the Group of 20 (G20) considers an internationally coordinated approach. Major jurisdictions are implementing or designing new measures. For instance, Singapore, which has had a vigorous licensing regime for crypto since enacting the Payment Services Act in January 2020, is again tightening its regulations.[9] Hong Kong will also implement a licensing system for crypto intermediaries: by application to Hong Kong's Securities and Futures Commission for a license (the next phase expected to be from 1 March 2023).[10] In the EU, the Market in Crypto-assets Regulation (MiCA) was adopted on 19 April 2023 and will come into force in 2024.[11] MiCA introduces a licensing scheme for crypto intermediaries, prospectus rules, anti-market abuse and insider trading rules as well as bespoke legislation for stablecoins. The UK government is planning to implement new regulations soon, releasing a consultation paper in February 2023.[12] In the US, although no specific

---

6 *See* FINANCIAL STABILITY BOARD, REGULATION, SUPERVISION AND OVERSIGHT OF CRYPTO-ASSET ACTIVITIES AND MARKETS: CONSULTATIVE DOCUMENT (Oct. 11, 2022), https://www.fsb.org/wp-content/uploads/P111022-3.pdf.

7 *See* INTERNATIONAL MONETARY FUND, IMF POLICY PAPER ELEMENTS OF EFFECTIVE POLICIES FOR CRYPTO ASSETS (No 2023/004, Feb. 23, 2023), https://www.imf.org/en/Publications/Policy-Papers/Issues/2023/02/23/Elements-of-Effective-Policies-for-Crypto-Assets-530092; *See also* Parma Bains et al., *Regulating the Crypto Ecosystem: The Case of Unbacked Crypto Assets*, IMF (Sept. 26, 2022), https://www.imf.org/en/Publications/fintech-notes/Issues/2022/09/26/Regulating-the-Crypto-Ecosystem-The-Case-of-Unbacked-Crypto-Assets-523715. The IMF also proposed regulations for stablecoins on the same day – *see* Parma Bains et al., *Regulating the Crypto Ecosystem: The Case of Stablecoins and Arrangements*, IMF (Sept. 26, 2022), https://www.imf.org/en/Publications/fintech-notes/Issues/2022/09/26/Regulating-the-Crypto-Ecosystem-The-Case-of-Stablecoins-and-Arrangements-523724. In a related paper the IMF reported on capital flow management measures in crypto – *see* Dong He et al., *Capital Flow Management Measures in the Digital Age: Challenges of Crypto Assets*, IMF (May 10, 2022), https://www.imf.org/en/Publications/fintech-notes/Issues/2022/05/09/Capital-Flow-Management-Measures-in-the-Digital-Age-516671. *See also* Cristina Cuervo, Anastasiia Morozova & Nobuyasu Sugimoto, *Regulation of Crypto Assets*, IMF (Jan. 10, 2020) https://www.imf.org/en/Publications/fintech-notes/Issues/2020/01/09/Regulation-of-Crypto-Assets-48810.

8 *See* Matteo Aquilina, Jon Frost & Andreas Schrimpf, *Addressing the Risks in Crypto: Laying out the Options*, BANK FOR INTERNATIONAL SETTLEMENTS (Jan. 12, 2023) https://www.bis.org/publ/bisbull66.htm; Raphael Auer & Stijn Claessens, Regulating Cryptocurrencies: Assessing Market Reactions, BANK FOR INTERNATIONAL SETTLEMENTS (Sept. 23, 2018) https://www.bis.org/publ/qtrpdf/r_qt1809f.htm.

9 *See*, *e.g.*, *Singapore Launches Licensing for Cryptocurrency Firms*, EJINSIGHT (Jan 30, 2020) https://www.ejinsight.com/eji/article/id/2364700/20200130-singapore-launches-licensing-for-cryptocurrency-firms; Lena Ng, *Singapore to Tighten Rules on Cryptocurrency Trading*, CLIFFORD CHANCE TALKING TECH (Nov. 30, 2022) https://www.cliffordchance.com/insights/resources/blogs/talking-tech/en/articles/2022/11/singapore-to-tighten-rules-on-cryptocurrency-trading.html.

10 *See*, *e.g.*, *Hong Kong Licensing Regime for Virtual Asset Exchanges to Take Effect on 1 March 2023*, CHARLTONS LAW (Jul. 2022), https://www.charltonslaw.com/hong-kong-licensing-regime-for-virtual-asset-exchanges-to-take-effect-on-1-march-2023.

11 For a good overview of MiCA, *see* Kai Zhang, Philip J. Morgan, Jeremy M. McLaughlin, *MICA – Overview of the New EU Crypto-Asset Regulatory Framework (Part 1)*, K & L GATES HUB (Nov, 15 2022), https://www.klgates.com/mica-overview-of-the-new-eu-crypto-asset-regulatory-framework-part-1-11-15-2022; Press Release, European Council & the Council of the European Union, Digital finance: agreement reached on European crypto-assets regulation (MiCA) (Jun. 30, 2022), https://www.consilium.europa.eu/en/press/press-releases/2022/06/30/digital-finance-agreement-reached-on-european-crypto-assets-regulation-mica; David Carlisle, *Crypto 2023 Predictions: MiCA Will be the Blueprint For Regulation Globally*, ELLIPTIC CONNECT (Dec. 14, 2022), https://hub.elliptic.co/analysis/crypto-2023-predictions-mica-will-be-the-blueprint-for-regulation-globally.

12 HM Treasury, *Future financial services regulatory regime for cryptoassets: Consultation and call for evidence*, (Report PU 3273, Feb. 2023),

cryptocurrency regulations exist, President Biden signalled that the US government plans to do so by executive order on 9 March 2022,[13] and by releasing an actual regulatory *framework* on 17 September 2022.[14] US crypto has typically been *regulated* via different regulatory bodies (chiefly the Securities and Exchange Commission [SEC] and Commodities Futures Trading Commission [CFTC]), which largely employ a "regulation by enforcement" approach.[15] For example, the SEC launch investigations into various aspects of crypto, including recent crypto "exchange" selling of unregistered securities (e.g. the examples of SEC investigations into Genesis and BlockFi).[16]

This paper proceeds as follows. In Part II we consider FTX and other crypto collapses, referred to collectively today as the Crypto Winter of 2022-23.[17] These collapses are contextualised with earlier crises including Mt. Gox in 2014 and the ICO bubble of 2017-2019.

Part III argues that these crises are characterized by what we term the financialization of crypto. This process of financialization has included the rise of Systemically Important Crypto Intermediaries (SICIs) that, contrary to the philosophy of DeFi, dominate the ecosystem. Due to lack of regulation and transparency, we classify these as forms of "shadow finance", which, in the formal banking sector, was a precipitant of the Global Financial Crisis of 2008.[18] Against this background, we present a macro perspective of crypto and argue that, despite its potentially transformative underlying technology, crypto is *not immune* from conflicts of interests, information asymmetries, centralisation of crucial functions, interconnections of principal actors, irrational behaviour, criminal conduct, and a wider range of agency, operational and financial risks. Any assessment of the major crypto "exchanges"[19] – a term we strongly argue should only be used for appropriately licensed firms operating according to well-recognised principles and requirements appropriate for the designation – suggests the crypto industry is even more centralized in many aspects than traditional financial markets. Several non-

---

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1133404/TR_Privacy_edits_Future_financial_services_regulatory_regime_for_cryptoassets_vP.pdf.

13 Ryan Browne, 'Biden just put out an executive order on cryptocurrencies — here's everything that's in it', CNBC (Web Page, Mar. 9, 2022), <https://www.cnbc.com/2022/03/09/heres-whats-in-bidens-executive-order-on-crypto.html>.

14 MacKenzie Sigalos, *Biden White House just put out a framework on regulating crypto — here's what's in it*, CNBC (Sept. 18, 2022), https://www.cnbc.com/2022/09/16/heres-whats-in-biden-framework-to-regulate-crypto.html.

15 As regards "regulation by enforcement" in the US, Chris Brummer's view, which we endorse, is that, "In the absence of clear guidelines, regulation by enforcement is becoming increasingly likely as a clarity-inducing tool". Chris Brummer, *Disclosure, Dapps and DeFi*, 5:2 STAN. J. BLOCKCHAIN L. & POL'Y 137 at 146 (2022).

16 For a comprehensive overview, *see* Program on International Financial Systems, *A Review on Cryptoasset Market Structure and Regulation in the U.S. PIFS International* (Feb. 2023), https://www.pifsinternational.org/cryptoasset-market-structure-and-regulation-in-the-u-s.

17 *See*, *e.g.*, Russell Wong, *Why Stablecoins Fail: An Economist's Post-Mortem on Terra*, 22:24 FED. RES. BANK RICH. ECON. BRIEF (2022). *See also* Hilary J. Allen, *The Superficial Allure of Crypto*, 59:3 FIN & DEV. 27 (2022).

18 We use "shadow finance" rather than "shadow banking" because these activities were largely beyond the regulatory perimeter (and hence in the shadows) but not conducted by traditional lending businesses.

19 In this paper we generally do not differentiate between centralized exchanges and decentralized exchanges in our use of the term "exchange" although we do acknowledge that decentralized exchanges have to date been more resilient to stress and thus offer promising potential, if structured upon appropriate design principles that address the realities of financialisation.

transparent crypto intermediaries and crypto conglomerates drive these centralised financial systems, not dissimilar to those in traditional finance which have proven historically problematic.

Part IV distinguishes between risks where crypto exhibits features of traditional finance, and those where idiosyncrasies justify bespoke regulation. We then propose regulatory solutions to address the financialization of crypto: (1) business licensing and supervision and appropriate balanced proportional risk-based prudential regulation of intermediaries, (2) disclosure and transparency requirements, (3) segregation and custody rules, (4) market abuse regulation and enforcement, (5) restructuring and resolution legislation, and (6) cross-border harmonization and coordination.

Part V concludes.

II. The Crypto Winter of 2022-23

Turning to consider the Crypto Winter (most prominently the failure of FTX), we highlight how it reflects the emergence of market failures and externalities similar to those which characterize traditional finance.[20] We characterize this as the "financialization" of crypto: as crypto has become functionally more like traditional finance, it also displays similar market failures and externalities, necessitating regulation.[21] We highlight analogies between elements of the crypto ecosystem and the problem of "shadow finance", regulatory arbitrage, concentration and interconnection at the heart of the 2008 financial crisis. Given that a central *raison d'etre* of crypto was to make such problems impossible, this is exquisitely ironic.

A. FTX: The Lehman and Enron Moments for Crypto

FTX was valued at USD 32 billion in its January 2021 funding round.[22] In early 2022, FTX was one of the world's largest so-called cryptocurrency intermediaries, labelling itself an "exchange" but rather being a complex conglomerate. FTX's revenue grew exponentially from USD 90 million in 2020 to over USD 1 billion in 2021[23] – astonishing growth of over 1,000 per cent in one year. Although these figures are significantly smaller than, say, Coinbase, which posted revenue of over USD 7 billion in 2021,[24] and the market leader Binance, with revenues

---

20 Although financialisation is a process that has been going on for thousands of years, it has accelerated since the 1990s – *see* Mario Seccareccia, *Understanding Financialization: History, Theory, and Institutional Analysis: Editor's Introduction*, 42:4 INT'L J. POL. ECON. 3 (2013). *See also* Malcolm Sawyer, *What Is Financialization?*, 42:4 INT'L J. POL. ECON. 5 (2013). IRIS H-Y CHIU, REGULATING THE CRYPTO ECONOMY: BUSINESS TRANSFORMATIONS AND FINANCIALISATION (1st ed, 2021).

21 There is also talk of the *cryptoization* of finance – *see* Bo Li and Nobuyasu Sugimoto, *Crypto Contagion Underscores Why Global Regulators Must Act Fast to Stem Risk*, IMF (Jan. 18, 2023) https://www.imf.org/en/Blogs/Articles/2023/01/18/crypto-contagion-underscores-why-global-regulators-must-act-fast-to-stem-risk. The *cryptoization* of finance refers to when crypto "assets are substituted for domestic currency and assets, and circumvent exchange and capital control restrictions". However, this is not discussed in this paper.

22 *Id*.

23 *See* Kate Rooney, *FTX grew revenue 1,000% during the crypto craze, leaked financials show*, CNBC (Aug. 20, 2022), https://www.cnbc.com/2022/08/20/ftx-grew-revenue-1000percent-during-the-crypto-craze-leaked-financials.html.

24 *See* Shareholder Letter, Fourth Quarter and Full-Year 2021, *Coinbase* (Feb. 24, 2022)

of over USD 20 billion in 2021,[25] FTX was one of the strongest growing major crypto firms, ranking high in transaction volumes.[26]

1. *FTX as a Liquidity Crisis*

The FTX failure was a classic liquidity crisis that turned into a solvency crisis, like that of Lehmann Brothers in 2008. When a financial intermediary is unable to access sufficient liquidity to continue its business, this liquidity crisis will often turn into a solvency crisis which can trigger wider losses of confidence in the entire sector, and potentially a financial crisis, as we observed in the second half of 2022 in the crypto ecosystem (although importantly not in the wider financial system).

2. *Liquidity Provider of Last Resort?*

Similar to 2008, this led to the question of whether there needs to be a "Lender of Last Resort" (LoLR) – a "liquidity provider of last resort" in the post-2008 formulation. In the FTX case, the prospect arose briefly of Binance perhaps providing an emergency liquidity facility, or even taking over FTX (as JP Morgan did with Bear Stearns early in the 2008 crisis or indeed as JP Morgan and a range of others had done in a series of previous crises including successfully in the Panic of 1907).

Despite FTX's efforts to secure a solution in the form of emergency liquidity or otherwise maintain the trust and confidence of market participants (including by reaching out to Binance for emergency assistance),[27] ultimately it was forced to file for insolvency. The result today is a range of insolvency actions in major jurisdictions and regulatory, investor and customer actions spread around the world.[28]

The role of Binance as FTX's largest competitor, deserves a closer look, as the FTX difficulties first became known to the world through Binance's publicly aired concerns of the (apparently) excessive exposures of its investment vehicle to Alameda, a part of the FTX conglomerate, and FTT, an FTX-issued crypto token.[29] That announcement was made *after* Binance had *sold* about USD 500 million in FTT, thereby frontrunning the FTT liquidity crisis and preserving its balance sheet from the announcement imposed on other crypto investors only able to sell *after* the announcement undermined trust in FTX.[30] Binance's role was unlike that of regulated

---

https://s27.q4cdn.com/397450999/files/doc_financials/2021/q4/Coinbase-Q421-Shareholder-Letter.pdf.

25 *See* Tom Maloney, Yueqi Yang & Ben Bartenstein, *World's Biggest Crypto Fortune Began With a Friendly Poker Game*, BLOOMBERG CRYPTO (Jan. 11, 2022) https://www.bloomberg.com/news/features/2022-01-09/binance-ceo-cz-s-net-worth-billionaire-holds-world-s-biggest-crypto-fortune.

26 Lehman Brothers was reputed to be in the "Too Big To Fail" category with 2007 revenues of USD$59 Billion – with the list of the biggest companies in the US in 2008, *see Fortune 500*, CNN MONEY (May 5, 2008) https://money.cnn.com/magazines/fortune/fortune500/2008/snapshots/10312.html. Ultimately however, Lehman Brothers was allowed to fail in 2008 – *see*, *e.g.*, OONAGH MCDONALD, LEHMAN BROTHERS (2016); BANK FAILURE: LESSONS FROM LEHMAN BROTHERS (Dennis Faber & Niels Erwin Vermunt eds., 2017).

27 *Id*.

28 Arner, Zetzsche and Buckley in 2018 identified that decentralized may not mean you're not subject to suit anywhere, but rather mean you are subject to suit everywhere! – *see* Dirk A. Zetzsche, Ross P. Buckley & Douglas W. Arner, *The Distributed Liability of Distributed Ledgers*, 4 U. ILL. L. REV. 1361 (2018).

29 *See* Fitzgerald, *supra* note.

30 *See* Olga Kharif, *Binance To Sell $529 Million of Bankman-Fried's FTT Token*, BLOOMBERG TECHNOLOGY

intermediaries in similar situations that have acted primarily in coordinated efforts to maintain the overall trust in financial markets. After posing as a potential "white knight" (thereby delaying bankruptcy for roughly a week and allowing time to execute many – possibly dubious – transactions), Binance opted out with another public statement that effectively thwarted other third-party restructuring efforts.

3. Regulation vs Technology: The Roots of Trust

In traditional finance, market abuse regulations largely prevent a regulated entity's public declaration of mistrust from causing liquidity crises – as in the case of FTX. And when liquidity crises occur, the remedy is sourcing liquidity from an external source. We have seen other market participants (such as JP Morgan in the above examples) or – occasionally – central banks or governments (as in 2008, 2020 and many other financial crises, with the classic framework dating to Bagehot at the end of the 19th century). Consequently, FTX's inability to source liquidity was the same as in traditional finance: insolvency resulting from an inability to meet customer/creditor/investor calls when they become due.

Crypto market trust and confidence were meant to flow from the underlying technology, rather than regulation and supervision. Cryptocurrencies are based on decentralized peer-to-peer money exchange, designed to avoid liquidity and solvency crises. Questions arise as to whether the original design for cryptocurrencies as a decentralised peer-to-peer transaction recording system is flawed or whether too many players have been allowed to circumvent it. In any event, any workable reform agenda for the crypto industry requires balancing the original decentralized design with an urgent need for centralized market protection.

Traditionally, liquidity and solvency crises bring firm and customer-specific consequences and risks of negative externalities like contagion and systemic crises and failures. Yet, we will argue crypto lacked both the *preventative* measures (particularly risk management and market abuse rules, and broader regulation and supervision both to maintain market trust and confidence and to maintain sufficient resources to meet customer, investor, and depositor demands) *and* the *restructuring and resolution* measures characteristic of traditional finance (generally implemented in the wake of the 2008 crisis), facilitating crisis support or intervention today. Both prevention and resolution in traditional finance rest on what crypto enthusiasts deem superfluous due to technological design: regulation.

4. More than a Liquidity Crisis?

However, there is the wider question about exactly why FTX had financial problems and whether FTX was not only a liquidity crisis but instead a solvency crisis. The answer to this question, given the accusations of fraud, potentially makes this an *Enron moment* for the crypto industry, rather than a *Lehman moment* (or a *Minsky moment)*.[31] .

(Nov. 7, 2022) https://www.bloomberg.com/news/articles/2022-11-06/binance-to-sell-529-million-of-ftt-token-amids-revelations; *see* Ortenca Aliaj et al., *Binance Ditches Deal to Rescue Rival Crypto Exchange FTX*, FINANCIAL TIMES (Nov. 10, 2022), https://www.ft.com/content/ad440b22-00e2-44e9-b95d-449bb89fd504.

[31] *See*, *e.g.*, Steve Mollman, *'A lot of people have compared this to Lehman. I would compare it to Enron': Larry Summers has some choice words for Sam Bankman-Fried and FTX*, FORTUNE (Nov. 12, 2022), https://fortune.com/2022/11/11/larry-summers-ftx-crypto-collapse-more-like-enron-than-lehman. A *Minsky moment*, named after the Economist Hyman Minsky, is the moment in a liquidity crisis when the entity becomes insolvent – *see*, *e.g.*, Jan A. Kregel, *Is this the Minsky Moment for Reform of Financial Regulation?*, (Levy

The FTX group comprised four main elements. First, the exchange, an entity licensed in the United States which focused on US customers, was the second-largest US crypto exchange before the group's collapse. Second, the global "exchange", which acted as an intermediary or trading venue, and was a market maker and broker-dealer for cryptocurrency trading. Third, a trading fund called Alameda, and finally, a variety of venture capital investments.[32] The global exchange moved its headquarters from Hong Kong to the Bahamas in September 2021, registering with the Securities Commission of the Bahamas under the Bahamas Digital Assets and Registered Exchanges Act 2020.[33]

FTX group was commonly called an "exchange", yet it largely functioned as a financial conglomerate (more like Lehman or Enron) than an exchange bringing together buyers and sellers. The lack of transparency involved also led to widespread accusations of fraud, denied by FTX founder Sam Bankman-Fried (SBF).[34] SBF was extradited to the US following his arrest in the Bahamas in late 2022, and was charged with eight counts of fraud and conspiracy.[35] SBF has now been released on USD 250 million bail, and faces additional charges from the US SEC for his alleged participation in a "scheme to conceal material information from FTX investors".[36]

As in other financial crises, it appears problems arose in Alameda, FTX group's trading arm and funds, particularly customer funds, were transferred from the cryptocurrency trading venue to cover Alameda's trading and investment losses.[37] Determining what precisely happened is

---

Economics Institute Working Paper No. 586, Feb. 25, 2010).

32 *See*, *e.g.*, Alex Hern & Dan Milmo, *What do we know so far about collapse of crypto exchange FTX?*, THE GUARDIAN (Nov. 18, 2022), https://www.theguardian.com/technology/2022/nov/18/how-did-crypto-firm-ftx-collapse.

33 Sam Bankman-Fried had claimed that the greater regularity clarity in the Bahamas was the principal reason for the move – *see* Shalini Nagarajan, *Sam Bankman-Fried says FTX has moved its HQ from Hong Kong to the Bahamas because of its crypto framework*, MARKETS INSIDER (Sept. 27, 2021) https://markets.businessinsider.com/news/currencies/sam-bankman-fried-ftx-crypto-hong-kong-bahamas-relocates-headquarters-2021-9. As regards the Bahamas Digital Assets and Registered Exchanges Act 2020, *see* Aliya Allen & Sean McWeeney Jr., *15 FAQ's on the Digital Assets and Registered Exchanges (DARE) Act, 2020*, GRAHAM THOMPSON INSIGHTS (2021), https://grahamthompson.com/wp-content/uploads/2021/01/GT-News-Insights-Vol-3-Issue-1-DARE.pdf.

34 *See*, *e.g.*, Rohan Goswami & MacKenzie Douglas, *In defensive interview, Sam Bankman-Fried claims he's broke and committed no fraud*, CNBC (Nov. 30, 2022), https://www.cnbc.com/2022/11/30/former-ftx-ceo-sam-bankman-fried-says-i-didnt-ever-try-to-commit-fraud.html. *See also* Camomile Shumba, *US Justice Department Wants FTX Fraud Allegations to Be Investigated*, COINDESK (Dec. 2, 2022) https://www.coindesk.com/policy/2022/12/02/us-justice-department-wants-ftx-fraud-allegations-to-be-investigated.

35 *See*, *e.g.*, David Yaffe-Bellany, William K. Rashbaum & Matthew Goldstein, *FTX's Sam Bankman-Fried Is Arrested in the Bahamas*, N. Y. TIMES (Dec. 12, 2022) https://www.nytimes.com/2022/12/12/business/ftx-sam-bankman-fried-bahamas.html.

36 *See*, *e.g.*, Michael Race & Monica Miller, *FTX boss Sam Bankman-Fried arrives in US to face charges*, BBC (Dec. 22, 2022), https://www.bbc.com/news/business-64036615; David Yaffe-Bellany, William K. Rashbaum & Matthew Goldstein, *Sam Bankman-Fried Pleads Not Guilty to Fraud and Other Charges*, N. Y. TIMES (Jan. 3, 2022), https://www.nytimes.com/2023/01/03/technology/sam-bankman-fried-pleads-not-guilty.html.

37 *See* Angus Berwick & Tom Wilson, *Exclusive: Behind FTX's fall, battling billionaires and a failed bid to save crypto*, REUTERS (Nov. 11, 2022) https://www.reuters.com/technology/exclusive-behind-ftxs-fall-battling-billionaires-failed-bid-save-crypto-2022-11-10.

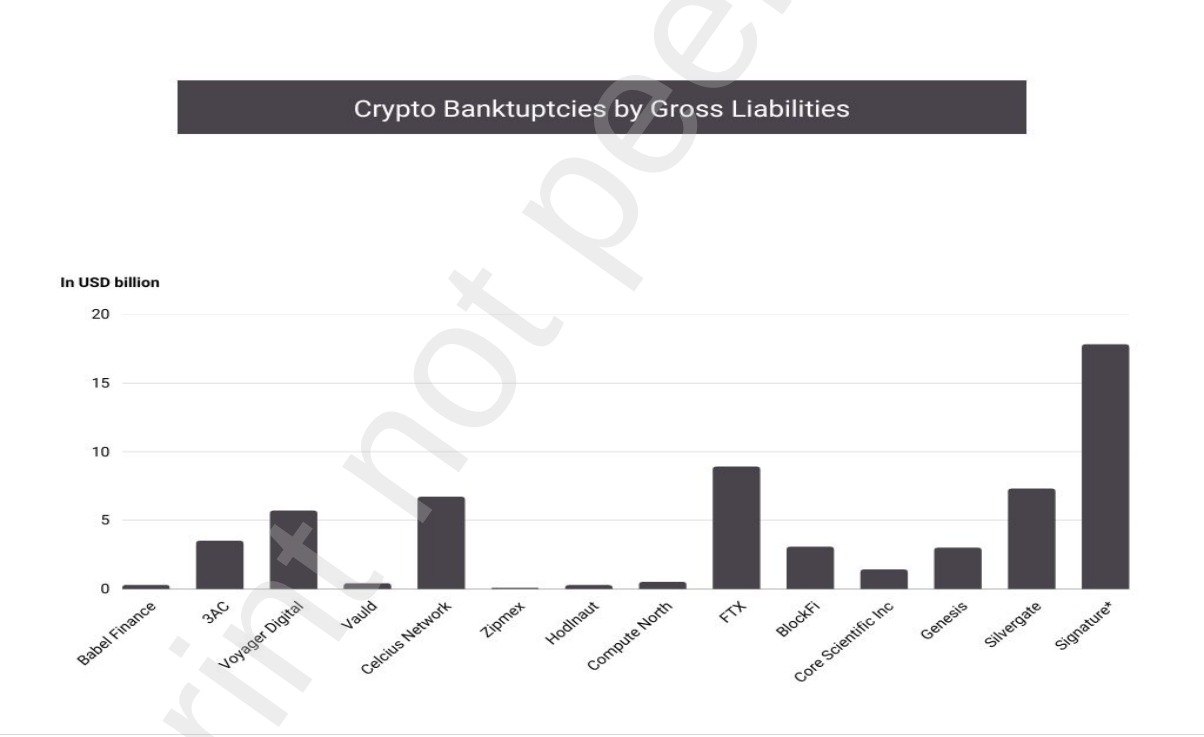
severely hampered by the complete lack of internal controls, proper accounting systems, and even systems for keeping track of customer accounts. As John Ray III, the restructuring expert appointed to lead FTX, stated, he has never in his entire career seen "such a complete failure of corporate controls".[38] So, what truly happened is at the time of writing still being deciphered.[39]

What seems clear is that while FTX portrayed itself as an exchange, it was functioning as a broker-dealer and proprietary trader in assets whose issuance it controlled. Ultimately, when in financial difficulty, reports suggest FTX lent its customers' funds to other parts of its corporate group[40] – behavior utterly different from that expected of a *bona fide* exchange, or any regulated entity in traditional finance.

B. Capacity to Steer Financial Firms

A single snowflake does not a winter make, and many collapses beyond FTX together comprise the Crypto Winter of 2022-23. Figure 1 shows the crypto bankruptcies of 2022-23 by gross liabilities.

Figure 1: Crypto Bankruptcies (by gross liabilities)[41]



38 *Id*.

39 *Id*. *See also* Kadim Shubba, Joshua Oliver & Sujeet Indap, *New FTX chief says crypto group's lack of control worse than Enron*, FINANCIAL TIMES (Nov. 18, 2022) https://www.ft.com/content/7e81ed85-8849-4070-a4e4-450195df08d7.

40 Vicky Ge Huang, Alexander Osipovich & Patricia Kowsmann, *FTX Tapped Into Customer Accounts to Fund Risky Bets, Setting Up Its Downfall*, WALL STREET JOURNAL (Nov. 11, 2022), https://www.wsj.com/articles/ftx-tapped-into-customer-accounts-to-fund-risky-bets-setting-up-its-downfall-11668093732.

41 Source: Research by ADA Chair in Financial Law (inclusive finance), University of Luxembourg. Note that the Signature numbers refer to Signature's crypto business only and leave out traditional banking business.

As for trading platforms, Vauld and Zipmex filed for creditor protection on July 22, Hodlnaut followed in August 2022,[42] and FTX and BlockFi in November 2022.[43] Babel Finance, Celcius Network, BlockFi and Genesis were more crypto lending firms; although we note the business models are not clear cut, as both Hodlnaut and FTX also ran crypto lending programmes. Further, Core Scientific and Compute North are Bitcoin mining firms, the Terra algorithmic crash concerned a stablecoin system, while Three Arrows Capital (3AC) acted as a crypto hedge fund (ie. a proprietary trader on its own and its investor's account). These issues echoed into eventual deposit withdrawals and losses at Silvergate Bank in the US, leading to its failure. Concerns about other tech-exposed banks led to the failure of Signature and Silicon Valley Bank all early in 2023.

While this shows widespread institutional instability throughout the crypto industry notwithstanding the business models, close examination confirms each collapse's pattern of significant interconnected centralised crypto intermediaries becoming unstable due to mismanagement, malfeasance, fraud, theft and a general lack of transparency.[44]

1. Stablecoin projects

Before crashing in May 2022, Terra's UST stablecoin was the fourth-largest stablecoin with USD 18 billion in market capitalisation (behind only Tether (USDT), USD Coin (USDC) and Binance USD (BUSD)).[45] The Terra project collapsed because of its algorithmic design relying on a two-coin system). Terra's UST coin was pegged to the underlying fiat currency via Terra's LUNA token, designed to stabilise the supply and demand of UST through arbitrage (i.e., contracting (or expanding) the UST pool by using the LUNA pool as a counterweight). Additionally, arbitrage opportunities were expected to quickly correct any slight movements away from the peg (since Terra allowed arbitrageurs to trade USD 1 worth of LUNA for 1 UST, and vice versa, at any time).[46]

This algorithmic mechanism could not handle Terra's growth and ultimately failed. Terra's algorithmic stabilization mechanism probably became overwhelmed because its Anchor protocol offered a hefty, and probably overly-ambitious, 20 per cent return for staking UST (since UST holders often sold en masse if they feared LUNA would fail).[47] Additionally, it is

---

42 Rebecca Oi, *Top 10 Biggest Crypto Failures of 2022*, (Dec. 20, 2022), https://fintechnews.sg/67859/crypto/top-10-biggest-crypto-failures-of-2022/.

43 Press Release, United States Securities Exchange Commission, BlockFi Agrees to Pay $100 Million in Penalties and Pursue Registration of its Crypto Lending Product (Feb. 14, 2022), https://www.sec.gov/news/press-release/2022-26; Greg Iacurci, *As BlockFi files for bankruptcy, what to know about crypto investor protections*, CNBC (Nov. 28, 2022) https://www.cnbc.com/2022/11/28/what-to-know-about-crypto-investor-protections-as-blockfi-files-for-bankruptcy.html.

44 *See*, *e.g.*, Dietrich Knauth, *Factbox: Crypto companies crash into bankruptcy*, REUTERS (Dec. 2, 2022), https://www.reuters.com/technology/crypto-companies-crash-into-bankruptcy-2022-12-01; Julian Mark, *The Companies That Helped Create 2022's 'Crypto Winter'*, WASHINGTON POST (Dec. 5, 2022), https://www.washingtonpost.com/business/2022/12/05/crypto-ftx-collapse-bankruptcy-companies.

45 *See Historical data for TerraClassicUSD*, COINMARKETCAP (Dec. 6, 2022), https://coinmarketcap.com/currencies/terrausd/historical-data.

46 Antonio Briola et al., *Anatomy of a Stablecoin's failure: The Terra-Luna case*, 51 FIN RES. LETTERS (2023).

47 *See*, *e.g.*, Elizabeth Lopatto, *How the Anchor protocol helped sink Terra*, THE VERGE (May 20, 2022), https://www.theverge.com/2022/5/20/23131647/terra-luna-do-kwon-stablecoin-anchor.

speculated that a coordinated attack on Terra broke the link, thereby profiting those on the other side (similar to the 2021 IronFinance algorithmic stablecoin project).[48] Terra's failure sent shockwaves through the entire crypto industry and the fall-out damaged or destroyed many other market participants (described below).

2. Crypto investment funds

The once respected crypto Singaporean hedge fund 3AC filed for bankruptcy protection on 1 July 2022 (a few days before Voyager and Celsius – see below).[49] 3AC went from over USD 10 billion in assets to collapse in a few months. After its failure, the Monetary Authority of Singapore accused 3AC of exceeding its assets threshold and providing false information.[50] 3AC, which has been called "the crypto version of Long-Term Capital Management" (LTCM) used high levels of leverage to make a series of large directional trades in Grayscale Bitcoin Trust (GBTC), Luna Classic (LUNC) and Staked Ether (stETH).[51] The consequences of losses on its positions spread throughout the ecosystem because it was trading funds primarily borrowed from over 20 other institutions. The concentration of risk in one point of failure and the resultant impact on a range of other significant market participants echoes LTCM's situation in the aftermath of Russia's August 1998 default. 3AC's founders Su Zhu and Kyle Davies quickly disappeared after filing for bankruptcy, prompting liquidators to serve subpoenas via Twitter.[52] The founders have since resurfaced as founders of Open Exchange, a new crypto investment vehicle, focusing on claims against failed crypto firms.[53]

---

48 *See*, *e.g.*, Taylor Locke, *Did a 'concerted attack' cause Terra's UST to crash below $1? An exec behind the largest stablecoin and experts agree it's suspicious*, FORTUNE (May 14, 2022), https://fortune.com/2022/05/13/terra-ust-stablecoin-crash-suspicious-potential-attack-george-soros. *See also* Austin Adams & Markus Ibert, *Runs on Algorithmic Stablecoins: Evidence from Iron, Titan, and Steel*, *Federal Reserve*, FEDS NOTES (Jun. 2, 2022), https://www.federalreserve.gov/econres/notes/feds-notes/runs-on-algorithmic-stablecoins-evidence-from-iron-titan-and-steel-20220602.html.

49 *See* Arjun Khapal, *Crypto hedge fund Three Arrows files for Chapter 15 bankruptcy*, CNBC (Jul. 2, 2022), https://www.cnbc.com/2022/07/02/crypto-hedge-fund-three-arrows-files-for-chapter-15-bankruptcy.html; MacKenzie Sigalos, *From $10 billion to zero: How a crypto hedge fund collapsed and dragged many investors down with it*, CNBC (Jul. 12, 2022), https://www.cnbc.com/2022/07/11/how-the-fall-of-three-arrows-or-3ac-dragged-down-crypto-investors.html. *See also* Alex Hern & Dan Milmo, *Three Arrows Capital to become latest casualty of crypto crash*, THE GUARDIAN (Jun. 29, 2022), https://www.theguardian.com/technology/2022/jun/29/three-arrows-capital-to-become-latest-casualty-of-crypto-crash.

50 *See* Tom Westbrook & Jason Neely, *Singapore regulator rebukes crypto fund Three Arrows Capital*, REUTERS (Jun. 30, 2022), https://www.reuters.com/business/finance/singapore-regulator-rebukes-crypto-fund-three-arrows-capital-2022-06-30.

51 Jacob Wollinsky, *How Hedge Fund Three Arrows Capital Was Crypto's Long-Term Capital Management*, FORBES (Aug. 24, 2022), https://www.forbes.com/sites/jacobwolinsky/2022/08/24/how-hedge-fund-three-arrows-capital-was-cryptos-long-term-capital-management.

52 Muyao Shen & Jeremy Hill, *Three Arrows Capital Liquidators Demand Documents Via Twitter*, BLOOMBERG CRYPTO (Jan. 6, 2023), https://www.bloomberg.com/news/articles/2023-01-05/3ac-liquidators-demand-documents-from-founders-via-twitter.

53 Aaryamann Shrivastava, *Bankrupt 3AC founders Kyle Davies and Zhu Su launch new exchange for crypto claims trading*, FXSTREET (Feb. 10, 2023), https://www.fxstreet.com/cryptocurrencies/news/bankrupt-3ac-founders-kyle-davies-and-zhu-su-launch-new-exchange-for-crypto-claims-trading-202302100000.

The 3AC failure appears to reinforce the view, that "crypto is a game of creating virtual fortunes out of thin air and convincing other humans with traditional forms of money that those virtual fortunes deserve to be real-world ones".[54]

3. *Crypto lenders*

Celsius was meant to operate as a safe and secure mechanism to generate attractive returns for crypto holders. It filed for bankruptcy protection on 13 July 2022, losing some USD 5 billion in customer funds.[55] It has been alleged (in a civil lawsuit) that Celsius was running a "Ponzi scheme" by offering depositors rates for staking of up to 17 per cent, while also loaning these funds out. The lawsuit claims Celsius, "artificially inflated the price of its digital coin, failed to hedge risk and engaged in activities that amounted to fraud".[56]

Voyager was a crypto lender like Celsius (and suffered the same fate). Voyager filed for bankruptcy protection on 5 July 2022, being unable to repay (or even account for) customer deposits.[57] Voyager did not keep customer deposits in designated wallets but mixed deposited crypto, and then lent deposits to third parties (like 3AC and FTX/Alameda) to pay interest to customers. Allegations that Voyager was involved in illegal conduct have also been made in, inter alia, an investigation by the US Federal Deposit Insurance Company.[58]

Crypto lender Genesis similarly filed for bankruptcy protection in January 2023, shortly after the US SEC charged it with selling unregistered securities.[59] Genesis operated within the Digital Currency Group, in which other companies operated various trading businesses (which continue) and had been borrowing from Genesis.[60]

---

54 Jen Wieczner, *The Money Game: The Crypto Geniuses Who Vaporized a Trillion Dollars*, NY MAG (Aug. 15, 2022), https://nymag.com/intelligencer/article/three-arrows-capital-kyle-davies-su-zhu-crash.html.

55 *See* Wayne Duggan & Farran Powell, *Celsius Crypto Meltdown: A Crypto Lender In Crisis*, FORBES (Oct. 4, 2022), https://www.forbes.com/advisor/investing/cryptocurrency/what-is-celsius.

56 *See* Arjun Kharpal, *Embattled crypto lender Celsius is a 'fraud' and 'Ponzi scheme,' lawsuit alleges*, CNBC (Jul. 8, 2022), https://www.cnbc.com/2022/07/08/crypto-lender-celsius-is-a-fraud-and-ponzi-scheme-lawsuit-claims.html.

57 *See* Jeremy Hill, *Voyager Account Holders Likely Won't Get all Their Crypto Back*, BLOOMBERG CRYPTO (Jul. 6, 2022), https://www.bloomberg.com/news/articles/2022-07-06/voyager-account-holders-likely-won-t-get-all-their-crypto-back.

58 *See*, *e.g.*, Allyson Versprille, *FDIC probing how bankrupt crypto lender Voyager marketed itself*, BLOOMBERG CRYPTO (Jul. 8, 2022), https://www.bloomberg.com/news/articles/2022-07-07/fdic-probing-how-bankrupt-crypto-broker-voyager-marketed-itself.

59 *See* Rohan Goswami & MacKenzie Sigalos, *Crypto lender Genesis files for bankruptcy in latest blow to Barry Silbert's DCG empire*, CNBC (Jan. 20, 2023), https://www.cnbc.com/2023/01/20/crypto-lender-genesis-trading-files-for-bankruptcy-barry-silbert-digital-currency-group.html; Rohan Goswami, *Crypto firms Genesis and Gemini charged by SEC with selling unregistered securities*, CNBC (Jan. 12, 2023), https://www.cnbc.com/2023/01/12/sec-charges-genesis-and-gemini-with-selling-unregistered-securities.html.

60 Sonali Basak et al., *Genesis Balance Sheet Reveals Web of Loans Across Silbert Empire*, BLOOMBERG TECHNOLOGY (Nov. 23, 2022), https://www.bloomberg.com/news/articles/2022-11-22/genesis-balance-sheet-reveals-web-of-loans-across-silbert-empire-dcg.

It is probable that many other crypto firms, including FTX, were destabilized by these other failures earlier in 2022 (especially as FTX was involved in attempted restructuring activity). [61] This should not happen if crypto is truly decentralized as DeFi was designed to avoid the interlinkages of traditional finance.

C. Operational Instability: Not an Exception, but the Norm

While the former largely demonstrates crypto management's incapacity to steer financial firms well, the Crypto Winter 2022-23 is further characterized by the capacity of outsiders to exploit a system's weaknesses and divert assets.

Figure 2 lists some high-volume asset diversions in the DeFi sector. Strikingly, several large-scale asset diversions occurred in 2022-23, thereby undermining much of the trust remaining in the general institutional stability of DeFi business models.

Figure 2: Major DeFi Asset Diversions[62]

Date	Platform	Assets diverted	Method
Jul 05	Mt. Gox	$ 473 000 000	Inside job / bad business conduct
Jan 18	Coincheck	$ 534 000 000	Inadequate security
Feb 21	CreamFinance	$ 38 000 000	Flash loan attack
Mrz 21	PAID Network	$ 7 000 000	Compromised private keys
Aug 21	CreamFinance	$ 25 000 000	Flash loan attack
Aug 21	Poly Network	$ 611 000 000	Software bug
Oct 21	CreamFinance	$ 130 000 000	Flash loan attack
Oct 21	Compound	$ 150 000 000	Software bug
Nov 21	bZx Protocol	$ 55 000 000	Compromised private keys
Dec 21	Bitmart	$ 196 000 000	Stolen private keys
Dec 21	VulcanForged	$ 140 000 000	Stolen private keys
Dec 21	BadgerDAO	$ 120 000 000	Governance attack
Feb 22	Wormhole	$ 325 000 000	Bridge exploit
Feb 22	Qubit Finance (X-Bridge)	$ 40 000 000	Bridge exploit
Mrz 22	Ronin Network	$ 625 000 000	Stolen private keys
Apr 22	Beanstalk	$ 182 000 000	Governance attack
Aug 22	Nomad Bridge	$ 190 000 000	Software bug
Sep 22	Wintermute	$ 162 000 000	Software bug
Okt 22	Binance	$ 570 000 000	Bridge exploit
Nov 22	FTX	$ 477 000 000	Inside job / bad business conduct

61 *See*, *e.g.*, Olga Kharif, *Crypto Billionaire Bankman-Fried Eyeing Bid for Celsius Assets*, BLOOMBERG (Sept. 28, 2022), https://www.bloomberg.com/news/articles/2022-09-27/crypto-billionaire-bankman-fried-eyeing-bid-for-celsius-assets. *See also* Steven Church, *FTX's $1.4 Billion Deal for Bankrupt Lender Voyager Is Cancelled*, BLOOMBERG CRYPTO (Nov. 16, 2022), https://www.bloomberg.com/news/articles/2022-11-15/ftx-s-1-4-billion-deal-for-bankrupt-crypto-lender-voyager-void.

62 Research by ADA Chair in Financial Law (inclusive finance), University of Luxembourg.

In some instances, private keys were stolen through hacks of crypto custodians wallets and exchanges ('Hot Wallet Hacks'),[63] in others attackers hacked the governance mechanism, acquiring control over the platform's protocols ('Governance Hacks') which allowed them to divert assets.[64] Several platforms experienced in 2022 the same type of earlier attacks, casting doubt on the industry's ability to learn and improve cyber security.

In hindsight, the crypto winter is not exceptional as elements including concentration, institutional instability and misconduct, feature prominently. For instance, before Mt. Gox's[65] failure in early 2014, it dealt with some 70 percent of Bitcoin transactions worldwide. Mt. Gox was a systemically important intermediary for the Bitcoin ecosystem. As in the Crypto Winter, a mix of incompetence, lack of risk management and unrealistic promises met a mass of over-enthusiastic crypto clients searching for high returns. Once the capacity and resources of the system were overly stretched, vulnerabilities emerged to theft and fraud: in the case of Mt. Gox this eventuated in the infamous 2011 hot wallet hack. That this hack was undetected for three years demonstrates severe internal deficiencies in accounting and auditing – these critical functions were not compliant with the standards prescribed for regulated financial intermediaries or even reasonable business behaviour, particularly when dealing with other people's money (the classic agency risk in finance).

A lack of appropriate risk-management and analysis combined with fraud and misconduct also characterised the ICO (Initial Coin Offering) bubble of 2017-19:[66] the common denominator of many crypto projects was (1) the emergence of one dominant crypto token, paired with (2) utterly inadequate disclosure of information, supported by (3) over-enthusiastic promises and announcements, and (4) the avoidance of financial regulation through generous self-classification of crypto assets, skirting existing financial regulation and facilitating institutional instability.

The issue with the ICO bubble lay not in the failure of innovative projects – failures are part of innovative ventures and losses are inherent in venture investing. The issue was that institutional failures and weaknesses prompted many failed crypto projects, resulting in operational malfeasance that facilitated fraud and theft, all while information technology (IT) infrastructure locked in investors' and customers' funds, without appropriate systems of transparency and investor protection.

III. Financialization of Crypto and the Rise of Systemically Important Crypto Intermediaries (SICIs)

63 On Mt. Gox *see, e.g.*, Robert McMillan, *The Inside Story of Mt. Gox, Bitcoin's $460 Million Disaster*, WIRED (Mar. 3, 2014), https://www.wired.com/2014/03/bitcoin-exchange.

64 On Beanstalk *see, e.g.*, Corin Faife, *Beanstalk Cryptocurrency Project Robbed after Hacker Votes to Send Themself $182 Million*, THE VERGE (Apr. 19, 2022), https://www.theverge.com/2022/4/18/23030754/beanstalk-cryptocurrency-hack-182-million-dao-voting.

65 *See* on Mt. Gox, Robin Sidel, Michael J. Casey & Eleanor Warnock, *Shutdown of Mt. Gox Rattles Bitcoin Market*, WALL STREET JOURNAL (Feb. 26, 2014), https://www.wsj.com/articles/SB10001424052702304834704579404101502619422.

66 *See* Dirk A. Zetzsche et al., *The ICO Gold Rush: It's a Scam, It's a Bubble, It's a Super Challenge for Regulators*, 60:2 HARV. INT'L L.J. 267 (2019).

A. Concentration and Interconnection in the Crypto Ecosystem

The Crypto Winter's central element was centralization in Systemically Important Crypto Intermediaries (SICIs) that are both too-big-to-fail and too-connected-to-fail in their ecosystem. While issues in the crypto ecosystem have historically had limited impact on traditional financial stability, the crypto ecosystem has produced its version of crypto concentration risk, similar to traditional finance's systemically important financial institutions and infrastructure. This concentration typically arises because a single crypto intermediary – often the entity controlling the issuance of a fashionable token – assumes a powerful role within its ecosystem and a *de facto* monopoly in supply and demand.

We have argued in the context of traditional finance that economies of scope and scale combined with technology's network effects facilitate the rapid emergence of new systemically important financial institutions; a trend we have characterized as FinTech 4.0.[67] Emerging systemically important crypto conglomerates, intermediaries and infrastructure illustrates this process in crypto. SICIs tend to arise out of a dependence between transactions of a crypto asset and an intermediaries' continued existence. Within *their ecosystem*, many crypto intermediaries are classic examples of systemically significant non-bank financial institutions, known as "shadow banks" or "non-bank financial intermediaries", that have been key in many financial crises and are a major on-going focus of major regulators and policymakers globally.[68]

As we analyse elsewhere, many so-called DeFi business models have centralised elements of set-up and governance.[69] In a purely DeFi market structure, the systems' development and maintenance is free. Thus, "true DeFi" is an unreal dream, and the market has accepted concentration in practice, with the consequential governance and agency risks seen in traditional finance.[70] FTX's collapse evidences this insight: FTX's operations were decentralized. The original Bitcoin white paper's design is very different to how FTX was run.[71] For instance, Bitcoin was formulated with peer-to-peer transactions and without intermediaries. By contrast, FTX processed transactions centrally and acted as an intermediary. However, FTX was not a cryptocurrency and so Bitcoin is not a directly appropriate comparison. But the comparison does highlight FTX's departure from DeFi in its business models and operating procedures. FTX demonstrates the evolution of centralised crypto services, and its attendant market failures and negative externalities, with which regulation has not kept pace.

---

67 D.W. Arner et al., *BigTech and Platform Finance: Governing FinTech 4.0 for Sustainable Development*, 27:1 FORDHAM J. CORP. & FIN L. 1 (2022).

68 The term "shadow bank" was coined by economist Paul McCulley in a speech at the 2007 annual financial symposium hosted by the Kansas City Federal Reserve Bank in Jackson Hole, Wyoming. McCulley focused on the US and referred primarily to nonbank financial institutions that engaged in maturity transformation – *see* Laura Kodres, *Shadow Banks: Out of the Eyes of Regulators*, IMF (Feb. 27, 2023), https://www.imf.org/en/Publications/fandd/issues/Series/Back-to-Basics/Shadow-Banks.

69 *See* Linn Anker-Sørensen & Dirk A. Zetzsche, *From CEFI to DEFI: The Issue of Fake DeFI*, (U. of Luxembourg Working Paper 12, 2021).

70 *Id*.

71 Satoshi Nakamoto, *Bitcoin: A Peer-to-Peer Electronic Cash System*, BITCOIN.ORG (Oct. 31, 2008), https://bitcoin.org/bitcoin.pdf.

Concentration in crypto runs counter to DeFi's philosophy: Crypto aimed to eliminate traditional financial intermediaries that concentrate flows of supply and demand in financial products. Decentralization is supposed to eliminate the market failures, negative externalities and misbehaviour characteristic of traditional finance. Crypto was designed to maximise the potential for positive externalities, such as democratization, inclusion, transparency, permanence and innovation via technological trust infrastructure. Ironically, what crypto was designed to prevent has come to characterize its ecosystem: the economies of scope and scale of finance combined with the network effects of technology have resulted in large complex crypto conglomerates of systemic importance for their users.

B. Bundled Intermediary Functions

The opacity and complexity of crypto conglomerates also carry connotations of shadow banking, shadow finance and regulatory arbitrage. We are interested in the cause of this opacity and complexity, identifying two drivers: a combination of a range of economic functions paired with the lack of transparency regarding actual operations and risks, as well as the regulation requiring appropriate management of these various economic functions. Both elements become obvious when compared to the five main models of intermediaries in traditional finance. In this section, we consider four types of these intermediaries, but not the fifth (insurance companies).

First are **exchanges**, or marketplaces at large. The main examples are stock exchanges, which after centuries of crises and scandals,[72] are now subject to strict securities regulation requiring segregated accounts for all customers. This ensures that in the event of exchange insolvency, customer assets are segregated and able to be returned. Segregation and custody requirements, and a range of operational controls promoting safety and soundness, are all central to exchange regulation. Cryptocurrency intermediaries often describe themselves as exchanges, but beyond a few regulated Instances, very rarely behave like exchanges by segregating accounts and assets.[73] Notably, there are three or four times more firms claiming to be exchanges in the crypto industry than in traditional finance for a far lower number and volume of transactions and the number of users, suggesting these firms are also engaging in other functions.[74] Therefore, further consolidation is expected bringing increased concentration risks and systemically significant financial infrastructures in crypto.

Second are **investment firms**, including broker-dealers and market makers. Investment firms take client assets, engage in trading, and offer finance and a range of repo and other collateralised services. Investment firms, and their clients, are typically exposed to counter-party risk, yet segregated client accounts provide considerable bankruptcy protection. Broker-

---

72 THE FINANCIAL CRISIS INQUIRY COMMISSION, THE FINANCIAL CRISIS INQUIRY REPORT: FINAL REPORT OF THE NATIONAL COMMISSION ON THE CAUSES OF THE FINANCIAL AND ECONOMIC CRISIS IN THE UNITED STATES (Jan. 2011), http://fcic-static.law.stanford.edu/cdn_media/fcic-reports/fcic_final_report_full.pdf.

73 Dennis Chu, *Broker-Dealers for Virtual Currency: Regulating Cryptocurrency Wallets and Exchanges*, 118:8 COLUM. L. REV. 2323 (2018).

74 Forbes puts the number of crypto exchanges at around 500 – *see* Farran Powell, *10 Best Crypto Apps & Exchanges Of 2023*, FORBES (Feb. 1, 2023), https://www.forbes.com/advisor/investing/cryptocurrency/best-crypto-exchanges, and there are estimates of up to 1000 additional decentralized exchanges. Conversely Deloitte states there are only around 130 traditional securities exchanges – *see* David Myers, *The future of global securities exchanges*, DELOITTE (Jan. 2023), https://www.deloitte.com/global/en/Industries/financial-services/perspectives/gx-future-of-global-securities-exchanges.html.

dealer regulation involves custody, settlement and other forms of risk management measures to benefit clients.

Third are **collective investment vehicles**, such as investment funds, mutual funds and pension funds. These are pools of assets that are invested, under the investment policy, to the benefit of the collective investors. Assets of the pooled investment vehicles are held in custody and segregated from other assets held by involved intermediaries. For any investment decision, the collective investors' interest as defined in the constituent documents should be the sole guiding consideration, identified in the investment policy, and strictly distinct from the interests of any intermediary involved. Any investment in a crypto asset should be made only if that asset seems to be a good investment from the perspective of the fund's investor. Asset managers making investment decisions on behalf of the fund (e.g., for the sake of argument only, Alameda) must not take into account the benefits the acquisition or disposal of certain crypto assets (e.g. FTT) creates for a related entity (e.g. FTX exchange). Moreover, conflicts of interest rules resulting in information barriers should actively prevent these considerations from being operative, blinding asset managers to the needs and wishes of other parts of the conglomerate and avoiding anticipatory obedience.

Fourth are **banks**. A bank takes in funds as deposits, loaning or investing most of the funds to other parties. Banks are subject to a range of prudential regulatory requirements to enhance their safety and soundness and maintain market trust and confidence both to support their core roles in payments and finance (a positive externality) and reduce contagion risks (a negative externality). For crypto, investors may have used the "cryptoderivatives" (i.e. forwards and options on crypto assets) as cash substitutes. The crypto industry may have furthered the misunderstanding of an investment as cash, already in the term cryptocurrency. Many crypto entities thus appear to function more as a bank than an exchange (and to some extent as a broker-dealer, as stated above).[75]

These crypto intermediaries operating (functionally) as a bank were not subject to traditional bank regulation and did not have access to protections such as deposit insurance, restructuring frameworks and eventually the central bank as a liquidity provider of last resort. Such measures aim at avoiding liquidity and confidence crises but none, including mandated capital levels and liquidity, apply to crypto.

In short, we experienced something similar to bank runs in the case of several SICIs (e.g. FTX, Mt. Gox and others), exacerbated by an absence of measures designed to prevent these runs. The abrupt exit of customers fuelled the liquidity crisis inherent in each crypto insolvency.

C. Implications: The Financialization of Crypto

This crypto intermediation concentration; this rise of oligopoly or monopoly powers in markets following the mantra of decentralisation; we term the financialisation of crypto. Where financialization happens, neither decentralization nor free market forces counter the control of the SICI as a central intermediary.

---

[75] Chu, *supra* note 74; William D. O'Connell, *Crypto platforms say they're exchanges, but they're more like banks*, THE CONVERSATION (Aug. 12, 2022), https://theconversation.com/crypto-platforms-say-theyre-exchanges-but-theyre-more-like-banks-188339; George Selgin, *Bank and Crypto Runs: F(ac)TX vs fiction*, CATO INSTITUTE (Nov. 21, 2022), https://www.cato.org/blog/bank-crypto-runs-factx-vs-fiction.

Given financialization and the rise of SICIs, the crypto failures of 2022 are highly unlikely to be the last; others will surely follow. The crypto winter confirms that crypto intermediaries and conglomerates are exposed to the classic financial and operational risks, market failures and negative externalities.[76]

Traditional finance addressed these issues through regulation, which raises the question, we now address, of how best to regulate crypto?

IV. Regulating Crypto

While crypto was presented as a new type of finance that avoided traditional financial risks, the ecosystem's operational and financial risks have evolved to evidence all of the traditional financial risks. Centuries of financial evolution illustrate that market trust requires transparency, comparable information, and protection from fraud and abuse. Trust in financial institutions follows risk mitigation, and is indispensable for efficient markets and market development. Therefore, we argue that where problems have similar causes, they require similar remedies: financialization requires crypto regulation. While others argue the best approach is to isolate crypto from finance, leaving it largely unregulated as a non-connected ecosystem,[77] we highlight how crypto has financialized, both in terms of what is being offered and in market failures and other weaknesses.[78]

Financial regulation largely targets improved market functioning and efficiency. Crypto's biggest risk is that financialization erodes trust and confidence such that the market collapses, or legislators feel pressed to shut crypto markets down permanently. We argue that an approach recognising and addressing market failures and externalities (both positive and negative) through regulation, enforcement and supervision, as well as international cooperation and coordination, is necessary for crypto to survive (and to thrive). We outline the need for regulation in the context of traditional risks of finance in Section A.

The idiosyncrasies of crypto require certain bespoke approaches. We highlight the most important of such aspects and considerations in Section B. Section C then combines these insights and sets out detailed policy proposals.

A. Financialization, Shadow Finance and Regulatory Arbitrage: "Same Risks, Same Rules"

Financial regulation seeks to enhance market transparency and efficiency, ensure financial stability, market fairness and integrity, and provide adequate customer, depositor and investor

---

76 *See*, *e.g.*, Cornelius Christian, *FTX collapse could mean 'cascade' of failures in crypto sector - Ran Neuner*, KITCO NEWS (Nov. 11, 2022), https://www.kitco.com/news/2022-11-11/FTX-collapse-could-mean-cascade-of-failures-in-crypto-sector-Ran-Neuner.html; Jack Denton, *Exchanges Seek to Calm Users as Trust in Crypto World Wavers*, BARRON'S (Nov. 14, 2022), https://www.barrons.com/articles/ftx-crypto-exchange-reserves-51668457984.

77 *CryptoSprint outputs*, FINANCIAL CONDUCT AUTHORITY (May 11, 2022) https://www.fca.org.uk/firms/cryptoassets/cryptosprint. *See also* Todd H. Baker, *Let's Stop Treating Crypto Trading as If It Were Finance*, THE CLS BLUE SKY BLOG (Nov. 29, 2022), https://clsbluesky.law.columbia.edu/2022/11/29/lets-stop-treating-crypto-as-if-it-were-finance/.

78 KATHARINA PISTOR, THE CODE OF CAPITAL: HOW THE LAW CREATES WEALTH AND INEQUALITY (2018).

protection. Financial regulation also seeks recently to support market development, economic growth, and further financial inclusion and sustainable development.[79] We will show each of these regulatory objectives to also be relevant to the crypto regulation.

1. Financial stability

Financial regulation is about seeking to prevent or reduce the most significant externality which arises in the context of finance: systemic financial crises. Financial stability regulation – both macroprudential and microprudential – is designed to achieve this objective.[80]

While crypto has not yet reached the financial dimension that warrants intervention to ensure whole financial system stability, financial technology usually grows very fast, due to the scale and scope economies inherent in IT and network effects.[81] Crypto models often quickly bypass the stages of "too small to care" and "too large to ignore" and enter the stage of "too big to fail".

In particular we are concerned with the crypto industry's spill-over effects into traditional finance. One regulatory response is to ring-fence cryptoassets and insulate crypto from traditional finance, and vice versa. For preventative measures, regulators will require information on counterparties, exposures and interconnectivity both across the crypto industry, and with traditional finance.

2. Market efficiency and transparency

Beyond stability, financial regulation focuses on promoting market functioning, transparency and efficiency.[82] Market efficiency seeks a semi-strong form of informationally efficient markets, that is markets in which prices reflect all publicly available information.[83]

Market efficiency is a concern for crypto for three reasons. First, information is available in a non-structured, unorganized manner, made available through various private and unregulated channels. Professional and retail investors are thus unable to properly evaluate investment opportunities and related risks. Second, a combination of erratic disclosure and unregulated, non-standardized, information streams as well as opaque and complex intermediary structures, cause unclear information and transaction costs while liquidity in most crypto assets is limited. With some notable exceptions for some large volume cryptoassets like ETH, arbitrage is thus unable to push asset prices towards the "right price" using publicly available information.

Third, crypto is characterized by non-financial information about the IT architecture, systems design and stability, which are often central to project evaluation. While white papers and project descriptions usually show some features of the IT design, few crypto customers fully

---

79 Douglas W. Arner et al., *Sustainability, FinTech and Financial Inclusion* 21 EUR. BUS. ORG. L. REV. 7 (2020).

80 Franklin Allen & Xian Gu, *The Interplay between Regulations and Financial Stability* 53:2 J. FIN SER. RES. 233 (2018).

81 Michael L. Katz & Carl Shapiro, *Network Externalities, Competition, and Compatibility* 75:3 AM. ECON. REV. 424 (1985).

82 AUSTRALIAN GOVERNMENT DEPARTMENT OF THE TREASURY, APPROACHES TO FINANCIAL REGULATION (Nov. 1, 1996), <https://treasury.gov.au/sites/default/files/2019-03/p1996-fsi-dp-07-chapt04.pdf>.

83 Eugene F. Fama, *Efficient Capital Markets: A Review Of Theory and Empirical Work* 25:2 J. FIN 383 (1970).

understand *both* the technical side of crypto and their financial implications, to understand and manage the risks. Developers, and in the case of SICIs, the crypto conglomerate developing and operating the system have significant informational advantages.

As the principal traditional tool to further market efficiency,[84] disclosure should be adopted and supported by standardization of crypto protocols and transparency on crypto asset supply and demand. Crypto disclosure could focus on the standardization of information disclosure requirements and information quality assurance mechanisms. These include accounting and auditing standards, technical details of projects, supply and demand in markets and assets, as well as valuation methods and algorithms. Further, microprudential regulation enhancing crypto intermediaries' operational safety and soundness would reduce fraud and theft, and promote trust while reducing the need for costly self-protective measures.

3. Customer, depositor and investor protection

The third central objective of financial regulation focuses on customer, investor and client protection.[85] This focuses on less informed but sometimes overly enthusiastic market participants that lack the means to protect themselves. It also seeks to maximize rational behaviour while recognizing that rationality is often not the dominant characteristic of human behaviour. Consumer protection also forms a part of the client and investor protection rationale. Despite the expectations of crypto consumers, the secret or hidden centralization and monopolization of market segments run contrary to DeFi principles.

Investor protection includes disclosure to enable informed decisions (as discussed vis-a-vis market functioning and efficiency), enforcement to address misconduct, and prudential mechanisms to reduce losses from intermediary or infrastructure failures while allowing exit to support market discipline (thus reinforcing financial stability regulation).

Like traditional finance, conflicts of interest stemming from the bundled intermediary functions need to be addressed. Unbundling and separation of functions and information barriers are of particular importance.

4. Fairness and market integrity

Fairness and market integrity focus on preventing both criminal use of the financial system and fraud and misconduct. Market integrity mainly focuses on issues relating to various forms of sanctions, money laundering and terrorist financing. Market fairness mainly focuses on criminal behaviour and financial misconduct, including insider trading and market manipulation, thus relating also to customer protection.

The crypto winter provides touches upon both dimensions of market fairness and integrity.

With market fairness, some report that FTX's fund Almeda traded primarily in FTX's main crypto-asset, equivalent to trading in a regulated entity's own security. Similarly, Binance publicly cast doubt on the financial reliability of FTX, their most serious competitor. Such a

---

84 Charles R. Korsmo, *The Audience for Corporate Disclosure*, 102:4 IOWA L. REV. 1581 (2017).

85 CHARLES GOODHART ET AL., *The rationale for regulation* in FINANCIAL REGULATION: WHY, HOW AND WHERE NOW? 1 (1998).

statement would enliven market abuse and market manipulation legislation in the regulated finance industry.

Additionally, some crypto intermediaries are seemingly not following AML/CTF requirements, accepting funds without KYC checks. There are two possible explanations for this. First, some intermediaries operate from jurisdictions where they are beyond the scope, or there is no enforcement, of AML/CTF legislation. Second, where there are enforced crypto AML/CTF rules, some intermediaries characterise their services to circumvent existing rules. For instance, they may characterize cryptoassets as utility assets where only investment and payment cryptoassets are subject to regulation.[86]

5. Growth, inclusion and sustainable development

While economic growth features strongly in financial regulation and regulatory policy, recently many other aspects have been added including innovation, inclusion and sustainable development.[87] Innovation, development and inclusion objectives have provided the strongest support for taking a permissive approach to crypto regulation.[88] While current views are increasingly sceptical about the technology potential, we think it important to highlight its great success in supporting fundraising efforts.[89] Further, an increasing range of successful applications are emerging in the context of traditional finance.[90] However, this reinforces our financialization argument and its implications necessitating appropriate regulation to support market development.

Additionally, some systems' designs raise energy issues.[91] Some crypto models waste energy and are exclusive, while others are highly energy efficient and inclusive, providing access to customers with low degrees of financial and technical literacy. For instance, developers claim that the Ethereum Merge, a major software upgrade to the Ethereum blockchain in September 2023, will reduce the Ethereum blockchain's energy usage by 99.95 percent. Moreover, another upgrade dubbed "the Surge" will reduce costs, enhance speed and system stability.[92]

While these upgrades show the potential of technological innovation, the absence of similar upgrades to the Bitcoin blockchain is deeply regrettable, as it is estimated it uses as much

86 Dirk A Zetzsche et al., *supra* note 67.

87 Douglas Arner et al., *Digital Finance, Financial Inclusion, and Sustainable Development: Building Better Financial Systems* in FINTECH AND COVID-19 IMPACTS CHALLENGES AND POLICY PRIORITIES FOR ASIA 176 (John Beirne, James Villafuerte, and Bryan Zhang eds., 2022).

88 Christine Moy and Jill Carlson, *Cryptocurrencies can enable financial inclusion. Will you participate?*, WEFORUM (Jun. 9, 2021), https://www.weforum.org/agenda/2021/06/cryptocurrencies-financial-inclusion-help-shape-it.

89 Nareg Essaghoolian, *Initial Coin Offerings: Emerging Technology's Fundraising Innovation*, 66:1 UCLA L. REV. 294 (2019).

90 Bain & Company, *Web3 and Blockchain*, BAIN (Jan. 31, 2023), https://www.bain.com/insights/management-tools-web3-and-blockchain.

91 Johannes Sedlmeir et al., *The Energy Consumption of Blockchain Technology: Beyond Myth*, 62:6 BUS & INFOR. SYS. ENGINEERING J. 599 (2020).

92 Reuters, *Crypto winter end in sight as Ethereum looks to shake the chills- analysts*, REUTERS (Dec. 13, 2022), https://www.reuters.com/markets/currencies/crypto-winter-end-sight-ethereum-looks-shake-chills-analysts-2022-12-12.

energy as the Netherlands, a country with some 18 million people.[93] One reason for this is Bitcoin's lack of a centralized governance mechanism to design and implement upgrades (a necessary feature if one is to follow the principles of DeFi and its aversion to centralized external regulation).

We suggest in the context of DeFi the usefulness of embedding regulatory principles – including sustainability – into system design.

B. Decentralization: "New Risks, New Rules"

While crypto is exposed to traditional financial risks, it is somewhat different to traditional finance, especially in its decentralization of financial functions. For instance, many DeFi systems follow the Bitcoin model where token holding is decentralized.[94] In DeFi exchanges, the liquidity pool is disintermediated: liquidity is generated by multiple users willing to hand over two types of tokens to the pool, in return for a reward. Upon a trading event, the trading algorithm allocates these tokens to the parties.[95] This partial decentralization is seen in many other functions of the DeFi stack, from valuation over crypto lending to crypto staking.[96]

This partial decentralization results in technical and financial complexity and often a cross-border situation, which renders regulation and enforcement a challenge.[97] While many functions are centralized, crypto, as part of DeFi, is often characterized by only *partial* decentralization of functions. Depending on the technology and set-up, there may be cases where many entities must function together to ensure the stack's proper functioning, and also to generally ensure compliance, cybersecurity, asset recovery, and investor protection. For instance, in the example above, several entities must act together to confirm ownership or provide liquidity; without them, neither the holding nor trading of a cryptoasset may take place. Similarly, the cooperation and coordination of several regulators may be required to enforce existing rules.

Partial decentralization has consequences for the design of regulation, as we show in this section using the examples of crypto custody, bundling of governance rights ("crypto staking") crypto lending and derivatives ("crypto stacking"), and finally, insolvency and resolution.

1. Custody in the context of Blockchain

The technical structure of segregation and custody is of particular concern to customer and investor protection. This takes the form of "hot" custody, leveraging omnibus accounts that are permanently online and linked to the distributed ledger from which the ownership in the token

---

93 University of Cambridge, *Cambridge Bitcoin Electricity Consumption Index: Comparisons*, THE CAMBRIDGE CENTRE FOR ALTERNATIVE FINANCE (2023), https://ccaf.io/cbeci/index/comparisons.

94 Fabian Schär, *Decentralized Finance: On Blockchain- and Smart Contract-Based Financial Markets* 103:2 FED. RES. BANK ST. LOUIS REV. 153 (2021).

95 *Id*.

96 V. S. Anoop & Justin Goldston, *Decentralized finance to hybrid finance through blockchain: a case-study of acala and current*, 6 J. BANKING AND FIN TECH. 109 (2022).

97 Francesca Carapella et al., *Decentralized Finance (DeFi): Transformative Potential & Associated Risks*, FEDERAL RESERVE BOARD (2022), https://www.federalreserve.gov/econres/feds/decentralized-finance-defi-transformative-potential-and-associated-risks.htm.

derives. Crypto intermediaries also often store their clients' private keys, the data confirming ownership of the clients' assets. Depending on the technology used, *some* crypto intermediaries represent a single point of failure contrary to the DeFi philosophy; cyberattacks, fraud or malfunctions could result in the public exposure of the private key, or prompt fraudulent transactions from the omnibus account to another one controlled by the attacker or fraudster.[98]

Several other concerns have been reported with custody. For instance, some crypto intermediaries re-used client assets held in custody without consent and proper governance. This is facilitated by a lack of transparency in the crypto ecosystem as to who acts as the contractual party, the liquidity provider, margin agent, and so on. Note that these functions can be provided also by a group of nodes on the stack, rather than the SICI running the ecosystem.

Further, the use of omnibus accounts results in the blending of an intermediary's own and third-party claims in cryptoassets. The industry seems to make little or no use of the tracing feature implicit in blockchain and distributed ledgers' endless chain of transactions. This happens at a time when the private law on competing claims stemming from re-use of assets is unsettled, to say the least, rendering any true assessment of who holds an asset in bankruptcy and fraud cases very difficult.

2. *Crypto staking*

Crypto staking is the bundling of governance rights to influence the outcome of the voting mechanism. For instance, users may "lend" their tokens or the governance rights attached to them, to other users, for a fee or altruistic motives.[99] Governance rights therefore remain decentralized in form, but not in function. A person, or group of persons, becomes a dominant stakeholder, contrary to the disclosed functioning of the ecosystem.

The situation is not unlike what was debated at length in the context of "vote buying" and "empty voting" in corporate law, yet without the mitigating effects of disclosure rules, corporate law-based collective redress, and in some countries fiduciary duties of large shareholders and "group law" (*Konzernrecht*).

Such staking practices have often been the focus of high returns, drawing customers who perceived the risks to be low. However, a lack of segregation and custody has instead often meant that – rather than a safe high-return investment (always a warning signal), investors were taking on high levels of risk via the providing crypto intermediary.[100]

3. *Crypto stacking*

Some DeFi ecosystems are connected to other ecosystems, both technically and financially. For instance, cryptoderivatives drawing on a basket of derivatives could connect multiple

---

98 Efpraxia Zamani, Ying He & Matthew Phillips, *On the Security Risks of the Blockchain*, 60:6 J. COMPUTER INFO. SYS. 495 (2020).

99 *See*, *e.g.*, Mildred Chidinma Okoye & Jeremy Clark, *Toward Cryptocurrency Lending* in FINANCIAL CRYPTOGRAPHY AND DATA SECURITY 367–380 (Aviv Zohar et al. eds., 2019). *See also* Hakwan Lau & Stephen Tse, *Decentralized Basic Income: Creating Wealth with On-Chain Staking and Fixed-Rate Protocols*, CORNELL UNIVERSITY (13 August 2021), https://arxiv.org/pdf/2107.14312.pdf.

100 *See*, *e.g.*, Adam J. Levitin, *Not Your Keys, Not Your Coins: Unpriced Credit Risk in Cryptocurrency*, 101 TEX. L. REV. (2022), https://ssrn.com/abstract=4107019, http://dx.doi.org/10.2139/ssrn.4107019.

ecosystems financially, or one token type can integrate another token type in its algorithm, thus embedding the other token technically.[101]

Besides systemic risk concerns, this practice creates a type of leverage through contracts whose settlement is deferred (as in derivatives), and crypto lending arrangements, with cryptoassets as underlying or margin. We do not see why crypto derivatives are less risky for consumers than financial derivatives. Quite the opposite, given the often-missing regulation and absence of disclosure obligations around interconnections and exposures. While this is a dimension of traditional financial risk, the new dimension is the technical interlinkage which may trigger, and has triggered, operational malfunctions and system shut-downs.[102]

4. Insolvency and resolution

Partial decentralization poses difficulties in arranging business continuity in insolvency, as financial incentives to maintain the systems vanishes, while several entities must act together to maintain a systems' operation. For instance, where code maintenance requires the upload of an update on many nodes, an update is impossible where nodes stop operating as insolvency looms. Similarly, users will provide less liquidity, and developers will invest less in cyber defense in times where it becomes likely that their investments (in terms of time and intellectual capacity) will be lost. How to incentivise and integrate these many actors in insolvency, resolution and restructuring proceedings will require new regulatory approaches.[103]

C. Designing Crypto Regulation

Both when crypto is akin to traditional finance, and when it poses new risks stemming from decentralisation, our earlier dictum applies that, "rather than eliminating the need for regulation, in fact DeFi requires regulation in order to achieve its core objective of decentralization".[104] Further, the current absence of proper regulation presents a real opportunity to reconceptualize regulation in the future. Our benchmark should not be what has worked well for traditional finance. The goal is suitable (and *in some respects* entirely novel) regulation for an immature industry that is technologically unlike what has gone before but which in many cases nonetheless exhibits similar market failures and externalities.

In the remainder of this section, we set out some relatively straightforward (in terms of implementation) regulatory approaches to the financialization of crypto, derived from an application of the main market failures and externalities characteristic of traditional finance that we set out in previous parts. These approaches seek to appropriately address the range of issues caused by the financialization of crypto.

---

101 *See* generally BLOCKCHAIN ECONOMICS AND FINANCIAL MARKET INNOVATION: FINANCIAL INNOVATIONS IN THE DIGITAL AGE (Umit Hacioglu ed., 2019).

102 For a more complete explanation *see* Ryan Surujnath, *Off The Chain! A Guide to Blockchain Derivatives Markets and the Implications on Systemic Risk*, 22:2 FORDHAM J. CORP. & FIN L. 256–304 (2017).

103 *See*, *e.g.*, Janis Sarra & Louise Gullifer, *Crypto-claimants and Bitcoin Bankruptcy: Challenges for Recognition and Realization* 28:2 INT'L INSOLVENCY REV. 233–272 (2019). *See also* Renato Mangano, *The insolvency of cryptocurrency exchanges: Lessons from the BitGrail case - reification of coins, pari passu ranking, and nominalism*, 35:1 BANKING & FIN L. REV. 197-204 (2019); Jonathan Sears & Julian Ng, *Bit by Bit - the Future Direction of English Insolvency Law and Cryptocurrency*, 15:2 CORP. RESCUE & INSOLVENCY 53–55 (2022).

104 Zetzsche, Buckley & Arner, *supra* note 28 at 172.

1. Licensing, conduct of business, prudential regulation and supervision

A core requirement in our view for the future successful evolution of the crypto ecosystem is licensing, that is crypto services should be prohibited unless properly licensed. Several legal requirements attach to licensing: the definition and delineation of the services provided, proper organization and adequate and sufficient human and IT resources, fit and proper management, adequate conduct of business, and prudential regulatory rules (i.e. the maintenance of adequate capital and liquidity).[105]

With such licensing comes clear regulatory treatment and differentiation of services provided. For instance, the use of the term "exchange" should be reserved to entities that bring together third parties' supply and demand in crypto assets in an appropriately designed and managed environment, while broker-dealers, market makers, banks and asset managers should all be subject to tailored requirements.

When drafting licensing rules, regulators will have to define crypto-related services and activities. In the absence of a very clear or comprehensive regulatory approach, legal uncertainty will prevail and some crypto intermediaries may either remain, or seek to stay, outside of the scope of regulation. Uncertainty as to whether certain crypto conduct is within the regulatory perimeter will result in under-enforcement, as all enforcement bodies are resource-constrained. Legal certainty is paramount to ensure proper enforcement.[106]

Implementing a default rule would be the straight-forward solution. For instance, defining all crypto services as being within the scope of securities regulation (so that securities regulation always applies)[107] *unless* exempted by financial supervisory authorities following an application from the respective crypto intermediary in which the intermediary establishes the case for regulatory treatment as a payments token (following payments and/or banking regulation as appropriate) or a utility token (for which legislators may or may not implement bespoke regulation).[108] A default rule shifts the burden of activity and information gathering from the authorities (where it currently rests) to the crypto intermediaries. It also entitles financial supervisory authorities to order crypto firms to provide information to them. The outcome of such a default rule may, however, be proportional: while the crypto intermediaries must register and ensure proper disclosure to regulators of the categorisation of their offering as a precondition for selling crypto products, regulation may be designed to ensure that the issue itself is not automatically subject to licensing. Further, given that existing AML/CTF rules apply to all transactions involving securities, the default rule proposed herein ensures full compliance with such rules.

---

105 *See* Saule T. Omarova, *Dealing with Disruption: Emerging Approaches to Fintech Regulation*, 61 WASH. J.L. & POL'Y 25 (2020). For a contrary view, *see* Hossein Nabilou, *The dark side of licensing cryptocurrency exchanges as payment institutions*, 14:1 L. & FIN MKTS REV. 39-47 (2020).

106 *See* generally Joseph Lee & Florian L'heureux, *A Regulatory Framework for Cryptocurrency*, 31:3 Eur. Bus. L. Rev. 423 (2020). *See also* Tina van der Linden & Tina Shirazi, *Markets in Crypto-Assets Regulation: Does It Provide Legal Certainty and Increase Adoption of Crypto-Assets*, 9:1 FIN INNOVATION 9 (2023).

107 With securities we include securities under US securities regulation. For Europe, the term, "transferable securities" leads to the same result.

108 *See*, *e.g.*, Carol Goforth, *U.S. Law: Crypto Is Money, Property, A Commodity, And A Security, All At The Same Time*, 49 J. FIN TRANSFORMATION 102-109 (2019).

We acknowledge that this solution is rather simplistic. Deeming a crypto asset a "security" will not magically transport the crypto asset into a regime "ready built to provide proper or even efficient oversight or clarity", but instead may create "both a lack of clarity and inefficiency in compliance" – since securities regulation generally fails to account for critical aspects of the crypto asset ecosystem and may impose obligations with little to no relevance for crypto assets.[109] Nevertheless we suggest that this situation is preferable to the current converse situation where most crypto conglomerate businesses remain unregulated. Furthermore, exemptive powers granted to securities regulators in their dealings with crypto can rectify these inefficiencies.

2. Disclosure and transparency

Central to financial market functioning is information. This is the core of the efficient markets hypothesis and of much financial regulation. With crypto, mandatory disclosure has so far received insufficient attention from both market participants and regulators.[110]

First, we see a need to provide financial information analogous to that which securities regulation entails. We would require from issuers initial documentation (such as a prospectus), and ongoing information through semi-annual and annual reports and material adverse change releases. Blockchain may be a much better system to do this and may – with appropriate design – provide to regulators real-time information.[111] This requires appropriate and consistent information and disclosure which is not yet required by regulation nor built into existing systems into blockchain environments by way of embedded regulation and supervision.

Second, certain intermediaries would need to provide information. Licensed crypto exchanges will have to provide pre and post trade information as well as comply with best execution duties. Furthermore, crypto intermediaries will need to provide information about group structure and activities so that counterparties can evaluate and understand risks. Coinbase, as a listed company, provides a most useful counterpoint in this regard to FTX.[112]

Beyond these disclosure rules that are part of the standard repertoire of regulators, we suggest issuers and crypto intermediaries should have to disclose the operational structure of the service and IT environment in which the cryptoasset is issued and traded. This would include explaining which functions are centralized and which decentralized. Some regulators have introduced obligations to submit a Programme of Operations that explain the systems

---

109 Written Testimony, Chris Brummer, *Written testimony before the US House of Representatives, Agricultural Committee, Subcommittee on Commodity Exchanges, Energy, and Credit The Future of Digital Asset Regulation* at 2 (Jun. 23, 2022), https://agriculture.house.gov/uploadedfiles/brummer_congressional_testimonythe_future_of_digital_asset_regulation.pdf.

110 *See*, *e.g.*, Jun Heng Chou, Prerana Agrawal & Jacqueline Birt, *Accounting for crypto-assets: stakeholders' perceptions*, 39:3 STUD. ECON. & FIN 471-489 (2022).

111 D.W. Arner, J. Barberis & R.P. Buckley, *FinTech, RegTech, and the Reconceptualization of Financial Regulation* 37 NW. J. INT'L L. & BUS. 371 (2017).

112 Coinbase has a reasonably sophisticated "Investor Relations" website - *see Investor Relations*, COINBASE, https://investor.coinbase.com/home/default.aspx. Additionally much other information is available from the NASDAQ stock exchange - *see Coinbase Global*, NASDAQ, https://www.nasdaq.com/market-activity/stocks/coin>, and from stockbrokers etc.

architecture and ensure systems resilience.[113] Such an approach should be adequate given the unique features and architecture of many cryptoassets. It would also outline how decentralised functions would be maintained in times of insolvency. In this respect, we recommend IOSCO (the International Organisation of Securities Commissions) develops a uniform standard format for these operational details, to facilitate comparison of the information disclosed.

3. Segregation and custody

To ensure safekeeping of assets, we recommend the separation of custody from other intermediary activities (such as exchange, brokerage, market making and proprietary trading, i.e. trading on one's account) plus requirements for segregation of individual accounts, and subjecting crypto custody to licensing. As part of such a licensing scheme we would suggest clarity around the fiduciary duties of crypto custodians.[114] This may involve, on the one hand, a definition of what custody entails in this context, for instance the retention and administration of a private key. On the other hand, such regulation may ensure that assets, without the owner's consent, may neither be lent, traded or used as security in transactions on the intermediary's account. Any crypto-asset lending for the benefit of investors should be properly documented, earmarked, traced across the blockchain, and monitored by the crypto custodian, while counterparty risks during the transactions should be properly managed by way of required margins and the like.

Again, a default rule bringing crypto within the scope of securities regulation may well simplify matters, as custody of securities and segregation of accounts are already addressed within securities regimes.

Specifically with crypto, regulators should consider the additional technical complexity and exposure in multiple DeFi stacks in which cryptoassets are referenced or otherwise tied to other cryptoassets. This justifies additional requirements around technical and cyber resilience. We would propose additional description of custody practices in the Business Plan (see supra, Part IV.C.2.) and rules that reduce, as far as possible, "hot wallet" transactions and that mandate storage of disaggregated amounts of assets (the equivalent to omnibus accounts) in cold wallets.

The crypto industry has already taken the initiative in the last few years to initiate "Proof of Reserves (PoR)" protocols.[115] In this regard, the general idea is that a crypto exchange or other crypto project or intermediary subject its reserves to audit at regular intervals. We suggest licensed crypto exchanges and projects make their PoR public (and in real time). Then the

---

113 *See* Dirk A. Zetzsche, Linn Anker-Sørensen, Maria Lucia Passador & Andreas Wehrli, *DLT-based enhancement of cross-border payment efficiency – a legal and regulatory perspective*, 15:1-2 L. & FIN MKTS REV. 70 at 103-108 (2021), DOI: 10.1080/17521440.2022.2065809; Dirk A. Zetzsche & Jannik Woxholth, *The DLT sandbox under the Pilot-Regulation*, 17:2 CAP. MKTS L.J. 212–236 (2022), https://doi.org/10.1093/cmlj/kmac003 (citing the EU DLT Pilot Regulation).

114 *See*, *e.g.*, Geoffrey Cone, Nicholas S. Bjorklund & Gregory C. Dyekman, *Digital assets and property rights in insolvency*, 27:5 TR. & TRUSTEES 406 (2021). *See also* MATTEO SOLINAS, *'Trustless' distributed ledgers and custodial services* in ROUTLEDGE HANDBOOK OF FINANCIAL TECHNOLOGY AND LAW (Iris Chiu & Gudula Deipenbrock eds., 2021); Matthias Haentjens, Tycho De Graaf & Ilya Kokorin, *The Failed Hopes of Disintermediation: Crypto-Custodian Insolvency, Legal Risks and Howto Avoid Them*, 2 Singapore J. Legal Stud. 526 (2020).

115 *See* Mark Maurer, *More Crypto Exchanges Verify Reserves, But Questions About Assets Remain*, WALL STREET JOURNAL (Dec. 5, 2022), https://www.wsj.com/articles/more-crypto-exchanges-verify-reserves-but-questions-about-assets-remain-11670153687.

regulators (and the public) can access and potentially audit the PoR statement as needed. Notwithstanding that it will be very difficult for most of the general public to perform the blockchain analytics required to audit the PoR, nevertheless, the fact that some users (and especially regulators) can do this (if they want to) should go a significant way to ensuring that the client funds held by a crypto exchange or project are stored safely and segregated properly.[116]

4. Fraud, market abuse and insider trading

To ensure market fairness and investor protection, regulators must implement and enforce effective rules against market abuses and insider trading.[117] If possible, these rules will need to be coordinated globally through cooperation mechanisms such as the IOSCO Multilateral Memorandum of Understanding, which could be extended explicitly to cover crypto.[118]

Core to market abuse regulations will be the definition of what constitutes market abuse. Again, securities regulation will provide important lessons and illuminative examples. Thus, our proposal – that securities regulation apply to crypto as a default rule – will avoid the need for bespoke regulation and often simply mimic existing securities regulation. Furthermore, to the extent of any divergence between securities regulation and crypto regulation bespoke regulation of crypto will encourage regulatory arbitrage because virtually all securities can be tokenized to bring them within a bespoke crypto regulatory regime if any advantages flow from doing so.

5. Restructuring and resolution legislation

At the height of the crypto collapses private market participant often shunned measures to preserve assets. While the reasons Binance did not provide liquidity to FTX when it was needed may be many, any resolution would have faced quite profound and likely disabling legal uncertainty, considering the uncertain qualification of crypto assets in insolvency. This uncertainty relates to very basic questions, for instance whether proprietary rights are assigned to crypto asset holders in insolvency and if so which ones and under which circumstances.[119]

While financial regulation alone cannot solve every legal issue surrounding crypto assets, resolution legislation would facilitate a clear line between an insolvent intermediary's assets subject to bankruptcy, and those that remain out of scope. Such a clear perimeter for assets subject to bankruptcy proceedings will be particularly crucial to a crypto insolvency or resolution, where IT systems in the DeFi stack are often proprietary and non-standardised, and

---

116 *See also* the letter from Adrienne A. Harris, Superintendent of Financial Services to Entities Licensed Under 23 NYCRR Part 200 or Chartered as Limited Purpose Trust Companies Under the New York Banking Law That Custody Virtual Currency Assets, *RE: Guidance on Custodial Structures for Customer Protection in the Event of Insolvency*, (Jan. 23, 2023), https://www.dfs.ny.gov/industry_guidance/industry_letters/il20230123_guidance_custodial_structures.

117 *See* generally EDWARD J. SWAN & JOHN VIRGO, MARKET ABUSE REGULATION (2019). *See also* ESTER HERLIN-KARNELL & NICHOLAS RYDER, MARKET MANIPULATION AND INSIDER TRADING: REGULATORY CHALLENGES IN THE UNITED STATES OF AMERICA, THE EUROPEAN UNION AND THE UNITED KINGDOM (2019).

118 Memorandum, International Organization of Securities Commissions (IOSCO), *Multilateral Memorandum of Understanding Concerning Consultation and Cooperation and the Exchange of Information (MMoU)*, IOSCO (2020).

119 *See* Woxholth, Zetzsche, Buckley & Arner, *Competing Claims to Cryptoassets*, (forthcoming).

depend on the interaction of many different actors. If the dissolution of the crypto system seems likely, these actors will become distinctly uninterested in the maintenance and defence against cyberattacks of the DeFi stack; which in turn will quickly erode any ability to restructure the crypto environment in times of stress. Resolution legislation is crucial to provide system continuity and incentivize the many (decentralized) support functions that characterize crypto ecosystems.

If incentives to continue operations in the event of a crisis are implemented, there should (theoretically and practically) be little need for a LoLR in *fully decentralized settings*. Furthermore, when a SICI has a dominant position within an ecosystem, as is typically the case, we do not recommend establishing a crypto LoLR due to the conflicts and moral hazards inherent in an LoLR in these markets.[120] Where ultimately necessary and warranted for the financial system or one of its segments, central banks will likely have the means to inject liquidity by regulated stablecoins, synthetic CBDCs, wholesale central bank digital currencies (CBDCs) or otherwise.

6. Crossborder harmonization and coordinated enforcement

We have shown elsewhere that the decentralization of functions across borders further disincentives compliance.[121] To address this, regulators need to engage in close cross-border cooperation and coordination. This requires, first and foremost, the inclusion of crypto assets in existing MoUs, particularly the IOSCO MMoU. Again, the easiest solution would be to widen the scope of existing MoUs among securities regulators worldwide, with the IOSCO MMoU providing the most important mechanism. Second, we recommend expanding existing MoUs including the IOSCO MMoU to address the partial decentralization of functions that we have laid out as characteristic of crypto. Asset segregation, safekeeping, crypto staking and stacking, and in particular cross-border restructuring and administration in bankruptcy with related asset recoveries, may all require the joint action of several regulators across jurisdictions.

Industry associations may facilitate information flows in certain instances,[122] but where externalities are concerned, regulators are best equipped to pursue the public interest and act to provide requirements relating to public goods and externalities.

Crypto provides a suitable case for a global oversight coordination body. Yet, the organizational complexity of a global regulator starting with the question of where the body will be located, financed and equipped, how it will be able to enforce decisions, and to what extent it can override local decisions, will combine to make the establishment of any global oversight body a significant challenge. We encourage the regulatory coordinators of traditional finance, such as the FSB, BIS and IOSCO, to expand their expertise in, and reach out to embrace, the field of crypto. As we have shown throughout this paper, crypto regulation will benefit greatly from insights drawn from the regulation of traditional finance.

120 While crypto intermediaries may play important roles in future restructuring (as JP Morgan did when Bear Stearns experienced difficutlies), the FTX-Binance example has shown that crypto intermediaries have their own interests and thus are not trustworthy LoLRs.

121 Dirk A. Zetzsche, Douglas W. Arner & Ross P. Buckley, *Decentralized Finance* 6:2 J. FIN REG. 172 (2020).

122 Such as the Crypto Market Integrity Coalition, *see* CMIC, <https://www.cmic.global>.

V. Conclusion

Crypto claimed many advantages which, with hindsight, have proven inaccurate. Many of the challenges revealed during the crypto winter are well-known in traditional finance. These include agency risks, conflicts of interests, lack of transparency, counterparty risks, operational risks, and the way individual crypto intermediaries often dominated trading and market making in certain cryptoassets. For these issues, we have good reason to apply the principle "same function, same risks, same rules".

In some respects, however, crypto's special features require bespoke regulation. The most important idiosyncrasy of crypto is its *partial* decentralization that requires many entities, rather than just one, to work together to deliver compliance, cybersecurity, asset recovery, and investor protection. Partial decentralization poses difficulties in ensuring business continuity in the event of insolvency, as with insolvency the financial incentives to maintain the system vanish. To address this consequence of partial decentralization we have recommended a combination of licensing and mandatory disclosure of details of the IT architecture and business continuity arrangements in a Business Plan approach. We also welcome the initiative from the crypto industry regarding "Proof of Reserves", although we feel this approach should go further and the information be available publicly and in real-time.

Due to its partially decentralized functions, crypto is, from a technical and financial perspective, complex. It requires additional expertise from intermediaries, gatekeepers including lawyers and auditors, and regulators. We have argued that the fit and proper test of most licensing regimes and the transparency ensured by a business plan approach in addition to standardized disclosure requirements are proper measures to enable market participants and regulators to understand this additional complexity.

Finally, partial decentralization often results in a cross-border situation that renders enforcement difficult and costly. Addressing this requires clear rules with crypto at the centre of their scope (e.g. a default rule that treats all cryptoassets as falling under securities regulation) and coordinated cross-border regulatory action facilitated by G20, BIS, IOSCO, FSB, IMF and Financial Action Taskforce (FATF) cooperation frameworks. A well-coordinated cross-border approach to regulation can also assist enforcement.

If regulators address in their forthcoming regulation the features of traditional finance that are apparent in crypto and develop adequate responses to its special features, crypto may well have a future as a regulated and supervised financial industry. At the same time, due to the continual rapid innovation in the markets and the difficulties of regulating decentralized algorithmic-based trading, lending and investment based somewhere in the cloud, ensuring proper crypto governance will remain a challenge. This makes the cross-border coordination proposed in this paper even more important, as it allows regulators to share knowledge regarding new practices and problems, and should enhance regulatory learning globally.