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Abstract

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

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I. Introduction

The year 2022 was an *annus horribilis* for the crypto ecosystem even before the collapse of the FTX group.[1] In just 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 to seek 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 here that crypto – despite its intention and underlying technological design as decentralized finance[5] – has in less than 15 years evolved to display all of the classic market

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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 (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

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failures and externalities that characterize traditional finance. Together with the widespread duplication of traditional financial products and services in the crypto ecosystem, we call this evolutionary process the "financialization" of crypto. Where the underlying 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 going forward, requires regulatory and supervisory systems designed to address its market failures and externalities. Similar risks and activities require similar regulatory approaches to support proper market functioning and reduce regulatory arbitrage.

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

The same question – the future of crypto– 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 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 the Payment Services Act became law in January 2020, is again tightening its regulations.[9] Hong Kong will also implement a comprehensive licensing system for crypto intermediaries: those who wish to do business in the territory will need to apply to Hong Kong's Securities and Futures Commission for a license (with the next phase expected to be from 1 March 2023).[10]

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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.

10 *See*, *e.g.*, *Hong Kong Licensing Regime for Virtual Asset Exchanges to Take Effect on 1 March 2023*,

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In the EU, the new EU Market in Crypto-assets Regulation (MiCA) was agreed upon in October 2022 and is predicted to come into force in 2024.[11] MiCA introduces a licensing scheme for crypto intermediaries, prospectus rules, anti-market abuse and insider trading rules and bespoke legislation for stablecoins. The UK government is planning to implement new regulations soon and released a consultation paper in February 2023.[12] In the US, although there are not yet specific cryptocurrency regulations, President Biden signalled that the US government is planning to do so by an executive order on 9 March 2022,[13] and by releasing an actual *framework* on regulating crypto on 17 September 2022.[14] Until now crypto has been *regulated* in the US via a mix of different regulatory bodies (chiefly the Securities and Exchange Commission [SEC] and Commodities Futures Trading Commission [CFTC]), which largely employ a process commonly characterized as "regulation by enforcement".[15] For example, the SEC launch series of investigations into various aspects of crypto, which most recently included 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 that collectively are referred to today as the Crypto Winter of 2022-23,[17] and put these into context along with the earlier crises including Mt. Gox in 2014 and the ICO bubble of 2017-2019.

We argue in Part III 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

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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).

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Intermediaries (SICIs) that, contrary to the philosophy of decentralized finance (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 the background of financialization and the evolution of SICIs, we present a macro perspective on the crypto industry and argue that crypto, despite its promising and potentially transformative underlying technology, is *neither immune nor special* with regard to 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. It is ironic that any assessment of the major crypto "exchanges"[19] – a term we strongly argue should only be used for firms that are appropriately licensed and operating according to well-recognised principles and requirements appropriate for the designation – suggests the crypto industry, rather than being decentralized, is perhaps even more centralized in some aspects than traditional financial markets. At the core of these new centralised financial systems stand a number of non-transparent crypto intermediaries and crypto conglomerates, not dissimilar to those which have often proven problematic in the history of traditional finance.

Part IV distinguishes between risks where crypto exhibits features of traditional finance, and those where idiosyncrasies justify bespoke regulation. We then go on to propose a set of regulatory solutions to address the financialization of crypto: (1) licensing and supervision of related conduct of business 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

In this part, we consider the events of the Crypto Winter (of which the failure of FTX was the most prominent) and highlight how they reflect the emergence of similar market failures and externalities to those which characterize traditional finance.[20] We characterize this as the "financialization" of crypto: as crypto has become functionally more and more like traditional finance, it has also displayed the same sorts of market failures and externalities which characterize finance and necessitate regulation.[21] In particular, we highlight analogies between

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[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-

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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] At the beginning of 2022, FTX was one of the world's largest so-called cryptocurrency intermediaries, labelling itself an "exchange" but in fact being a complex conglomerate, having grown exponentially from USD 90 million in revenue in 2020 to over USD 1 billion in revenue in 2021[23] – an 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 and ranked high in rankings of transaction volumes.[26]

1. FTX as Liquidity Crisis

In many ways, the FTX failure was a classic liquidity crisis that turned into a solvency crisis, similar to 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 industry 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?

This has led, again similarly to 2008, 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 stepping in with 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).

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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) 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).

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Despite FTX's efforts to secure a solution in the form of emergency liquidity or otherwise maintaining the trust and confidence of other market participants (including by reaching out to Binance for emergency assistance),[27] ultimately it was unable to secure additional funds and 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]

In fact, 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 to FTT, FTX's main crypto token.[29] That announcement was made *after* Binance had *sold* about USD 500 million in FTT, the tokens issued by FTX, thereby frontrunning the liquidity crisis and preserving its own balance sheet from the hit that the very announcement imposed on other crypto investors that could only sell *after* the announcement had undermined trust in FTX and caused a liquidity crisis in FTT and eventually FTX.[30] Binance's role in all this 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 made any restructuring effort by third parties impossible. In short, Binance appears to have helped expedite the failure of one of its most ambitious competitors.

3. Regulation vs Technology: The Roots of Trust

In traditional finance, the origin of liquidity crises is rarely a regulated entity's public declaration of mistrust in another – as in the case of FTX – because market abuse regulations prevent such behavior; and when liquidity crises occur the remedy is provision of liquidity from an external source. As liquidity providers we have seen other market participants (such as JP Morgan in the examples above) or – in some circumstances – a central bank or government (as in 2008, 2020 and many other financial crises, with the classic framework dating to Bagehot at the end of the 19th century). The consequence of being unable to source liquidity for FTX was the same as in traditional finance: insolvency as a result of being unable to meet customer / creditor / investor calls when they become due.

With crypto, this market trust and confidence was meant to flow from the underlying technology, as opposed to regulation and supervision. Cryptocurrencies have their roots in decentralized peer-to-peer money exchange which is 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, it is clear to see that any workable reform agenda for

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[27] *Id*.

[28] Arner, Zetzsche and Buckley in 2018 identified that decentralized may well 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 **Error! Bookmark not defined.**.

[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.

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the crypto industry will need to balance the original decentralized design with the current, urgent need for centralized market protection.

In traditional finance, liquidity and solvency crises bring firm and customer specific consequences and risks of negative externalities like contagion and systemic crises and failures. Yet, as we will argue, crypto lacked both the *preventative* measures (in particular, risk management and market abuse rules, and more broadly, 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 that are characteristic for traditional finance (in many cases implemented in the wake of the 2008 crisis) and would facilitate appropriate 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 was in fact a solvency crisis. The answer to this question, particularly when we consider the accusations of fraud, potentially makes this an *Enron moment* for the crypto industry, rather than a *Lehman moment* (or a *Minsky moment)*, and really hinges on the structure of the FTX group.[31] Indeed, according to US corporate restructuring expert and attorney John Ray III, who was installed as the new CEO of FTX to organize the bankruptcy and attempt to reclaim some of the assets, FTX is a bigger mess than was Enron.[32]

The FTX group basically comprised four main elements. First there was the exchange, an entity licensed in the United States which focused on US customers and was the second-largest US crypto exchange prior to the collapse of the group. Second, there was the global "exchange", which was really an intermediary, a sort of trading venue, market maker and broker-dealer for cryptocurrency trading. Third, there was what was essentially a trading fund called Alameda, and finally, a variety of venture capital investments.[33] The global exchange had moved its headquarters from Hong Kong to the Bahamas in September 2021 and was registered with the Securities Commission of the Bahamas in accordance with the Bahamas Digital Assets and Registered Exchanges Act 2020.[34]

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[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] Dominic Rushe, *New FTX boss, who worked on Enron bankruptcy, condemns 'unprecedented failure'*, THE GUARDIAN (Nov. 17, 2022), https://www.theguardian.com/technology/2022/nov/17/ftx-enron-crypto-collapse-john-ray-unprecedented. *See also* Mark Humphery-Jenner, *Why the collapse of FTX is worse than Enron*, UNSW NEWSROOM (Nov. 25, 2022), https://newsroom.unsw.edu.au/news/business-law/why-collapse-ftx-worse-enron.

[33] *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.

[34] 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*

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As a group, FTX was commonly called an "exchange", yet in many ways it functioned more as a financial conglomerate (like Lehman or Enron) than an exchange that brings together buyers and sellers. The lack of transparency involved has also led to widespread accusations of fraud, which the FTX founder Sam Bankman-Fried (SBF) has denied.[35] SBF was arrested in the Bahamas on 12 December 2022 and – owing to an extradition treaty with the US – was placed in the custody of the US authorities and charged in Federal Court in New York with eight counts of fraud and conspiracy.[36] SBF has now been released on a USD 250 million bail, and faces additional charges from the US SEC for his role in participating in an (alleged) "scheme to conceal material information from FTX investors".[37]

What seems to have happened, as has happened in so many other financial crises, is that the problems arose in the trading arm, in this case Alameda. Apparently, funds, particularly customer funds, were transferred from the cryptocurrency trading venue to Alameda to cover its trading and investment losses.[38] The determination of what precisely happened is being severely hampered by the complete lack of internal controls, proper accounting systems, and even of systems for keeping track of customer accounts. As John Ray III has stated, he has never in his entire career seen "such a complete failure of corporate controls".[39] So, an understanding of what happened is at the time of writing still evolving.[40]

However, what seems clear is that while FTX portrayed itself as an exchange, in reality it was functioning more as a broker-dealer and proprietary trader in assets whose issuance it itself controlled. At the end of the day, when in financial difficulty, reports suggest FTX even lent

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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.

[35] *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.

[36] *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.

[37] *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.

[38] *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.

[39] *Id*.

[40] *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.

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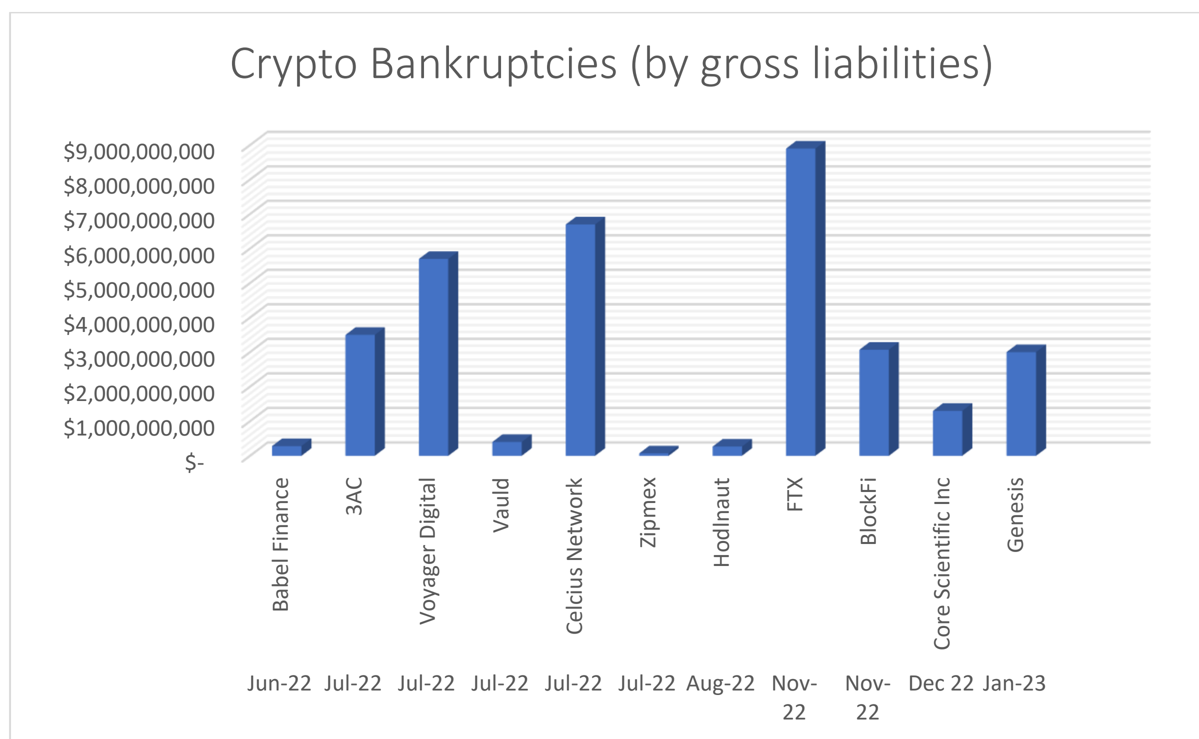
its customers' funds to other parts of its corporate group[41] – behavior utterly different from what one would expect from a *bona fide* exchange, or any regulated entity in traditional finance.

B. Capacity to Steer Financial Firms

A single snowflake does not make a winter, but there were many collapses beyond FTX that 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)[42]



As for trading platforms, Vauld and Zipmex filed for credit protection in July 22, Hodlnaut followed suit in August 2022,43 and FTX and BlockFi filed for bankruptcy in November 2022.44 The crashes of Babel Finance, Celcius Network, BlockFi and Genesis were more of crypto lending firms; although we note that the business models are not clear cut, for instance both Hodlnaut and FTX also ran crypto lending programmes. At the same time, Core Scientific

[41] 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.

[42] Source: Research by ADA Chair in Financial Law (inclusive finance), University of Luxembourg.

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

[44] 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.

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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).

While this shows how widespread is the institutional instability throughout the crypto industry notwithstanding the business models, a closer look confirms that each collapse display the same pattern of significant interconnected centralised crypto intermediaries becoming unstable due to mismanagement, malfeasance, fraud, theft and a general lack of transparency.[45]

1. Stablecoin projects

Prior to its crash 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)).[46] The Terra project collapsed because of its algorithmic design (which relied on a two-coin system). Terra's UST coin was designed to be pegged to the underlying fiat currency via Terra's LUNA token, which was 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).[47]

As Terra grew in size, this algorithmic mechanism simply could not handle the resulting activity 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 returns for staking UST (since UST holders often sold en masse if they feared LUNA would fail).[48] Additionally, it is speculated that the Terra project came under a coordinated attack in order to break the link and thereby profit those on the other side (as had happened with the IronFinance algorithmic stablecoin project in 2021).[49] 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

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[45] *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.

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

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

[48] *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.

[49] *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.

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Three Arrows Capital (3AC), once a highly respected crypto hedge fund, filed for bankruptcy protection on 1 July 2022 (a few days before Voyager and Celsius – see below).[50] 3AC – registered in Singapore – had managed to go from over USD 10 billion in assets to collapse in just a few months. In the aftermath of its failure, the Monetary Authority of Singapore has accused 3AC of exceeding its assets threshold and providing false information.[51] 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).[52] The consequences of losses on its positions spread throughout the ecosystem because it was trading funds primarily borrowed from over 20 other institutions. The problem stemmed from the concentration of risk in one point of failure and the resultant impact on range of other significant market participants, not unlike the situation of LTCM in 1998 in the aftermath of Russia's August default. 3AC's founders Su Zhu and Kyle Davies disappeared soon after the bankruptcy filing and as their whereabouts were unknown they were subpoenaed via Twitter.[53] The two founders of 3AC have resurfaced at the time of writing as founders of Open Exchange, a new crypto investment vehicle, focusing on claims against failed crypto firms.[54]

On its face, the 3AC failure appears to reflect the doubters' 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".[55] But then of course this is also descriptive of many aspects of traditional finance.

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, with losses of some USD 5 billion in customer funds.[56] It has been alleged (in a civil lawsuit) that Celsius was running a

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[50] *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.

[51] *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.

[52] 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.

[53] 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.

[54] 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.

[55] 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.

[56] *See* Wayne Duggan & Farran Powell, *Celsius Crypto Meltdown: A Crypto Lender In Crisis*, FORBES (Oct. 4,

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"Ponzi scheme" by offering depositors rates for staking of up to 17 per cent, and at the same time, loaning these funds out. The lawsuit claims Celsius, "artificially inflated the price of its own digital coin, failed to hedge risk and engaged in activities that amounted to fraud".[57]

Voyager was a crypto lender similar to Celsius (and suffered the same fate). Voyager filed for bankruptcy protection some days earlier on 5 July 2022, being unable to repay (or even account for) customer deposits.[58] Voyager did not keep customer deposits in designated wallets but mixed deposited crypto and then also lent deposits to third parties (like 3AC, and FTX and Alameda) in order 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.[59]

In the same vein, crypto lender Genesis filed for bankruptcy protection in January 2023, a few days after the US SEC had charged it with selling unregistered securities.[60] Genesis operated within a group of companies controlled by Barry Silbert's Digital Currency Group, in which other companies operated various trading businesses (which continue) and had been borrowing from Genesis.[61]

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 the attempted restructuring).[62] This should not happen if crypto is truly decentralized as decentralized finance was designed to avoid the interlinkages of traditional finance.

2022), https://www.forbes.com/advisor/investing/cryptocurrency/what-is-celsius.

57 *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.

58 *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.

59 *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.

60 *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.

61 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.

62 *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.

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

While the former shows to a large extent the lack of capacity of crypto management 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. It is striking that several large scale asset diversions took place in the period of 2022-23, thereby tending to undermine any trust remaining in the institutional stability of DeFi business models in general.

Figure 2: Major DeFi Asset Diversions[63]

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

In some of these instances, private keys were stolen through hacking the wallets of crypto custodians and exchanges while they were online (so called 'Hot Wallet Hacks'),[64] in others the attackers hacked into the governance mechanism and thus acquired the means to control the protocols of the platform (so called 'Governance Hacks') which allowed them to divert

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

[64] 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.

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assets.[65] Several platforms experienced in 2022 the same type of attack as in earlier years, casting doubt on the industry's ability to learn and improve cyber security.

In hindsight, the crypto winter is not exceptional. Over the almost fifteen year history of crypto, elements prevalent in the crypto winter, such as concentration, institutional instability and misconduct, feature prominently.

For instance, when Mt. Gox[66] failed in early 2014, it was dealing with some 70 percent of Bitcoin transactions worldwide. Without a doubt, Mt. Gox was a systemically important intermediary for the Bitcoin ecosystem. And as we observed 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 its doors were open to theft and fraud: in the case of Mt. Gox this came in the form of the now infamous hot wallet hack apparently pursued since 2011. Such a hack being undetected for over three years demonstrates internal deficiencies in accounting and auditing – indeed, 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 was also characteristic of the ICO (Initial Coin Offering) bubble of 2017-19:[67] the common denominator of many crypto projects was (1) the emergence of a crypto ecosystem in which one token was to dominate, paired with (2) utterly inadequate disclosure of information, supported by (3) over-enthusiastic promises and announcements, and (4) a tendency to avoid financial regulation through all-too generous self-classification of crypto assets that resulted in the inapplicability of existing financial regulation and facilitated institutional instability. To be sure, the issue with the ICO bubble lies not in the failure of innovative projects – failures are part of innovative ventures and losses are inherent in venture investing.

The issue, however, is that many failures of crypto projects were prompted by institutional failures and weaknesses that resulted in operational malfeasance that facilitated fraud and theft, while investors' and customers' funds were locked in by the information technology (IT) infrastructure, all 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

[65] 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.

[66] *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.

[67] *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).

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The central element of the Crypto Winter has been centralization in Systemically Important Crypto Intermediaries (SICIs) that have been both too-big-to-fail and too-connected-to-fail in the context of their ecosystem. While to date issues in the crypto ecosystem have had limited impact on financial stability in traditional finance, it is now clear that – as with the evolution of systemically important financial institutions and infrastructure in traditional finance – the crypto ecosystem has evolved to produce its own version of crypto concentration risk. 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 own 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 the network effects of technology result in the rapid emergence of new systemically important financial institutions; a trend we have characterized as FinTech 4.0.[68] The emergence of systemically important crypto conglomerates, intermediaries and infrastructure illustrates this process in the context of crypto. SICIs ("Systemically Important Crypto Intermediaries") tend to arise because all transactions in that crypto asset come to depend upon the intermediaries' continued existence. Within *their own ecosystem* many crypto intermediaries are classic examples of systemically significant non-bank financial institutions, in short, the "shadow banks" or – in the current terminology – "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.[69]

As we have analysed in detail elsewhere, in many so-called DeFi business models crucial elements of the set-up and governance are centralised.[70] In a purely DeFi market structure no one pays for the systems' development and maintenance. Under this premise "true DeFi" is an unreal dream, and the market in practice has accepted concentration, with the consequential governance and agency risks familiar from traditional finance.[71] The FTX collapse is evidence for this insight: FTX was not operating in a decentralized manner. Indeed, if we go back to the original Bitcoin white paper, we see how very different the design of Bitcoin is from how FTX was run.[72] For instance, Bitcoin was designed so that transactions could be made peer-to-peer and without intermediaries. By contrast, FTX processed transactions centrally and acted as an intermediary. FTX was of course not a cryptocurrency and so comparisons with Bitcoin are not directly appropriate. However, the comparison serves to highlight that FTX was not using DeFi in its business models and operating procedures. FTX is an example of the evolution of centralization of services in crypto, and its attendant market failures and negative externalities, with which regulation has not kept pace.

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68 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).

69 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.

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

71 *Id*.

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

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The concentration in crypto is at odds with DeFi philosophy: Crypto was meant to eliminate the need for traditional financial intermediaries that concentrate financial 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. The greatest of ironies is that 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 own users.

B. Bundled Intermediary Functions

The opacity and complexity of crypto conglomerates also carries connotations of shadow banking, shadow finance and regulatory arbitrage. We are interested in the cause of this opacity and complexity, and identify two drivers: a combination of a range of economic functions paired with the lack transparency regarding actual operations and risks, as well as of the regulation that would require appropriate management of these various economic functions. Both elements become obvious when compared to the five main models of intermediaries in traditional finance. We will consider four of these types of intermediaries in this section, 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,[73] are now subject to strict securities regulation which requires segregated accounts for all customers. This ensures that in the event of exchange insolvency, customer assets are segregated and able to be returned to customers. Segregation and custody requirements, and a range of operational controls to promote 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.[74] It is also worth noting that 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 number of users, highlighting that of these firms are in fact engaging in other functions as well.[75] Therefore, further consolidation can in fact be expected but with such concentration will come increased risks, resulting in the crypto equivalents of systemically significant financial infrastructures.

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 are typically exposed to counter-party risk, and so are

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[73] 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.

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

[75] 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.

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their clients, yet as client accounts are again segregated, there is 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 pensions funds. These are pools of assets that are invested, in accordance with the investment policy, to the benefit of the collective investors. Assets of the pooled investment vehicles are held in custody and segregated from any other asset held by the intermediaries involved. 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). Even more so, conflicts of interest rules resulting in information barriers should actively prevent these considerations from being operative, and asset managers in conglomerates should not know of the needs and wishes of other parts of the conglomerate to avoid anticipatory obedience.

Fourth are **banks**. A bank takes in funds as deposits, and loans or invests 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). When looking at crypto, investors may have used the "cryptoderivatives" (i.e. forward and out options on crypto assets) as cash substitutes, and this misunderstanding of an investment as cash may have been furthered by misleading communication on the side of the crypto industry, as is implicit already in the term cryptocurrency. From that perspective, many crypto activities appear more functionally equivalent to those of a bank than an exchange (and to some extent a broker-dealer too, as stated above).[76]

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. All of these measures aim at avoiding liquidity and confidence crises. Yet none of these measures, 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), and this happened quite logically due to the absence of measures designed to prevent these runs. The exit of customers as quickly as they could exacerbated the liquidity crisis in all of the crypto insolvencies.

C. Implications: The Financialization of Crypto

[76] 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.

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This concentration in crypto intermediation; 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 central intermediary.

Given financialization and the rise of SICIs, it is highly unlikely that the failures of 2022 are the final failures in crypto; 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.[77]

In traditional finance, these issues are addressed by regulation, which raises the question of how to regulate crypto. We address this question in section IV.

IV. Regulating Crypto

While crypto was presented to the world as a new type of finance avoiding the risks associated with traditional finance, in practice, agency, operational and financial risks have evolved across the ecosystem and crypto has proven not to be immune from traditional risks of finance. The other lesson of centuries of financial evolution is that trust in the market requires transparency, comparable information, and protection from fraud and abuse. Trust in financial institutions follows risk mitigation, and this trust is indispensable for efficient markets and market development. Therefore, we argue in this section that where the causes of problems are similar, so should be the remedy: financialization requires the regulation of crypto. While others have argued that the best approach is to isolate crypto from finance and leave it largely unregulated as a non-connected ecosystem,[78] we have highlighted that crypto has in fact financialized, both in terms of what is being offered within the ecosystem and in the context of the market failures and other weaknesses which have evolved. As a result, shadow finance and regulatory arbitrage are central features and require appropriate approaches. It is also the case that – in a way that is often not understood – law and regulation are essential to proper market functioning.[79] Crypto would benefit from this in terms of its own future development.

Financial regulation is largely about improving market functioning and efficiency. Crypto's biggest risk in our view is that financialization erodes trust and confidence to such an extent that the market collapses, or legislators feel pressed to shut crypto markets down permanently. In turn, we argue that an approach which recognizes market failures and externalities (both positive and negative) and addresses these through regulation, enforcement and supervision, as well as international cooperation and coordination, is necessary for crypto to survive (and to

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77 *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.

78 *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/.

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

Electronic copy available at: https://ssrn.com/abstract=4372516

thrive). We outline the need for regulation in the context of traditional risks of finance in Section A.

At the same time, the idiosyncracies 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. Most recently, financial regulation also seeks to support market development and economic growth and to further financial inclusion and sustainable development.[80] We show in this section that each of these regulatory objectives are also relevant to the regulation of crypto.

1. Financial stability

At the base, financial regulation is about seeking to prevent or reduce the most significant externality which arises in the context of finance: financial crises and in particular systemic financial crises. Financial stability regulation – both macroprudential and microprudential – is designed to achieve this objective.[81]

While crypto has not yet reached the financial dimension that warrants intervention to ensure stability of the whole financial system, it is characteristic for financial technology to grow very fast, due to the scale and scope economies inherent in IT (data and software, in particular) and network effects.[82] In turn, any crypto model has bypassed the stages of "too small to care" and "too large to ignore" rapidly, and entered the stage of "too big to fail".

While crypto is not displacing traditional finance, we are concerned with spill-over effects within the crypto industry (such as from one SICI to another) and into traditional finance. Accordingly, regulators may well wish to ring-fence certain cryptoassets from other 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

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

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

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

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In addition to financial stability, financial regulation focuses on promoting market functioning, transparency and efficiency.[83] Market efficiency seeks a semi-strong form of informationally efficient markets, that is markets in which prices reflect all publicly available information.[84]

Market efficiency is naturally a concern for crypto, given the following three reasons. First, information is available in a non-structured, unorganized manner and is made available through various private and unregulated channels, hence investors – whether professional or retail – lack the necessary information to properly evaluate investment opportunities and related risks. Second, due to a combination of erratic disclosure and unregulated and thus non-standardized information streams as well as opacity and complexity of intermediary structures, information and transaction costs are generally unclear, while liquidity in most crypto assets is limited. In turn, with some notable exceptions for some large volume cryptoassets like ETH, arbitrage is unable to push asset prices towards the "right price" based on 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, so as to understand and manage the risks. The informational advantages of the developers, and in the case of SICIs, the crypto conglomerate developing and operating the system, are significant.

Disclosure is the principal traditional tool to further market efficiency,[85] and should be brought to bear here supported by standardization of crypto protocols and transparency on supply and demand on crypto assets. In the case of crypto, disclosure could focus on standardization of information disclosure requirements as well as on information quality assurance mechanisms such as 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 seeking to enhance the safety and soundness of the operations of crypto intermediaries would reduce fraud and theft and further 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.[86] In particular, this focuses on less informed but sometimes overly enthusiastic market participants that lack the means to protect themselves. It must also seek to maximize rational behaviour while recognizing that rationality is often not the dominant characteristic of human behavior. Consumer protection also forms a part of the client and investor protection rationale. In this regard the secret or hidden centralization and monopolization of market segments, contrary to DeFi principles, runs particularly counter to the expectations of crypto consumers.

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83 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>.

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

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

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

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Investor protection takes a number of forms: disclosure to enable informed decisions (as discussed in the context of market functioning and efficiency), enforcement to address misconduct which is ever-present throughout financial history (considered in more detail in the context of market fairness and integrity), and prudential mechanisms to reduce the likelihood of losses from intermediary or infrastructure failures while allowing exit to support market discipline (and thus reinforcing financial stability regulation).

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

4. Fairness and market integrity

Fairness and market integrity focuses on the prevention of both criminal use of the financial system (particularly in the context of money laundering and terrorist financing) and of fraud and misconduct. In operation, 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, such as insider trading and market manipulation, and thus relates also to customer protection.

The crypto winter provides examples that touch upon both dimensions of market fairness and integrity.

As to insider trading and market abuse, FTX and Binance as its major competitor provided reasons for concern. Some reports state that FTX's fund Almeda traded primarily in FTX's main crypto-asset – which is the equivalent to trading in a regulated entity's own security. At the same time, Binance could publicly cast doubt on the financial reliability of FTX, after all FTX had become Binance's most serious competitor by then due to FTX's recent growth. Such behavior is unthinkable in the regulated finance industry where any such statement would run counter to market abuse and market manipulation legislation.

In the same vein, it seems some crypto intermediaries are still not following AML/CTF requirements, accepting new funds without KYC checks. There are two possible explanations for this. First, some of the intermediaries operate from jurisdictions where crypto intermediaries are beyond the scope of AML/CTF legislation, or AML/CTF legislation is not properly enforced. Second, in jurisdictions that have AML/CTF rules in place for crypto and enforce them, some intermediaries characterise their services so as to circumvent existing rules. For instance, they may do so by characterizing cryptoassets as utility assets where only investment and payment cryptoassets are subject to regulation.[87]

5. Growth, inclusion and sustainable development

While economic growth has long been a central feature of financial regulation and financial regulatory policy, more recently a number of other aspects have been added in an increasing range of jurisdictions, including innovation, inclusion and sustainable development.[88] Of these,

[87] Dirk A Zetzsche et al., *supra* note 67.

[88] 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).

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sustainable development is the most recently added element to the financial regulatory schema in an increasing range of countries. In many aspects, it has been the innovation, development and inclusion objectives which have provided the strongest support for taking a permissive approach to the evolution of crypto from a regulatory standpoint.[89] To date, while there are a range of increasingly sceptical views about the potential of the underlying technology, from our standpoint, it is important to highlight that it has indeed been highly successful in supporting fundraising efforts.[90] It is also the case that an increasing range of successful applications are emerging in the context of traditional finance.[91] This however in fact reinforces our argument in respect of financialization and its implications from the standpoint of the necessity of appropriate regulation to support the development of the market going forward.

In addition, design features of some systems raise energy issues in particular.[92] Some crypto models waste energy and are inherently exclusive in nature, while others are highly energy efficient and inclusive in that customers with low degrees of financial and technical literacy may participate. For instance, developers claim that the Ethereum Merge, a major software upgrade to the Ethereum blockchain in September 2023, will reduce the Ethereum blockhain's energy usage by 99.95 per cent. At the same time, another upgrade dubbed "the Surge" will reduce costs, enhance speed and system stability.[93]

While these upgrades clearly show the potential of technological innovation, the absence of similar upgrades to the Bitcoin blockchain are deeply regrettable, as, according to some estimates, this blockchain uses collectively as much energy as the Netherlands, a country with some 18 million people.[94] One reason for the absence of such upgrades is Bitcoin's absence of a centralized governance mechanism which could design and implement them, and such problems lead inexorably to a degree of centralization that totally undermines the principles of DeFi and its arguments against centralized regulation by external authorities.

Going forward, we suggest in the context of DeFi the usefulness of embedding regulatory principles – including relating to sustainability – into system design.

B. Decentralization: "New Risks, New Rules"

While crypto is not immune from risks of traditional finance, in some respects, however, crypto differs from traditional finance. The main aspect where this is the case is partial decentralization of functions within the financial ecosystem. For instance, many DeFi systems

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[89] 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.

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

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

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

[93] 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.

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

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are built upon the Bitcoin model where the holding of the token is decentralized.[95] In DeFi exchanges, the liquidity pool that allows for trading without middlemen is decentralized: the liquidity is generated by multiple users willing to hand over two types of token to the pool, in return for a reward. Upon a trading event, the trading algorithm will then allocate these tokens to the trading parties.[96] The same partial decentralization may be seen in any other function of the DeFi stack, from valuation over crypto lending to crypto staking.[97]

This partial decentralization results in technical and financial complexity and often a cross-border situation which renders regulation and enforcement a challenge.[98] While by far not all functions are decentralized, where crypto, as part of DeFi, is characterized by *partial* decentralization of functions, depending on the technology and set-up, there may be cases where many rather than one entity must function together to ensure the proper functioning of the stack, but also to ensure compliance, cybersecurity, asset recovery, and investor protection at large. 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. In the same vein, several regulators together must cooperate and coordinate their actions 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

A particular concern of customer and investor protection is the technical structure of segregation and custody in the crypto industry. So far, "hot" custody is common practice, that is custody in omnibus accounts that are permanently on-line and linked to the distributed ledger from which the ownership in the token derives. At the same time, crypto intermediaries often manage clients' private keys, that is, the data that confirms ownership in the clients' assets are stored in the intermediary's systems. In such a set-up, and 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 exposure of the private key wherever this is stored (turning the private key into a public one for some seconds at least), or prompt fraudulent or malfunctioning transactions from the omnibus account to another one controlled by the attacker or fraudster, as the case may be.[99]

A number of other concerns have been reported in the context of custody. For instance, some crypto intermediaries re-used client assets held in custody without clients' consent and proper

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

[96] *Id*.

[97] 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).

[98] 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.

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

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governance in place. This has been facilitated by the fact that the division of functions within a crypto ecosystem is not always transparent as to who functions as the contractual party, the liquidity provider, margin agent, and so on. Note that any of these functions can be provided also by a group of nodes acting 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 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 a unsettled, to say the least, rendering any true assessment who holds an asset in bankruptcy and fraud cases very difficult.

2. *Crypto staking*

Crypto staking can be understood as 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.[100] In turn, governance rights 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 the context of 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*).

At the same time, such staking practices have often been the focus of high returns, drawing customers who perceived the risks to be low. However, lack of segregation and custody has instead often meant that – rather than a safe high-return investment (always a warning signal), in fact investors were taking on high levels of risk via the providing crypto intermediary.[101]

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.[102]

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 a reason why crypto derivatives are less risky for consumers than financial derivatives. Quite the opposite, we would argue, in light of the often

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100 *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.

101 *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.

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

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missing regulation and in particular the 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.[103]

4. Insolvency and resolution

Partial decentralization poses particular difficulties in arranging business continuity in insolvency, as with insolvency financial incentives to maintain the systems vanishes, while several entities need to act together to maintain a systems' operation. For instance, where code maintenance requires the upload of an update on many nodes running a software, an update is impossible where nodes stop to operate in the vicinity of insolvency. In the same vein, 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.[104]

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".[105] Further, the current absence of proper regulation presents a real opportunity to reconceptualize regulation in the future. Our bench-mark 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 which arise as a result of 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. A number of 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

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[103] 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).

[104] *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).

[105] Zetzsche, Buckley & Arner, *supra* note 28 at 172.

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management, adequate conduct of business, and prudential regulatory rules (i.e. the maintenance of adequate capital and liquidity).[106]

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.[107]

A straight-forward solution in this regard would be the implementation of a default rule. For instance, all crypto services may be defined as being within the scope of securities regulation (so that securities regulation always applies)[108] *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).[109] 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 so as 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.[110] Nevertheless we suggest that this situation is preferable to the current converse

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[106] *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).

[107] *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).

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

[109] *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).

[110] Written Testimony, Chris Brummer, *Written testimony before the US House of Representatives, Agricultural*

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situation where most crypto conglomerate businesses remain unregulated. Furthermore, such acknowledged inefficiencies may be rectified through exemptive powers granted to securities regulators in their dealings with crypto.

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.[111]

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 by which to do this and in fact may – with appropriate design – provide to regulators real-time information.[112] 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. In particular, 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 are able to evaluate and understand risks. Coinbase, as a listed company, provides a most useful counterpoint in this regard to FTX.[113]

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 which functions are centralized and which decentralized. Such an obligation to submit a Plan of Operations to explain the systems architecture and ensure systems resilience has been introduced already by some regulators.[114] Such an approach should be adequate given the unique features and architecture of many cryptoassets. It could also usefully be required to outline how essential decentralised functions would be maintained in times of insolvency. In

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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.

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

[112] 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).

[113] 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.

[114] *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).

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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 own 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.[115] 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 own 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 is 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. In particular, 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.[116] 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 actually 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

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[115] *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).

[116] *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.

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that the client funds held by a crypto exchange or project are stored safely and segregated properly.[117]

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.[118] 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.[119]

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 so as 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 in light of 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.[120]

While financial regulation alone is incapable of solving all the legal issues 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 the 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

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117 *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.

118 *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).

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

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

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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 establishment of a crypto LoLR due to the conflicts and moral hazards inherent in an LoLR in these markets.[121] 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.[122] 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, in particular 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 bankrupcty with related asset recoveries, may all require the joint action of several regulators in various jurisdictions.

Industry associations may facilitate information flows in certain instances,[123] 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 particular 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, finance and equipped, how it will be able to enforce decisions, and to what extent it can override local decisions, will combine to make 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

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[121] 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.

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

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

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Crypto claimed many advantages which, with hindsight, have proven inaccurate. In particular, 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 all of these issues we have good reason to apply the principle "same function, same risks, same rules".

In some respects, however, crypto is special and these features must be considered in 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 particular 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 on the part of 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. This may be addressed with clear rules that leave no doubt that crypto is within 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 governance of crypto 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.

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