

THE CENTRALIZATION PARADOX IN CRYPTOCURRENCY MARKETS

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INTRODUCTION

The costly and highly public collapse of cryptocurrency exchange FTX has highlighted two key phenomena central to crypto-market design.¹ First, despite its originating claims to decentralization, crypto-markets are anchored by exchanges that operate in a profoundly centralizing manner. In other words, single organizations act as anchor intermediaries to perform a variety of critical functions: marketing, trading, risk management, lending, venture investing, infrastructure building, and so on.² A number of crypto-exchanges have grown rapidly into complex and significant financial enterprises, whose operations create externalities reaching far beyond the walls of their own firm. That is, the failure of these large and important firms imposes costs on third parties that can be high and unpredictable for

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1. Joshua Oliver, Nikou Asgari & Kadhim Shubber, *FTX: Inside the Crypto Exchange That 'Accidentally' Lost \$8bn*, FIN. TIMES (Nov. 18, 2022), <https://www.ft.com/content/913ff750-d1f4-486a-9801-e05be20041c1> [<https://perma.cc/D36Y-MQ9B>]; Kadhim Shubber & Bryce Elder, *Revealed: The Alameda Venture Capital Portfolio*, FIN. TIMES (Dec. 6, 2022), <https://www.ft.com/content/aaa4a42c-efcc-4c60-9dc6-ba6ccb599e6> [<https://perma.cc/LPC8-Y56Y>].

2. See, e.g., Marco Dell'Erba, *Crypto-Trading Platforms as Exchanges* 37–39, 41–45 (2023) (unpublished manuscript) (on file with author) (noting that 62% of global crypto exchanges surveyed by the author were centralized—further detailing the range of functions performed by exchanges); Shubber & Elder, *supra* note 1.

many to bear.³ FTX's Chapter 11 bankruptcy filing, for example, involved an estimated nine million creditors across 130+ entities. Major crypto firms, BlockFi and Genesis Global Capital, ended up in follow-on bankruptcies of their own.⁴ In the wake of FTX's Chapter 11 filing, customers that traded on FTX found themselves unable to retrieve cash/crypto held by the exchange, forcing some into immediate financial distress.⁵ FTX fell owing over \$3 billion to its largest fifty creditors. Two creditors held claims where the amounts owed to each exceeded \$200 million.⁶ Galois Capital, a large crypto hedge fund, was forced to shut its doors after \$40 million of its assets became stranded in FTX's bankruptcy.⁷ It ended up selling its FTX bankruptcy claims for sixteen cents on the dollar.⁸

Secondly, regulation has failed to exercise control over the structural and governance architecture of cryptocurrency exchanges, such that their institutional design practices have evolved largely outside of federal oversight.⁹ Whereas "traditional" securities and commodities exchanges are subject to an extensive rulebook, with dedicated federal overseers to monitor and punish breaches, the same cannot be said for cryptocurrency

3. See generally Marco Dell'Erba, *Crypto Shadow Banking* (2023) (unpublished manuscript) (on file with author) (highlighting the variety of financial functions, like brokerage, performed by platforms as well as other centralized crypto-entities).

4. *Factbox: From BlockFi to Genesis, Crypto Firms Reel from Exposure to FTX*, REUTERS (Jan. 5, 2023, 11:27 AM), <https://www.reuters.com/technology/blockfi-genesis-crypto-firms-reel-exposure-ftx-2023-01-05/> [<https://perma.cc/HSG9-W4Y6>].

5. *Id.*

6. Joshua Oliver & Sujeet Indap, *FTX Businesses Owe More than \$3bn to Largest Creditors*, FIN. TIMES (Nov. 20, 2022), <https://www.ft.com/content/5d826ca9-389e-41ec-a38b-da43211da974> [<https://perma.cc/VTV4-2NPK>]; *Crypto Crash: Why Financial System Safeguards Are Needed for Digital Assets: Hearing Before the S. Comm. on Banking, Hous., & Urban Affs.*, 118th Cong. (Feb. 14, 2023) (written testimony of Yesha Yadav, Associate Dean and Professor of Law, Vanderbilt University).

7. Sam Reynolds, *Crypto Hedge Fund Galois Capital Shuts Down After Losing \$40M to FTX*, COINDESK (Feb. 21, 2023, 8:55 AM), <https://www.coindesk.com/business/2023/02/20/crypto-hedge-fund-galois-shuts-down-after-losing-40-million-to-ftx-ft/> [<https://perma.cc/5LGY-B982>].

8. *Id.*

9. States—notably Wyoming and New York—have established licensing regimes for virtual asset businesses. In the context of oversight, crypto-exchanges are generally classified as money transmission firms that are subject to payments-related oversight under state rules. As payments businesses, they are also subject to prohibitions against money laundering and terrorist financing. Adam J. Levitin, *Not Your Keys, Not Your Coins: Unpriced Credit Risk in Cryptocurrency*, 101 TEX. L. REV. 877, 883–84, 938–42 (2022). As of the time of writing, the Securities and Exchange Commission has launched actions against both Binance and Coinbase, arguing that they are, *inter alia*, operating as unregistered securities exchanges and ought to be subject to the provisions of traditionally applicable securities regulation. See, e.g., Jonathan Stempel, Hannah Lang & John McCrack, *U.S. Tightens Crackdown on Crypto with Lawsuits Against Coinbase, Binance*, REUTERS (June 7, 2023, 07:43AM), <https://www.reuters.com/legal/us-sec-sues-coinbase-over-failure-register-2023-06-06/> [<https://perma.cc/7N27-EQ2J>].

platforms.¹⁰ This has meant relatively few historic hard constraints in set-up, allowing venues to evolve in ways responsive to the peculiarities of cryptocurrency products, competitive pressure, and the firm's private preferences about how it wishes to conduct business. Functionally, this latitude has offered exchanges the ability to develop practices, where multiple business lines are routinely folded into single organizational structures.¹¹ But limited regulatory oversight has resulted in a patchy understanding of crypto-exchange operations, risk management, and governance. In the wake of FTX's collapse, insights about the firm's broken, dysfunctional, and opaque operating practices have come to light gradually as bankruptcy and criminal proceedings unearth what went on.¹² Binance, the world's largest crypto-exchange by volume, has found itself under frequent scrutiny for its complex and obscure governance, where doubt lingers over even basic questions like the jurisdiction where the firm is based.¹³ Given limited regulatory standards, vetting, and transparency, it follows that the riskiness of any number of exchanges and their organizational models cannot be credibly gauged, making it exceedingly difficult for the crypto-market and its stakeholders to privately protect themselves against the failure of highly central and centralizing firms.

This essay highlights why, paradoxically, the seemingly decentralized world of cryptocurrencies has come to depend heavily on trading firms that institutionalize a highly centralized organizational model.¹⁴ Despite

10. For discussion of the lack of dedicated regulation for crypto-exchanges, see generally Kristin N. Johnson, *Decentralized Finance: Regulating Cryptocurrency Exchanges*, 62 WM. & MARY L. REV. 1911 (2021) (suggesting the creation of a registration regime); Sec. & Exch. Comm'n, Comments on Investors' Exchange LLC; Notice of Filing of Application, as Amended, for Registration as a National Securities Exchange Under Section 6 of the Securities Exchange Act of 1934, Release No. 34-75925, <https://www.sec.gov/comments/10-222/10-222.shtml> [<https://perma.cc/JCV8-NHDR>]. On certain obligations applying to exchanges, see, e.g., 15 U.S.C. § 78f(b); 15 U.S.C. § 78s(a).

11. Johnson, *supra* note 10, at 1953–55 (highlighting the high degree of centralization in crypto-exchanges); Dell'Erba, *supra* note 2.

12. See, e.g., Voluntary Petition for Non-Individuals Filings for Bankruptcy, *In re FTX Trading Ltd.* (2022) (No. 22-11068-JTD); Declaration of John Ray III in Support of Chapter 11 Petitions and First Day Pleadings, *In re FTX Trading Ltd.* (2022) (No. 22-11068-JTD).

13. Ryan Browne, *Binance, the World's Largest Cryptocurrency Exchange, Gets Banned by UK Regulator*, CNBC (June 28, 2021, 1:26 PM), <https://www.cnbc.com/2021/06/28/cryptocurrency-exchange-binance-banned-by-uk-regulator.html> [<https://perma.cc/8W29-GBYE>]; Javier Paz, *Binance Is Bleeding Assets, 12 Billion Gone in Less than 60 Days*, FORBES (Jan. 10, 2023, 10:22 AM), <https://www.forbes.com/sites/javierpaz/2023/01/10/binance-is-bleeding-assets-12-billion-gone-in-less-than-60-days/?sh=1401c19553c3> [<https://perma.cc/HDZ7-BVG9>]; Caitlin Ostroff, Patricia Kowsmann & Dave Michaels, *SEC Probes Trading Affiliates of Crypto Giant Binance's U.S. Arm*, WALL ST. J. (Feb. 15, 2022, 12:02 PM), <https://www.wsj.com/articles/sec-probes-trading-affiliates-of-crypto-giant-binances-u-s-arm-11644948162> [<https://perma.cc/2QFD-JUDG>].

14. This discussion also relies on and recaps analysis and sources in my Article, Yesha Yadav, *Toward a Public-Private Oversight Model for Cryptocurrency Markets* (Vand. L. Rsch. Paper, Working Paper No. 22-26, 2022), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4241062 [<https://perma.cc/2HE5-VALC>].

shunning the notion of centralized intermediation, cryptocurrency users can face costly practical hurdles when engaging with decentralized public blockchains, like those underpinning Bitcoin or Ether. The task can entail technical knowledge, search costs for counterparties, unpredictable fees, delays in execution, and the need for users to be capable of protecting their own interests.¹⁵ These challenges can hamper popular uptake as well as limit the capacity of cryptocurrencies to develop as a viable asset class, capable of being traded/used rapidly, reliably, and with customers able to access a range of services (e.g., professionalized custody of crypto-assets).

Exchanges respond to such shortcomings by offering a highly intermediated trading environment where a user's real-time engagement with blockchains is generally fairly minimal.¹⁶ Trades are matched, verified, and settled on an exchange's books.¹⁷ Users can enjoy various conveniences like greater speed, liquidity, and certainty about fees.¹⁸ To enable transactions to settle rapidly outside of blockchains, exchanges typically require customers to maintain wallets issued by an exchange (hosted wallets) and the exchange often also holds the password to these wallets.¹⁹ In maintaining access to and extensive day-to-day control of a customer's crypto and cash, an exchange can settle trades by updating user accounts internally on its books, rather than having to send instructions for individual transactions to underlying blockchains.²⁰

Where platforms convene large numbers of customers and hold their cryptocurrencies/fiat, they also end up becoming well-placed to offer a range of commercial products, where an exchange might use its access to customer assets to pool these funds, place them in investment vehicles, extend credit collateralized by a customer's crypto, or provide premium custody-related services for additional fees.²¹ Successful venues—capable

15. David Easley, Maureen O'Hara & Soumya Basu, *From Mining to Markets: The Evolution of Bitcoin Transaction Fees*, 134 J. FIN. ECON. 91, 92 (2019).

16. Johnson, *supra* note 10, at 1921–22.

17. *Id.*

18. See, e.g., *Coinbase Markets Trading Rules*, COINBASE, https://www.coinbase.com/legal/trading_rules [<https://perma.cc/3UJL-SL97>] (noting that settlement is instantaneous); Yadav, *supra* note 14, at 41–45.

19. Levitin, *supra* note 9, at 888.

20. For a detailed discussion of the risks involved from the standpoint of customers potentially losing their ownership rights in their crypto/money held by an exchange, see Levitin, *supra* note 9, at 881–82, 891–95.

21. Staking products, where customer assets are typically pooled and deployed by the exchange to perform proof-of-stake verification for rewards, have attracted scrutiny by the SEC as potential securities. For example, the SEC and the crypto exchange Kraken agreed to a settlement of \$30 million to resolve an SEC action alleging that Kraken had issued securities by offering a staking product to its customers. See Press Release, Sec. & Exch. Comm'n, Kraken to Discontinue Unregistered Offer and Sale of Crypto Asset Staking-As-A-Service Program and Pay \$30 Million to Settle SEC Charges (Feb. 9, 2023), <https://www.sec.gov/news/press-release/2023-25> [<https://perma.cc/3QSN-WLEH>].

of earning regular revenue from trades as well as through the sales of subscriptions and services—can become powerful pools of capital and influence. This can motivate top trading venues to use their own money to engage in venture investing, lending to crypto-businesses, brand-building through lavish marketing, as well as investing in the development of their own blockchains.²² FTX, for instance, left behind an estate with an investment portfolio valued at around \$5 billion, comprising equity in an eclectic set of ventures such as crypto-start-ups, a traditional securities exchange, as well as a fertility clinic.²³ Venues might also mint their own crypto-tokens, entitling holders to use the exchange's services and products at a discount. These tokens might then acquire market cache linked to the reputation and utility of the venue.²⁴ As assets capable of being traded and generating value, such proprietary exchange coins have held out the possibility of being used as collateral to fund the issuer-venue's operations or constitute a portion of its balance sheet. In the case of FTX, its proprietary coin—the FTT token—was deployed by the exchange's organization as collateral to release credit for funding its operations.²⁵

In its second contribution, this essay details some of the key risks that arise from this organizational design choice. In the absence of systematic oversight, a highly centralized crypto-exchange design raises a number of risks for an underprepared marketplace—where externalities arising from fallout are liable to force costs on actors that may not be well-placed to anticipate or bear them. While a comprehensive discussion of the risks is outside the scope of this essay, some stand out as especially salient. Importantly, limited regulatory levers heighten the information asymmetries attaching to a complex, sophisticated, and centralized intermediary. In providing a variety of functions and services as part of a single or closely connected organization, crypto-exchange firm design

22. See, e.g., *BNB Chain: Blockchain for Exchanging the World*, BINANCE BLOG (Feb. 17, 2019), <https://www.binance.com/en/blog/all/bnb-chain-blockchain-for-exchanging-the-world-304219301536473088> [<https://perma.cc/NUA5-L8JQ>]; Omkar Godbole, *Tokens of Optimism Ecosystem Surge as Coinbase Unveils Its Layer 2 Base*, COINDESK, (Feb. 24, 2023, 3:05 AM), <https://www.coindesk.com/markets/2023/02/24/optimism-ecosystem-coins-surge-as-coinbase-unveils-ethereum-layer-2-platform/> [<https://perma.cc/SUZ3-MU4L>].

23. See, e.g., Hannah Miller & Olga Kharif, *Sam Bankman-Fried Turns \$2 Trillion Crypto Rout into Buying Opportunity*, BLOOMBERG (July 20, 2022, 9:08 AM), <https://www.bloomberg.com/news/articles/2022-07-19/sam-bankman-fried-expands-ftx-alameda-empire-by-bailing-out-failing-crypto-firm?leadSource=verify%20wall> [<https://perma.cc/J2PE-Z47S>]; Shubber & Elder, *supra* note 1.

24. See, e.g., Kate Irwin, *FTX Token FTT Pumps 32% After New CEO Says Exchange Could Be Revived*, DECRYPT (Jan. 19, 2023), <https://decrypt.co/119586/ftx-token-ftt-pumps-new-ceo-exchange-revived> [<https://perma.cc/9GLC-Q7E5>].

25. Taylor Locke, *How FTX's Own Token Was the Final Nail in Its Coffin*, FORTUNE (Nov. 18, 2022, 2:21 PM), <https://fortune.com/crypto/2022/11/18/how-ftx-own-token-ftt-was-the-final-nail-in-its-coffin/> [<https://perma.cc/56NP-CE37>].

increases the cost of investigation and analysis.²⁶ Insight is needed not just to calibrate the risk attaching to single types of activities (e.g., trading), but to further assess how such risks might impact other related functions (e.g., custody or commercial customer products). In the case of FTX, for example, as the exchange failed, panicking demand by customers for a return of their assets eventually resulted in a trading halt and a pause on redemptions.²⁷ With FTX in bankruptcy, the legal ability of customers to extract their funds has come to depend on the terms of service governing products marketed to customers, and whether these might have caused customers to cede their ownership rights in crypto-assets to the exchange.²⁸ This mixing of functions means that understanding one or two operations is insufficient to calibrate the risk of a crypto venue. Rather a deeper and more complex understanding is needed to parse out the fuller costs created by the interconnected operations of the exchange alongside those raised by the particularities of the crypto-market where it operates.

Further, complicated organizational structures raise the risk that corporate governance and risk management arrangements are insufficiently robust to contend with the problems facing large and interconnected organizations. Mixing functions invariably raises worries about whether an exchange, or one of its arms, is conflicted, primed to act against the interests of its customers in order to benefit itself. Information leakage represents an ever-present threat to good governance, where proprietary insights gleaned from one part of the venue's operations are used by an exchange to benefit itself in another.²⁹ For example, by dint of having a perch from which to survey customer trading, the exchange (or an affiliate) might look to trade ahead of customers, raising the cost to the customer, while increasing the certainty of profits that can be enjoyed by a venue. Without proper controls,

26. See Bryce Elder, *Untangling the Knotty Empire of Bankman-Fried and FTX*, FIN. TIMES (Nov. 10, 2022), <https://www.ft.com/content/c28e0570-d4c4-433c-b0a0-c99fba613822> [https://perma.cc/VU9H-D5S7].

27. Sage D. Young & Bradley Keoun, *The Epic Collapse of Sam Bankman-Fried's FTX Exchange: A Crypto Markets Timeline*, COINDESK (Nov. 15, 2022, 7:43 AM), <https://www.coindesk.com/markets/2022/11/12/the-epic-collapse-of-sam-bankman-frieds-ftx-exchange-a-crypto-markets-timeline/> [https://perma.cc/26AX-GXJA].

28. Vicky Ge Huang, Alexander Osipovich & Patricia Kowsmann, *FTX Tapped into Customer Accounts to Fund Risky Bets, Setting Up Its Downfall*, WALL ST. J. (Nov. 11, 2022, 11:16 AM), <https://www.wsj.com/articles/ftx-tapped-into-customer-accounts-to-fund-risky-bets-setting-up-its-downfall-11668093732?page=1> [https://perma.cc/8XQ2-PZQT]; Alex Hern, *Crypto Exchange FTX Expects to Have More than 1m Creditors*, GUARDIAN (Nov. 15, 2022), <https://www.theguardian.com/technology/2022/nov/15/crypto-exchange-ftx-creditors-bankruptcy-filing-sam-bankman-fried> [https://perma.cc/T93Z-HN84].

29. Matthew Goldstein, Alexandra Stevenson, Maureen Farrell & David Yaffe-Bellany, *How FTX's Sister Firm Brought the Crypto Exchange Down*, N.Y. TIMES (Nov. 18, 2022), <https://www.nytimes.com/2022/11/18/business/ftx-alameda-ties.html?searchResultPosition=1> [https://perma.cc/MU8M-8N4S].

highly centralized firms face powerful temptations to misuse the advantages offered by their ability to perform a multiplicity of different roles, such as holding customer assets, confidential information, and controlling access to critical trading services. Funds may be easily misappropriated by a rogue exchange.³⁰ A desire to profit at customer expense might be reflected in sub-optimal investment in the operational safeguards applied to user assets. Risk management and compliance arrangements may tolerate special arrangements for the exchange's own operations relative to those of customers or counterparties. Importantly, these risks are not new.³¹ They have, in some form, long represented a constant threat within traditional marketplaces. Whereas more conventional venues are subject to rules for monitoring and overseeing organizational conflicts of interest and tendencies toward opportunism at the expense of customers, such systematic control is mostly missing in the context of crypto-exchanges.³² This has left centralized crypto venues vulnerable to the complex play of conflicts of interest and informational gaps but without the benefit of effective regulatory levers and governance measures to mitigate problems.

In its final contribution, this essay briefly explores the implications of informational and organizational deficits for ensuring that market participants have the tools to understand and bear the risks arising from failures within centralized cryptocurrency exchanges. Without the capacity to calibrate and absorb risks, exchange users, counterparties, and stakeholders cannot efficiently put a price on their participation in cryptocurrency markets. This leaves them vulnerable to surprise losses that they may not be able to afford. It also makes it rational for cautious users to distrust the entire marketplace systematically, punishing even those firms that seek to showcase higher compliance and transparency. This leaves the cryptocurrency ecosystem in a dysfunctional state, where limited trust alongside the high-risk set up of centralized exchanges impede the creation of a vibrant and safe marketplace for trading. It also points to the urgent need for comprehensive federal oversight that can work in an informed and effective way to curb some of the risks of centralized crypto-marketplaces, protecting customers and counterparties, lowering the costs of research and investigation, and helping to move the market toward credible, lasting standards of integrity and consumer welfare.

30. Oliver et al., *supra* note 1.

31. Goldstein et al., *supra* note 29.

32. Jonathan R. Macey & Maureen O'Hara, *From Markets to Venues: Securities Regulation in an Evolving World*, 58 STAN. L. REV. 563, 585 (2005).

I. DECENTRALIZATION, CENTRALIZATION, AND EXCHANGES

Arguably the defining feature of the vision underlying crypto is its adherence to notions of decentralization and disintermediation. This section details the main pillars of this founding ethos. It describes how the idea of decentralization plays out in the construction of the market's underlying infrastructure, designed to provide verification and processing of transactions without the presence of a central intermediary. In outlining how crypto's basic philosophy is incorporated into the operational processes for transferring value, this section describes the drawbacks to everyday users of participating within more decentralized systems. It concludes by showing why exchanges have become key to making crypto popular for everyday people and institutions by removing some of the key costs involved in using decentralized value transfer mechanisms: for example, the need for technical learning, variable fees, illiquidity, and limited user convenience.

A. *Marketplace Without Intermediaries*

Famously, Satoshi Nakamoto sought to reconceptualize market design by offering a vision for a system of value transfer that could function without central intermediaries like banks or national governments.³³ They set out an outline for a mechanism that could enable payments to be made between counterparties directly, anywhere in the world, and without the need to have recourse to a central intermediary like a bank. This would mean that the basic checks normally performed by a bank when a payment is made would have to be undertaken by this peer-to-peer system's operating software—its code—and performed in such a way that no single entity would be in charge. Code would have to stipulate how each transaction would need to be checked—in other words, what attributes would have to be present in order for the transaction to be acceptable to the system.³⁴ In addition, the ways in which these checks would be undertaken would need to deploy more decentralized verification mechanisms.³⁵

Nakamoto's peer-to-peer value-transfer mechanism system—Bitcoin—looks to a network of participating nodes (computers that have downloaded and are running the protocol) that agree that incoming transactions contain the attributes needed for properly verified trades. Such checks include for

33. See, e.g., Kevin Roose, *The Latecomer's Guide to Crypto*, N.Y. TIMES (Mar. 16, 2022), <https://www.nytimes.com/interactive/2022/03/18/technology/cryptocurrency-crypto-guide.html> [<https://perma.cc/PKP2-LW3G>]; Satoshi Nakamoto, *Bitcoin: A Peer-to-Peer Electronic Cash System* 1–2, <https://bitcoin.org/bitcoin.pdf> [<https://perma.cc/N9SP-KE73>].

34. Nakamoto, *supra* note 33, at 1–3.

35. Roose, *supra* note 33; Nakamoto, *supra* note 33, at 2.

example, ensuring that senders and recipients have an account on the system, the coins they are sending are not being spent twice in the same transaction, and belong to the person looking to spend them.³⁶ Once a majority of nodes agree that the transaction satisfies the demands of the protocol, it can be included in the record of transfers considered valid and acceptable to the system.³⁷ Recorded on the network's ledger, the transaction is then regarded as essentially unchangeable. That is, it cannot be reversed or undone without spending extensive computing resources. While a hack might seek to reverse a transaction by force, the distributed ledger's (or blockchain's) operating system preserves integrity in normal times by looking to make sure that transactions are written into a ledger are, for all practical purposes, immutable.³⁸ Further, the ledger itself is designed to be highly transparent, enabling anyone to view and vet its current state alongside previous transactions.³⁹ Importantly, the system also relies on a set of highly motivated actors—the “miners”—to preserve the system's operational health.⁴⁰ Miners compete to win the right to act as a set of gatekeepers, scouring incoming orders to pick out those that are likely to win consensus from the network. Those that compete and win this chance to pick transactions for verification are rewarded with freshly minted Bitcoin. In this way, the Bitcoin protocol gives miners serious economic skin-in-the-game, where their profit and betterment are intrinsically tied to the viability of the Bitcoin system. If the system can be maintained—where the transactions being selected are trustworthy and not disruptive of the system—miners can preserve access to future minted coins and a source of economic utility, prestige, and value. Increasingly, the Bitcoin system requires payers to attach the promise of a small fee to each order.⁴¹ The fee can be anything—and a sender has to decide by themselves how much they wish to include. When miners prepare the block of trades that will be presented to the network, they are also entitled to keep any fees that are attached to the trades. As David Easley and Maureen O'Hara observe, fees have become an essential part of Bitcoin's trading system, virtually required to be added to a payment order in busy times. This can better ensure that miners looking to select trades for inclusion in the blockchain choose the

36. Nakamoto, *supra* note 33, at 2. This description provides a simplified overview, while a fuller discussion of distributed ledgers is outside the scope of this essay.

37. Roose, *supra* note 33; Nakamoto, *supra* note 33, at 2–3.

38. Nakamoto, *supra* note 33, at 1–2.

39. Roose, *supra* note 33; Nakamoto, *supra* note 33, at 2.

40. Nakamoto, *supra* note 33, at 3–4.

41. See Easley, O'Hara & Basu, *supra* note 15; see also Leo Schwartz, *Bitcoin Pauses Bitcoin Withdrawals Amid Fee Spikes, but CZ Calls Broader Fears 'FUD'*, FORTUNE CRYPTO (May 8, 2023, 9:23 AM), <https://fortune.com/crypto/2023/05/08/binance-pauses-bitcoin-withdrawals-fee-spikes-cz-fears-fud/> [<https://perma.cc/NP36-SZSG>].

trade with an appended fee. Without such fees, there may be a risk that the order is left behind, either temporarily or even for long enough that it is canceled by the system.⁴²

Importantly, in accessing public blockchains, users are expected to take care of themselves. They must open an account on the network using pseudonymous identities (i.e., a public handle). Users have to maintain their own private passwords. If a user loses the password, then access to their account is also lost forever. If a transaction is made erroneously, it is up to the user to determine how best to reverse it (e.g., to convince the real-life recipient to send a transaction back to the sender). The system itself cannot step in to review accepted trades and undo those that may be tainted by some mistake (e.g., an incorrect amount of coin is sent). In the case of the Bitcoin network, the user must decide whether to attach fees to the transaction order—and if so, how much should be offered. If this amount is insufficient, or too much, the sender loses.⁴³ Parties must, therefore, find their own way around the network and not expect a central protector to verify information and maintain the resiliency of the network.⁴⁴

Clearly, this kind of environment represents a reconceptualization of traditional ways of moving value within financial markets. To avoid the need for a central intermediary, verification is undertaken on a distributed basis by a diffuse network of participants. To mitigate the risk of rogue nodes that might seek to approve only malicious trades (e.g., to pay themselves), public blockchains depend on gatekeepers—such as miners—to protect the system.⁴⁵ For their efforts—and to incentivize performance—

42. Easley, O'Hara & Basu, *supra* note 15, at 101.

43. *Id.* at 92–93 (highlighting the significance of appending fees and noting that this reflects a form of bidding to attract interest from miners to pick up the transaction quickly).

44. There are instances where threats to the network have been thwarted or otherwise sought to be addressed by a cadre of developers and programmers that have a governance role, or otherwise administrative responsibilities for the network. In some cases, even in the case of Bitcoin, these developers have been tasked with protecting network integrity when the system is threatened by a significant bug or a hack. In one important case, a large hack on an application housed on the Ethereum blockchain prompted the Ethereum Foundation to suggest a reset of the Ethereum blockchain to essentially undo the effects of the hack. David Siegel, *Understanding the DAO Hack*, COINDESK (Jan. 13, 2023, 1:46 PM), <https://www.coindesk.com/learn/understanding-the-dao-attack/> [<https://perma.cc/R853-9RPU>]; Elikem Attah, *Five Most Prolific 51% Attacks in Crypto: Verge, Ethereum Classic, Bitcoin Gold, Feathercoin, Vertcoin*, CRYPTOSLATE (Apr. 27, 2020, 6:42 AM), <https://cryptoslate.com/prolific-51-attacks-crypto-verge-ethereum-classic-bitcoin-gold-feathercoin-vertcoin/> [<https://perma.cc/9M3E-JKCA>]; Nic Carter & Linda Jeng, *DeFi Protocol Risks: The Paradox of Cryptofinance*, in REGTECH, SUPTECH AND BEYOND: INNOVATION IN FINANCIAL SERVICES (Bill Coen & D.R. Maurice eds., 2021) (manuscript at 13–17), <https://www.risk.net/regtech-suptech-and-beyond-innovation-in-financial-services/7891846/defi-protocol-risks-the-paradox-of-cryptofinance> [<https://perma.cc/7UTA-LT9M>].

45. Different kinds of verification and gatekeeping conventions may be used. For example, proof-of-stake is another popular way to maintain network integrity. Here, those holding large stakes of

miners are rewarded in coin and fees. Recognizing the disintermediated nature of the blockchain, users are on their own. They cannot depend on helpdesks, social media, lawyers, or regulators to agitate on behalf of their interests and come to their aid in case funds are lost or stolen.

As such, blockchains are far from perfect, user-friendly, or always reliable. As noted above, they reflect a means of creating proxy verification methods to substitute for a lack of an expert intermediary. On distributed verification systems, checks take some time as miners collate transaction information and different nodes arrive at consensus. In Bitcoin, each block of transactions requires around ten minutes to be created and processed.⁴⁶ And there is no guarantee that a user's order will get picked up immediately. During busy periods, it might not make it at all. Transactions also imply costs. Fees—with implied surge pricing—point to challenges for users that might want a steady, certain environment when seeking to transfer value.⁴⁷ For those that might want to simply experiment with cryptocurrencies, the task of finding someone to sell a coin or fractions of coins poses a special difficulty within an environment where users are not known to one another and are identifiable through pseudonymous user handles. This dynamic requires a user to become comfortable with potentially using social media platforms to seek out brokers or other facilitators to find a counterparty. If something goes wrong, avenues for recourse are highly circumscribed.

B. Crypto-Exchanges as Centralizing Intermediaries

While the concept of decentralization has played a founding role as part of underlying public blockchains, it remains a largely philosophical construct for those transacting on most major cryptocurrency exchanges.⁴⁸ Rather than having to contend with the technological challenges posed by a blockchain-only trading environment, exchanges offer a variety of

the network's coins get to choose transactions. They stake, or lock up their coins, and once they have performed, their coins, alongside a maintenance reward, are returned. Proof-of-stake now represents the preferred verification norm for the Ethereum blockchain, for example. *Proof-of-Stake*, ETHEREUM (Mar. 1, 2023), <https://ethereum.org/en/developers/docs/consensus-mechanisms/pos/> [<https://perma.cc/36UV-9ZQG>].

46. Che Kohler, *What Is Bitcoin Block Time?*, BITCOIN MANUAL (Nov. 23, 2022), <https://thebitcoinmanual.com/articles/btc-block-time/#:~:text=The%20block%20time%20on%20the,considered%20to%20be%20processed> [<https://perma.cc/TFR8-5WP3>].

47. See, e.g., Angela Walch, *Why Bitcoin Fails as Money: An Operational Risk Analysis* 15–16, 21–24 (June 22, 2021) (unpublished manuscript), <https://ssrn.com/abstract=3864612> [<https://perma.cc/L5KR-ZDCY>] (offering a discussion of the operational difficulties of using the Bitcoin blockchain as a reliable payment method).

48. Dell'Erba, *supra* note 2, at 34–37.

conveniences.⁴⁹ Importantly, by bypassing the verification and settlement processes on public blockchains, exchanges offer a way for users to experience cryptocurrencies without having to immerse themselves within the more self-reliant, technical, and uncertain world of public blockchains. As briefly described below, exchanges have thus played an essential role in creating mass-market appeal for crypto. Within the United States, crypto-exchanges have ignited cultural consciousness for cryptocurrencies, moving it from the fringes into everyday conversations, for example, as part of the Super Bowl or mega sports sponsorships deals.⁵⁰

1. *What Crypto-Exchanges Do*

Crypto trading venues provide a way to match those wishing to buy and sell various kinds of digital assets.⁵¹ Rather than having to seek out a broker or facilitator online, crypto-exchanges collect orders centrally, match them, and then generate a trade. In addition to enabling trading, exchanges also offer a venue for listing new assets that can be traded by their customers. In the context of traditional securities markets, venues like the New York Stock Exchange (NYSE) or Nasdaq list the equity of companies looking to raise money from the general public. Alongside the Securities and Exchange Commission (SEC), this process entails exchanges vetting emerging corporations and supervising their ongoing compliance with listing standards that seek to enforce standards of corporate governance and financial health.⁵² Crypto-exchanges, too, list established and emerging coins. These include the major assets like Bitcoin or Ether. In addition, new

49. This section references and reflects the discussion set out in Yadav, *supra* note 14, at 40–42.

50. *Arena Info*, CRYPTO.COM ARENA, <https://www.cryptoarena.com/about-us> [<https://perma.cc/5BR3-2HED>]; Tiffany Hsu, *Prepare Yourself for This Weekend's 'Crypto Bowl'*, N.Y. TIMES (Feb. 13, 2022), <https://www.nytimes.com/2022/02/11/business/media/super-bowl-commercials.html?searchResultPosition=1> [<https://perma.cc/HB8Z-F6VF>]; Anthony Tellez, *Crypto Ads Are a Super Bowl Talker, with Floating QR Codes and Larry David*, NPR (Feb. 14, 2022, 12:42 PM), <https://www.npr.org/2022/02/14/1080237873/superbowl-ads-crypto-bitcoin> [<https://perma.cc/RFS4-Z7GB>].

51. On the origins of the New York Stock Exchange and its core economic purposes, see generally Paul G. Mahoney, *The Exchange as Regulator*, 83 VA. L. REV. 1453 (1997). For discussion of how securities exchanges provide an organizing framework for entire markets, see Chris Brummer, *Stock Exchanges and the New Markets for Securities Laws*, 75 U. CHI. L. REV. 1435, 1451–52 (2008); Stavros Gadinis & Howell E. Jackson, *Markets as Regulators: A Survey*, 80 S. CAL. L. REV. 1239, 1246–48 (2007).

52. See, e.g., Roberta S. Karmel, *The Future of Corporate Governance Listing Requirements*, 54 SMU L. REV. 325 (2001); John C. Coffee, Jr., *Racing Towards the Top?: The Impact of Cross-Listings and Stock Market Competition on International Corporate Governance*, 102 COLUM. L. REV. 1757 (2002) (on the certification and vetting functions of securities exchanges); Robert B. Thompson, *Collaborative Corporate Governance: Listing Standards, State Law, and Federal Regulation*, 38 WAKE FOREST L. REV. 961 (2003).

coins, representing assets attaching to up-and-coming ventures and blockchains can also seek out listings. Crypto-exchanges routinely determine the listing criteria on which to include and maintain a pipeline for crypto-tokens to be available for trading.⁵³

These functionalities offer a very different environment that what users might get when trading only on blockchains. Searching for a counterparty becomes much easier. In fact, the user typically does not search at all. Rather, they just have to place an order to buy or sell an asset at an agreed price into the exchange's trading system. In addition, exchanges generally offer a range of assets to users looking to enter the crypto-market. This affords the user opportunities to use a single interface to transact in a variety of different assets, rather than having to engage with individual blockchains, and find way to move assets/entitlements from one blockchain to another.⁵⁴ Fees are predictable. In some cases, venues might seek to entice users with low or no fees for trading.⁵⁵ Subscription services may be set up to provide fee discounts and perks.⁵⁶ Exchanges also represent a central locus of responsibility. Rather than having no recourse, exchanges hold out the possibility they can help with lost passwords, hacked funds, or manipulations that disrupt the flow and integrity of trading.⁵⁷ This can benefit those uncomfortable about having to help themselves in all cases and worried about being stolen from or manipulated by those that are more skilled and possess greater expertise within the blockchain environment.

2. Why Are Crypto-Exchanges So Centralized?

Crypto trading venues, paradoxically, typically showcase far more intense levels of centralization than traditional securities or commodities

53. *A Guide to Listing Assets on Coinbase*, COINBASE (May 3, 2021), <https://blog.coinbase.com/a-guide-to-listings-assets-on-coinbase-2556fee4efa6> [<https://perma.cc/NGJ9-7P9B>].

54. *Lessons from the Wormhole Exploit: Smart Contract Vulnerabilities Introduce Risk; Blockchains' Transparency Makes It Hard for Bad Actors to Cash Out*, CHAINALYSIS (Jan. 30, 2023), <https://blog.chainalysis.com/reports/wormhole-hack-february-2022/> [<https://perma.cc/8ZZA-B4AW>].

55. *Binance Launches Zero-Fee Bitcoin Trading*, BINANCE (July 6, 2022, 9:00 AM), <https://www.binance.com/en/support/announcement/binance-launches-zero-fee-bitcoin-trading-10435147c55d4a40b64fcbf43cb46329> [<https://perma.cc/385Z-ZCMR>].

56. *See, e.g., Coinbase One*, COINBASE, <https://help.coinbase.com/en/coinbase/other-topics/coinbase-one/account> [<https://perma.cc/5SVS-GDMH>].

57. *See, e.g., Russell Brandom, Binance Is Facing an Unconventional New Legal Claim Over May 19th Outage*, VERGE (Aug. 19, 2021, 7:42 AM), <https://www.theverge.com/2021/8/19/22631213/binance-lawsuit-downtime-may-outage-options-leverage-bitcoin> [<https://perma.cc/X5S9-ZBRK>]; *r/CoinBase*, REDDIT, <https://www.reddit.com/r/CoinBase/> [<https://perma.cc/LW72-A6S4>] (showing social media offers an active way to communicate or create pressures on venues to respond to disruptions that customers might face, such as delays in retrieving their money); *Coinbase Markets Trading Rules*, *supra* note 18 (noting sanctions against manipulative trading behavior, for example).

exchanges. While a full discussion of the market structure underpinning equity and commodity markets is outside the scope of this essay, it is worth noting that certain specificities unique to crypto-markets mean that exchanges have incentive and latitude to develop highly centralized organizational structures, where a single institution or closely interconnected set of firms perform a range of functions.

Custody, Clearing, and Settlement of Trades: Cryptocurrencies rely heavily on the notion of passwords (or private keys) as essential to controlling a user's recorded entitlements on blockchains.⁵⁸ These keys allow the user to access their coins, to transfer them to another person, and to validate transactions. Where these keys are lost or misplaced, the user can no longer assert any real control over their coins. Digital wallets seek to securely store these passwords. Ultimately, however, access to account passwords (keys) is necessary in order for a user to have any ability to engage with the crypto entitlements recorded on public blockchains.⁵⁹

This characteristic of crypto—as core convention for recognizing ownership—has resulted in exchanges also taking on the role of custodians of customer crypto-assets. In order to enable trading to occur rapidly and without the need for each trade to also be sent to a blockchain, exchanges verify and process trades on their own books. Customer entitlements are updated in real time as money/crypto change hands over the course of a day—where the exchange settles the trade on the venue's balance sheet. Stated simply, trades take place outside of the blockchain, or off-chain.⁶⁰ Customers are spared the need to wait for the blockchain to process their order—rather they can buy or sell on exchange and know almost instantly that their trade is matched and settled. To take advantage of this ease and convenience, exchanges generally request that their customers send their crypto to a proprietary exchange wallet—a specific address supplied by the exchange to record the customer's crypto entitlements. Venues also ask customers to hand over the private keys to their accounts—allowing the exchange to move the value held in customer wallets both to enable convenient settlement as well as afford the exchange greater flexibility in how this crypto is held. For example, as Adam Levitin details, exchanges might pool user crypto into large omnibus accounts, separately recording each user's entitlement, while holding these assets as part of a larger group

58. See, e.g., Nakamoto, *supra* note 33, at 2.

59. See, e.g., Alexander Lee, Brendan Malone & Paul Wong, *Tokens and Accounts in the Context of Digital Currencies*, FED. RSRV.: FEDS NOTES (Dec. 23, 2020), <https://www.federalreserve.gov/econres/notes/feds-notes/tokens-and-accounts-in-the-context-of-digital-currencies-122320.html> [<https://perma.cc/Q755-TCYW>].

60. Johnson, *supra* note 10, at 1954.

account.⁶¹ As Levitin notes, this kind of arrangement creates the risk that customers can essentially end up with a bare contractual claim against the estate, rather than having a direct proprietary claim to their assets.⁶² With the exchange in charge of keeping custody of passwords and holding assets in exchange-controlled accounts, the arrangement can mean that the venue ends up as legal owner, not the customers.⁶³ For example, FTX's bankruptcy has raised the risk that its customers eventually end up as unsecured creditors of the estate, entitled only to recoveries once other secured and priority creditors are repaid—rather than having any kind of secured claim, or seeing their assets extracted out from the FTX bankruptcy estate and ready for distribution.⁶⁴ Nevertheless, the crypto-exchange model is characterized by this role of the platform as custodian, necessary to facilitating fast, cheap, and reliable trade matching, clearing, and settlement.

Market Making and Liquidity Provision: Some venues have also made gains by acting as so-called market makers for their own platform. That is, they use their own money to transact with customers, taking the other side of the deal for any buyer or seller.⁶⁵ Becoming a market maker allows the venue (or affiliate) to lubricate buying and selling by ensuring that a counterparty always exists in the event that activity on the platform slows, and it fails to muster a sufficient number of counterparties for customers to be able to make a bargain. In other words, the platform stands ready to step in when liquidity on the platform deteriorates, meaning that customers cannot trade easily whenever they wish to and/or without seriously impacting asset prices.⁶⁶

As with custody, unique aspects of crypto-markets incentivize venues to become tempted to provide market making services for trading customers. First, as a relatively novel asset class, the usual levers deployed to produce

61. Levitin, *supra* note 9, at 4–6.

62. See Adam Levitin, *Binance's Custodial Arrangements: Whose Keys? Whose Coins?*, CREDIT SLIPS (Nov. 8, 2022, 3:03 PM), <https://www.creditslips.org/creditslips/2022/11/binances-custodial-arrangements-whose-keys-whose-coins-.html> [<https://perma.cc/JX7N-4UCQ>].

63. See *id.*

64. See, e.g., Nik Popli, *Why FTX Account Holders Are Unlikely to Get Their Money Back*, TIME (Nov. 25, 2022, 5:00 AM), <https://time.com/6236610/ftx-account-holders-money-back/> [<https://perma.cc/GPD7-PUUR>].

65. Lawrence R. Glosten, *Insider Trading, Liquidity, and the Role of the Monopolist Specialist*, 62 J. BUS. 211, 211–14 (1989) (detailing the role of market making and the importance of liquidity on venues). For example, Nikou Asgari, *Trading Teams at Crypto.com Exchange Raise Conflict Questions*, FIN. TIMES (June 18, 2023), <https://www.ft.com/content/b5d2bf4b-225c-4f30-9f1c-cbe8dc762fa8> [<https://perma.cc/9MP7-KZYL>].

66. Glosten, *supra* note 65, at 211–14.

liquidity in more traditional markets may not always be available.⁶⁷ For example, professional traders constitute key players in liquidity provision across capital markets (e.g., equities). Expert securities firms, sometimes deploying hyper-fast trading techniques, provide continuous, cheap market making on securities exchanges.⁶⁸ Developed marketplaces also offer well-established tools for encouraging such activity, for example, vast reserves of historic data that can help traders to value assets, trusted mechanisms to disseminate prices, and a sophisticated infrastructure to communicate information between traders and venues.⁶⁹ Securities trading platforms also routinely motivate professional market makers to transact on their venues by offering “carrots” in the form of reduced fees or monetary rewards for providing liquidity.⁷⁰

Such infrastructure remains patchy in the context of crypto-trading venues, putting pressure on platforms themselves to step in when liquidity thins.⁷¹ While professional market making institutions have been making their way onto crypto trading platforms, their consistent availability can be curtailed by disrupted trading conditions and the challenges of valuing and pricing assets with a limited trading history, often novel and highly speculative. Further, such traders may not want to be active on all platforms, seeking out opportunities only when they can make money—for example,

67. Anna Baydakova, *High-Frequency Trading Is Newest Battleground in Crypto Exchange Race*, COINDESK (Sept. 13, 2021, 4:24 AM), <https://www.coindesk.com/markets/2019/07/08/high-frequency-trading-is-newest-battleground-in-crypto-exchange-race/> [https://perma.cc/A8AW-F9W6] (noting the gradual entry of HFT market makers in crypto).

68. See, e.g., Jonathan Brogaard, Terrence Hendershott & Ryan Riordan, *High Frequency Trading and Price Discovery* (Eur. Cent. Bank, Working Paper No. 1602, 2013), <https://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp1602.pdf> [https://perma.cc/GY5V-AAXU] (detailing the operation of high-frequency traders as contributors to greater efficiencies within equity markets).

69. See, e.g., John C. Coffee, Jr., *Market Failure and the Economic Case for a Mandatory Disclosure System*, 70 VA. L. REV. 717, 720–30 (1984); Merritt B. Fox, Randall Morck, Bernard Yeung & Artyom Durnev, *Law, Share Price Accuracy, and Economic Performance: The New Evidence*, 102 MICH. L. REV. 331, 341–44 (2003) (highlighting mandatory disclosure conventions—offering the marketplace access to vast reserves of data in order to facilitate the creation of informationally efficient marketplaces); see also Jonathan Brogaard, James Brugler & Dominik Rösch, *Competition and Exchange Data Fees* (Mar. 2, 2023) (unpublished manuscript), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3703431 [https://perma.cc/S459-YUKU] (highlighting the data products that exchanges sell, which provide a range of choices for professional traders).

70. See, e.g., Stanislav Dolgoplov, *The Maker-Taker Pricing Model and Its Impact on the Securities Market Structure: A Can of Worms for Securities Fraud?*, 8 VA. L. & BUS. REV. 231, 233–40 (2014) (detailing rebates and rewards offered to traders for creating liquidity on the venue, as well as the some of the incentive models used by different venues).

71. Vildana Hajric & Michael P. Regan, *High-Frequency Trader Says Institutions Are Taking Over Crypto*, BLOOMBERG (Oct. 8, 2022), <https://www.bloomberg.com/news/audio/2022-10-08/high-frequency-trader-says-institutions-are-taking-over-crypto> [https://perma.cc/YNV3-LTDP]; Baydakova, *supra* note 67.

if ordinary everyday traders are active and who might be considered less strategic than institutional counterparts.⁷²

Additionally, certain aspects of crypto-markets can make liquidity much more transitory and unreliable. Specifically, crypto-exchanges are typically open all the time, twenty-four hours a day, seven days a week. This constant state of activity increases the odds that venues suffer from bouts of illiquidity, where customers disappear, and professional traders are unavailable. Weekends, for instance, increase the challenge of maintaining constant liquidity. Everyday financial institutions are not open for business. And banks are closed, creating a problem for traders that need funding in order to enter the market. Invariably, the pressure of these constraints shows up in the commonly observed phenomenon of crypto-prices exhibiting extreme price swings over the weekend, as liquidity becomes fallow and even relatively small trades can create outsized effect on asset prices.⁷³

A third characteristic of the crypto-market is its capacity to generate new tokens that seek to be traded on different venues. Venues make differing demands from those seeking to list assets. Limited standardization on matters of disclosure means that a platform can come up with its own approach, opening the door for new coins to proliferate by shopping around to find a listing home.⁷⁴ Take the area of decentralized finance (defi)—referencing applications that look to operate on an entirely automated basis using blockchain-based verification. This market has grown enormously in popularity and size in recent years. Revenue from defi applications has surged from \$239 million at the start 2021 to \$5.22 billion by the end of 2022—a cumulative growth rate of more than 2100%.⁷⁵ The total value locked (TVL) in defi applications has increased by 6900% from 2020 to 2022, despite a steep fall in 2022 on account of distressed market

72. See, e.g., Hajric & Regan, *supra* note 71 (detailing the emergence of professional algorithmic traders on crypto platforms and discussing how infrastructure remains under development to accommodate them); Eva Szalay, *Battle for Dominance Heats Up in Cryptocurrency Trading*, FIN. TIMES (Jan. 5, 2022), <https://www.ft.com/content/b2ef8b06-bfeb-4f02-ac6d-a17676d01839> [<https://perma.cc/J7B6-6R7Q>].

73. Vildana Hajric & Katherine Greifeld, *Bitcoin's Wild Weekends Turn Efficient Market Theory Inside Out*, BLOOMBERG (Jan. 9, 2021, 6:00 AM), <https://www.bloomberg.com/news/articles/2021-01-09/bitcoin-s-wild-weekends-turn-efficient-market-theory-inside-out#xj4y7vzkg> [<https://perma.cc/HL8Y-HPMK>].

74. On the need for workable, responsive, and standardized disclosure rules and standards for digital assets, see Chris Brummer, *Disclosure, Dapps & DeFi*, 5.2 STAN. J. BLOCKCHAIN L. & POL'Y 137, 138–40 (2022); Chris Brummer, Trevor I. Kiviat & Jai Massari, *What Should Be Disclosed in an Initial Coin Offering?*, in CRYPTOASSETS: LEGAL, REGULATORY AND MONETARY PERSPECTIVES 157–202 (Chris Brummer ed., 2019).

75. Nansen Team, *DeFi Statistics*, NANSEN (Dec. 29, 2022), <https://www.nansen.ai/guides/defi-statistics-in-2022#:~:text=Cumulative%20DeFi%20revenue%20grew%20from,of%20%241.5%20billion%20in%202022> [<https://perma.cc/4DU6-RHUN>].

conditions.⁷⁶ Such defi ventures can often include coins native to various applications—referencing entitlements to services and/or governance rights, for example.⁷⁷ Where applications emerge and become popular, their coins may be potentially listable. This can increase pressure on venues to list coins as a way to win customers who come to the platform to buy and sell defi-based entitlements. Crucially, the regular arrival of new coins means the need to provide liquidity for their trading. Where assets are of recent vintage and relatively unknown—with limited trading history, a small float, and uncertain valuation—liquidity may be hard to generate naturally. In other words, there may be few customers willing to trade and professional interest may be hard to attract. In such cases, platforms can face pressure to put their own balance sheet on the line in order to make a market for new digital assets, where customer demands for a listing may not always be met by a resilient and deep market for trading these claims.⁷⁸

Alameda Research—FTX’s closely affiliated investment fund—was perhaps the most well-known and influential market maker, both within FTX as well as more broadly in the crypto-market.⁷⁹ The FTX fallout has revealed the outsized role that Alameda played as a market maker in spurring activity on FTX, producing a market in ever-expanding new listings and in offering liquidity to customers when other counterparties became scarce.⁸⁰ In certain cases, Alameda stepped in to protect FTX from risky trades, taking losses in the process. It was the major market maker for FTT, the exchange’s own token, for example.⁸¹

While traditional exchanges might offer incentives to professional traders to do business on their platforms (e.g., reduced fees), using the venue’s own balance sheets to make markets represents an often dangerous and problematic practice. Taking the other side of risky trades can open a venue up to large losses. In the cryptocurrency market, Alameda, for example, was confronting repeated hits to its balance sheet even before the

76. *Id.*

77. *See, e.g., Compound Comp*, COINBASE, <https://www.coinbase.com/price/compound> [<https://perma.cc/5PHC-ELQ2>].

78. Joshua Oliver, *Sam Bankman-Fried’s Trading Shop Was Given Special Treatment on FTX for Years*, FIN. TIMES (Dec. 3, 2022), <https://www.ft.com/content/1e435a4e-e8f9-4330-be84-99c516630d4a> [<https://perma.cc/ZWZ3-ZKFM>].

79. *Id.*

80. *Id.*; Jamie Crawley, *Alameda Research Shouldered FTX Loss of up to \$1B Following Client’s Leveraged Trade in 2021: FT*, COINDESK (May 8, 2023, 11:03 PM), <https://www.coindesk.com/business/2023/12/02/alameda-research-shouldered-ftx-loss-of-up-to-1b-following-clients-leveraged-trade-in-2021-ft/> [<https://perma.cc/MB4D-GSF2>].

81. Matthew Goldstein, Alexandra Stevenson, Maureen Farrell & David Yaffe-Bellany, *FTX’s Sister Firm, Alameda Research, Was Central to Collapse*, N.Y. TIMES (Nov. 30, 2022), <https://www.nytimes.com/2022/11/30/business/dealbook/ftx-alameda-research-sam-bankman-fried.html> [<https://perma.cc/E65Q-45N3>].

market's downturn in 2022.⁸² Worryingly, it can encourage exchanges to use their uniquely detailed access to information about client orders to transact against their own customers.⁸³ In-house market makers are ideally placed to always win by transacting ahead of customer orders, that is, knowing how their users will trade and then getting ahead and making the deal first. This disadvantages clients who end up having to pay more for the bargain. And it results in venues unfairly purloining confidential insights that only they can access. Further, an exchange's own market maker might enjoy more favorable access to exchange facilities than other traders. This inequity was made clear by Alameda which received a host of special privileges when trading on FTX, avoiding being subject to the same risk mitigation measures that applied to other customers, for example. This allowed Alameda to take on heavier exposures than anyone else.⁸⁴

A Variety of Disparate Commercial Pursuits: As a final point, it is worth noting that crypto-exchanges have emerged as commercial and financial heavyweights. In many ways, this is unsurprising. To be sure, venues within traditional securities and commodities markets routinely sell a slew of products (e.g., data) to their users.⁸⁵ However, a lack of a comprehensive system for regulating crypto-exchanges has afforded crypto-venues wide latitude when seeking to pursue commercial opportunities and competitive edge. This means that venues can engage in commercial activities that regulated exchanges would not be able to pursue. For example, crypto-exchanges often provide loans to their customers that can help fund their trading positions.⁸⁶ Such margin loans are normally subject to strict rules in securities markets and extended by a client's brokers—not by the platform.⁸⁷ Lucrative loans for crypto-trading can encourage clients to take large risks on the crypto-exchange providing them, return more regularly to the venue, and refrain from taking their business to another competitor. While this practice might build customer loyalty, it can also fuel unsafe

82. Crawley, *supra* note 80.

83. See, e.g., Stacy Elliott, *Alameda Research Was Frontrunning FTX Token Listings: Report*, DECRYPT (Nov. 14, 2022), <https://decrypt.co/114622/alameda-research-frontrunning-ftx-token-listings> [<https://perma.cc/BXW7-VV3Q>].

84. Oliver, *supra* note 80.

85. Brogaard et al., *supra* note 68.

86. Arthur Crownson, *Top Crypto Margin Trading Exchanges*, CRYPTOVANTAGE (Jan. 4, 2023), <https://www.cryptovantage.com/best-crypto-exchanges/best-exchanges-for-margin-trading/> [<https://perma.cc/F4JV-S3YW>].

87. *Margin Regulation*, FINRA, <https://www.finra.org/rules-guidance/key-topics/margin-accounts#:~:text=Under%20these%20rules%2C%20as%20a,to%20as%20a%20margin%20call> [<https://perma.cc/583Z-UFP7>].

levels of risk-taking for a customer and place the venue in peril where loans are not properly secured (e.g., if crypto-valuations suddenly collapse).⁸⁸

A lack of a historic, systematic federal oversight framework has further resulted in crypto-exchanges pursuing commercial activities that can expose their balance sheets to unconventional risks. For example, a number of major exchange groups have become prolific investors, taking equity positions in emerging crypto-ventures. These venture investments can be extensive and diverse. FTX, for example, held positions worth over \$5 billion in a variety of enterprises.⁸⁹ These included some unusual choices, such as betting shops, a drone market, a farming company, and a video game enterprise—alongside a more predictable slate of crypto ventures and startups.⁹⁰ As some of the deepest pools of capital within the crypto-market, exchanges are singularly well-positioned to invest in supporting other major digital asset companies. This was made clear by FTX's rescue efforts during summer 2022 to support a slew of struggling crypto-ventures as they teetered.⁹¹ It was also highlighted by Binance's efforts to play a similarly leading role to fund a recovery in the wake of FTX's collapse and the market's sharp downturn. Even as these activities might afford exchange groups a chance to make big returns, they also create the chance of extreme risk, if investments fail to pan out. This can endanger customer assets as well as create systemic dangers for the market as a whole.⁹²

II. THE PROBLEM OF HYPER-CENTRALIZATION IN CRYPTO MARKETS

At seemingly breakneck speed, leading cryptocurrency exchanges have gained in financial stature and complexity. Outside of rules placing constraints on their conduct and organizational models, cryptocurrency venues have adopted firm structures that showcase high degrees of centralization, where single or closely connected entities perform a multiplicity of diverse functions, from the provision of trading services to custody and the sale of a range of commercial products to venture investment. This approach to operations can be explained—as detailed in Part II—by exchanges looking to aggressively create a liquid market in a novel asset class—and having the latitude to do so outside of real federal

88. See Justin Baer & Orla McCaffrey, *Market Rout Shows Dangers of Margin Lending*, *Crypto Style*, WALL ST. J. (July 20, 2022, 11:28 AM), <https://www.wsj.com/articles/market-rout-shows-dangers-of-margin-lending-crypto-style-11658334507> [https://perma.cc/XH6W-XKJR].

89. Shubber & Elder, *supra* note 1.

90. *Id.*

91. Pymnts, *Is Crypto's Richest Billionaire Becoming Its 'Lender of Last Resort?'*, YAHOO! (June 21, 2022), <https://www.yahoo.com/now/crypto-richest-billionaire-becoming-lender-203415308.html?guccounter=1> [https://perma.cc/75ZB-2ADC].

92. See Dell'Erba, *supra* note 3.

oversight. But it cannot continue unconstrained, especially as crypto-exchanges have grown in influence and imposed externalities on stakeholders by dint of their unique internal trading operations and governance. This Part briefly explores some critical problems arising out the hyper-centralized structure of crypto exchanges that increase the difficulty for both understanding platform risks and controlling the propensity of exchanges to engage in misconduct and rent-seeking. It focuses on the informational deficits created by centralization and the inability of unvetted governance practices to control the risk of harms. As highlighted in this Part, the uniquely centralized format of exchange organization thus constitutes a source of serious, unpredictable risk within the crypto-market, making the case for introducing effective, responsive regulatory intervention to place crypto platforms on safer grounds.

A. Informational Failures

At first glance, a more centralized exchange might work to lower the costs involved in understanding the risks that it poses. A single, shared balance sheet, key staff and management, and a select set of activities all consolidated in one place ought to make it easier to obtain the information needed to get an idea of how the overall firm works and the risks that it might pose to its counterparties, customers, and the market.

But this assumption fails to take account of several confounding factors that complicate the task of predicting the extent of exposure that an exchange's counterparties and customers face. First, it does not speak to either the opacity of the activities that an exchange is carrying out or how transparently the risks may be assessed. As detailed in Part II, several functions that exchanges perform can obscure understanding of the different kinds of risk that a platform confronts. Venues that assume large risks on their own balance sheet imperil their capacity to remain viable if they do not also maintain a sufficiently deep and high-quality buffer of assets.⁹³ This sounds like a simple enough insight. But it carries special salience in the context of crypto-exchanges. On its face, such exchanges ought to face very little such risk. All that they are doing is matching one trading party with another. This should mean that venues assume fewer dangers to their financial health. Importantly, unlike in traditional securities markets where a share sale might take multiple days to finalize, a crypto trade typically settles instantaneously, as the exchange immediately updates entries on its

93. For example, in the context of traditional securities and commodities clearinghouses, see generally, *Manage Your Risk: How Clearing Works*, ICE (2016), https://www.theice.com/publicdocs/How_Clearing_Works.pdf [<https://perma.cc/3L6S-82M9>].

internal books and records.⁹⁴ Because there is no real waiting time between matching a trade and finalizing it, there should be negligible risk that either buyer or seller goes bust before the trade finalizes, which leaves the venue on the hook to fulfill the terms of the bargain.

But despite their outward simplicity, crypto-exchanges court default risk in ways unique to their highly centralized business model. For example, in addition to simply matching trades, exchanges typically also offer custody of customer crypto assets. Venues maintain control and access to user accounts by retaining private keys—and in this way, they facilitate the movement of value easily across accounts. But custodianship also brings risks. Exchanges are prime targets for hacks and thefts of customer passwords—where successful criminals can sometimes make off with hundreds of millions in stolen crypto—leaving an exchange to find ways to either recover assets or compensate customers.⁹⁵ In the absence of standardized rules and practices to govern how asset custody ought to be managed, alongside the evolving ingenuity of cyber-criminals, crypto-exchange hacks have become commonplace. According to one study, 2021 saw twenty such hacks take place, with \$100 million stolen separately in six of these thefts.⁹⁶ Crypto-exchange, Bitmart, for instance, reported a hack of around \$200 million in customer funds, causing the venue to halt trading for three days.⁹⁷ Following its bankruptcy filing, FTX found itself becoming a lucrative target, and it ended up losing \$415 million in crypto assets.⁹⁸ Beyond hacks, exchanges providing careless custody services might also lose user passwords—for example, where a USB-key or laptop holding password is misplaced. Perhaps the most infamous instance of such misfeasance took place when one of Canada’s major crypto-exchanges, Quadriga, collapsed following the sudden death of its co-founder. He reportedly passed away on holiday in India while in sole possession of customer private keys that held around C\$190 million at the time.⁹⁹

94. *Coinbase Markets Trading Rules*, *supra* note 18, at section 1.8.

95. See Kevin Collier, *Crypto Exchanges Keep Getting Hacked, and There’s Little Anyone Can Do*, NBC NEWS (Dec. 17, 2021, 10:32 AM), <https://www.nbcnews.com/tech/security/bitcoin-crypto-exchange-hacks-little-anyone-can-do-rcna7870> [<https://perma.cc/8R3B-CKD3>].

96. *Id.*

97. *Id.*

98. Rohan Goswami, *FTX Says \$415 Million of Crypto Was Hacked*, CNBC (Jan. 17, 2023, 6:38 PM), <https://www.cnbc.com/2023/01/17/ftx-says-415-million-of-crypto-was-hacked.html> [<https://perma.cc/R8CZ-7LJ9>].

99. *Quadriga Bankruptcy: C\$190 Million May Have Turned into Digital Dust*, INT’L RESTRUCTURING NEWSWIRE (Norton Rose Fulbright, New York, N.Y.), July 2019, at 12, <https://www.nortonrosefulbright.com/en/knowledge/publications/168bc350/quadriga-bankruptcy> [<https://perma.cc/QSK2-2TQA>].

Working out how susceptible an exchange might be to vulnerabilities in performing custodianship is an informationally daunting task. From an operational standpoint, this requires analyzing the quality of security applied to maintaining the integrity of customer private keys, both when a customer is trading online, and when their account is dormant because keys might be preserved offline. Determining the caliber of protective technology (e.g., data encryption, detection of malware and malicious software), the personnel authorized to access customer passwords, where this staff is based and where keys are held (e.g., keys may be held in a different country from where a customer trades), and the resources of the exchange to make good on losses represent just a handful of questions whose answers speak to the particular bundle of risks that any customer confronts.¹⁰⁰

And beyond the operational standpoint lies the importance of investigating deeper concerns of trust and legal reassurance about whether customers can depend on the exchange to preserve their property rights that recognize deposited crypto as the customer's own rather than as assets belonging to the exchange. For one, disclosures provided by an exchange can lack credibility where they fall outside of a regulatory regime imposing the need for professional third-party vetting, audit, and liability in the event of misrepresentation or fraud.¹⁰¹ Quadriga's customers, for example, were lulled into a false sense of safety through savvy, convincing marketing that promised reliable, failsafe access to their assets.¹⁰² Moreover, underscoring this challenge, without legal clarity about the character of crypto-assets (e.g., securities vs. commodities) and the custody arrangements needed to preserve customer property rights, exchange practices can end up muddying the waters, with comingling and exchange control over keys resulting in ownership entitlements being conferred on an exchange, rather than remaining with customers. For Quadriga, Canada's Ontario Securities Commission, the country's major capital markets regulator, deemed custody arrangements to have resulted in clients transacting in contractual,

100. See Mark Cornish, Vikram Panjwani & Jenna Surface, *Using Crypto and Digital Assets? 6 Risks to Consider When Selecting a Provider*, PWC (Sept. 1, 2022), <https://www.pwc.com/us/en/tech-effect/emerging-tech/six-risk-areas-when-choosing-a-digital-asset-provider.html> [<https://perma.cc/QT8L-D8LP>].

101. See, e.g., *id.* (highlighting the risks involved in understanding reporting provided by platforms and digital asset service providers).

102. ONT. SEC. COMM'N, *QUADRIGA CX: A REVIEW BY STAFF OF THE ONTARIO SECURITIES COMMISSION 11–12* (2020), <https://www.osc.ca/sites/default/files/2020-10/QuadrigaCX-A-Review-by-Staff-of-the-Ontario-Securities-Commission.pdf> [<https://perma.cc/6V2V-MS6P>] (“Quadriga billed itself as reliable, claiming on its website that ‘all funds in the [Quadriga] system are highly liquid, and can be withdrawn at any time.’ In reality, Quadriga’s custody model and practices were flawed, and placed client assets at significant risk . . .”).

rather than in proprietary, claims.¹⁰³ In the United States, bankruptcy proceedings have pointed to a similar danger. Celsius—while not technically an exchange—ended up with legal ownership to around \$4.2 billion in customer crypto deposited by customers with Celsius as part of a high-interest “Earn” program.¹⁰⁴ Asset handling and investment practices resulted in the court ruling that asset ownership rested with Celsius—and not customers, who would only be able to assert a contractual claim to recover as unsecured creditors of the estate.¹⁰⁵

Beyond understanding the risk of single functions like trading and custody, informational challenges deepen when seeking to develop an account of how problems from one activity might migrate and amplify that of another. In other words, the fact of hyper-centralization makes the investigative task especially complex, where the market must price the risk arising out of the dynamic interaction of multiple crypto-exchange functions operating within a single or closely connected set of firms.

For example, commercial pursuits—where exchanges might offer their customers a suite of lucrative products like loans—can result in the production of unexpected dangers for the exchange’s role as a custodian and a protector of customer assets.¹⁰⁶ As noted above, crypto-exchanges have marketed a variety of services to customers designed to reward those willing to entrust their crypto to the exchange for onward investment.¹⁰⁷ Because services can often involve the exchange comingling customer assets, achieving clarity in identifying and preserving a customer’s legal rights to their crypto becomes that much harder.¹⁰⁸

Take the case of “staking” products. As a general matter, some blockchains—like Ethereum—look to staking as a way of ensuring the integrity of their underlying infrastructure.¹⁰⁹ In a “proof-of-stake” verification model, only those that have a substantial number of coins on the blockchain can win the chance to check prospective transactions for inclusion within the system.¹¹⁰ The logic of this proof-of-stake validation is

103. *See id.* at 11–12.

104. Nikhilesh De, *Celsius ‘Earn’ Assets Belong to Bankrupt Crypto Lender, Judge Rules*, COINDESK (Jan. 9, 2023, 2:54 PM), <https://www.coindesk.com/policy/2023/01/05/celsius-earn-assets-belong-to-bankrupt-crypto-lender-judge-rules/> [<https://perma.cc/R8K5-VX7Z>].

105. *Id.*; *see also* Levitin, *supra* note 9, 879–80; Popli, *supra* note 64. The ruling applied to products invested as part of Celsius’s “Earn” product, whereby customer assets were invested by Celsius as part of specific yield-seeking products. *See* De, *supra* note 104.

106. *See, e.g.*, Levitin, *supra* note 62.

107. *Id.* (noting ambiguous wording in the context of Binance’s staking products).

108. *Id.* *See generally* Levitin, *supra* note 9.

109. *What Is Staking?*, COINBASE, <https://www.coinbase.com/learn/crypto-basics/what-is-staking> [<https://perma.cc/AV8T-9LA5>].

110. *Id.*

fairly straight-forward. Those with the most “at stake” have the most to lose from a weak, malfunctioning, and easily manipulated blockchain, such that they are best incentivized to protect its integrity. In return for their efforts, those that stake their coins and validate transactions acquire rewards (in the form of new tokens)—effectively earning even greater economic skin-in-the-game.¹¹¹

Naturally, exchanges enjoy an especially prime perch from which to engage in staking. By pooling customer assets, venues are well-placed to qualify as chosen validators and to earn rewards for themselves and for their customers. Coinbase, for example, reported generating \$63 million from staking, representing around 11% of its overall net revenue.¹¹²

While staking can generate rewards for a venue and its customers, it also creates some in-built risks whose full importance is harder to value than by simply examining the risk of custody or staking activities by themselves. For one, it typically requires pooling customer assets such that these can be staked collectively on a blockchain—increasing the logistical importance of identifying customer assets and insulating them from the exchange’s insolvency. Even where an exchange is careful about securing customer assets, the need for pooling and for the venue to deploy these assets on a blockchain as a single entity can amplify the danger that customers end up holding unsecured, contractual claims.¹¹³ In addition, the practice means that customers and the marketplace must price in the prospect of novel risks emanating from the specificities of staking. For instance, staking pools are vulnerable to hacks and thefts.¹¹⁴ Once staked, coins may be lost if validation is improperly performed.¹¹⁵ Where exchanges are pooling and staking customer assets, they ought to institutionalize additional protections to better safeguard customer coins against dissipation.¹¹⁶ In all, beyond simply examining custody systems or the staking systems of a blockchain, it becomes necessary to further analyze how the exchange looks after

111. See *Earn Rewards While Securing Ethereum*, ETHEREUM, <https://ethereum.org/en/staking/> [<https://perma.cc/W32J-52FQ>].

112. Adam Morgan McCarthy, *Staking Revenues Under Threat as Coinbase Shares Tumble 22%*, BLOCK (Feb. 10, 2023, 4:41 PM), <https://www.theblock.co/post/210702/staking-revenues-under-threat-as-coinbase-shares-tumble-22> [<https://perma.cc/9PZR-PZW9>].

113. See, e.g., Levitin, *supra* note 62 (noting the legal ambiguity in relation to staking product claims).

114. See, e.g., Sergio Zammit, *The Dangers of Reckless Crypto Staking*, CRYPTIMI (Apr. 8, 2023), <https://www.cryptimi.com/news/the-dangers-of-reckless-crypto-staking> [<https://perma.cc/B3MF-6G6K>].

115. See, e.g., *Ethereum 2.0 Glossary*, CONSENSYS, <https://consensys.net/knowledge-base/ethereum-2/glossary/> [<https://perma.cc/6EH6-MR8J>] (discussing the practice of “slashing”).

116. See, e.g., *Earn Rewards with Secure Staking*, COINBASE, <https://www.coinbase.com/cloud/products/staking> [<https://perma.cc/89N7-4LTG>] (noting protections against slashing).

customer assets in the context of staking (or some other) activity. This additional informational load increases the cost of determining the scope and implications of the risks being assumed by a venue.¹¹⁷

Examples of such hybridized risks—produced by a highly centralized and multi-practice trading firm—abound.¹¹⁸ An exchange that is a custodian of customer funds—while also market-making using its own money—might appropriate customer assets to support its market-making (e.g., FTX and Alameda). Where an exchange operates a venture capital arm, infusing funding into start-ups while also running trading operations, it might be tempted to dip into customer money for fueling private investments. High-risk, high-reward venture capital arms open the venue to the uncertainty that some investments turn awry and produce large, destabilizing losses, whose pain ultimately ends up falling hardest on everyday customers.¹¹⁹

B. The Governance Challenge

The hyper-centralization evident in the organizational structure of typical cryptocurrency exchanges elevates the significance of high-quality, strong governance as a way to manage internal risks and conflicts of interest. Yet the task of establishing suitably robust and protective internal controls like corporate governance, risk management, legal, and compliance, becomes exceedingly challenging in light of complexities created within a deeply centralized model for crypto-exchange services.

For a start, the high informational costs discussed above give rise to difficulties in building well-adapted levers of governance to mediate internal conflicts. In some cases, the risks needing to be addressed are novel and/or are constantly in flux. The sophisticated nature of hacks, for example, presents challenges for even diligent operators looking to institute systems impervious to the risk of determined digital thieves and malicious agents. Even as monitoring systems are strengthened, exchanges confront the problem of being outrun by technologically skilled bad actors capable of nimbly outsmarting existing controls.¹²⁰ Beyond hacks and thefts, exchanges inhabit an ecosystem that is home to an evolving, innovating slate of technologies in the form of new blockchains or emerging ventures

117. See Levitin, *supra* note 62.

118. Shubber & Elder, *supra* note 1 (noting the complex risks facing FTX in its capacity as a venture investor in its own right).

119. *Id.*

120. See, e.g., Ed Drake, *Crypto Hackers Getting 'More Sophisticated' as Exchanges Amp Up Security*, COINGEEK (Feb. 7, 2020), <https://coingeek.com/crypto-hackers-getting-more-sophisticated-as-exchanges-amp-up-security/> [<https://perma.cc/6A7Z-FGAG>].

and their native tokens.¹²¹ With limited systematic regulation overseeing the crypto-industry in the United States, low barriers to entry mean that exchanges must be capable of responding to sometimes experimental arrivals seeking to list their coins or to acquire start-up funding from an exchange provider.¹²² Perhaps nowhere is this expansiveness (and vulnerability to new risks) more evident than in the case of decentralized finance—where applications are programmed to function on an automated basis, seemingly without reliance on an intermediary.¹²³ As noted earlier, defi within crypto-markets has experienced powerful growth in recent years, bringing an underexplored set of risks to exchanges that might list an application’s coins, have to deal with its unique technologies, or have to accommodate business from developers building defi products to run on an exchange’s proprietary blockchain.¹²⁴

To be sure, informational deficits are commonplace even within more mainstream financial markets.¹²⁵ Yet tools that might help in mitigating them are either missing or are much more attenuated within the cryptocurrency industry—adding to the challenge of establishing well-suited governance and risk management. Crucially, comprehensive systems of regulation typically facilitate the production of high-quality information that, in turn, can promote standardization, good governance, and greater accountability within internal organizations. Mandatory disclosure and reporting by public companies, for example, communicate broadly about a company’s core business, financial health, and the quality of its management and governance.¹²⁶ Regulations establish benchmarks for presenting information (e.g., requiring auditors and legal professionals to vouch for a company’s financial and legal compliance). And top-down legal stipulations about the composition of a corporate board (e.g., to include independent directors, various committees as well as competent personnel)

121. See, e.g., *Introducing Base: Coinbase’s L2 Network*, COINBASE, <https://help.coinbase.com/en/coinbase/other-topics/other/base> [https://perma.cc/5PCP-FPU7].

122. See, e.g., Brian Armstrong, *An Update on Our Asset Listing Process*, COINBASE (July 21, 2022), <https://www.coinbase.com/blog/an-update-on-our-asset-listing-processes> [https://perma.cc/5KCJ-WRBJ] (highlighting processes for navigating the tension between listing new tokens versus customer protection and the preservation of fairness in choosing which coins get listed).

123. See Raphael Auer, Bernhard Haslhofer, Stefan Kitzler, Pietro Saggese & Friedhelm Victor, *The Technology of Decentralized Finance (DeFi) 2* (BIS Working Papers, No. 1066, 2023), <https://www.bis.org/publ/work1066.pdf> [https://perma.cc/X4H6-KBH2] (“Decentralized Finance (DeFi) offers on-chain financial services such as borrowing, lending, or investing without relying on a traditional centralized financial intermediary.”).

124. See, e.g., Nansen, *supra* note 75.

125. This is an extensive topic with a large and diverse literature. For some discussion on sources of information loss in securities and financial markets, see generally, David Llewellyn, *The Economic Rationale for Financial Regulation*, OCCASIONAL PAPER SERIES, Apr. 1999, at 21–22.

126. See, e.g., Coffee, *supra* note 52.

are further backstopped by private industry norms enforced through exchange listing promulgated under the authority of the New York Stock Exchange or Nasdaq.¹²⁷

In the specific context of overseeing national securities exchanges, regulation requires venues to furnish detailed disclosures about their internal workings, corporate form, and risk management alongside representations to show effectively that the exchange can perform its functions in accordance with the standards required by the law.¹²⁸ Not only must aspiring national exchanges ensure that they have remedied internal failings and deficits to meet established regulatory prescriptions, but they must also substantiate their progress through in-depth, regular information flows to bridge data gaps within the market. In turn, fuller information flows can foster a sharper understanding of the risks facing an exchange (e.g., to address fragilities from emerging technology like cyberthreats) and promote rulemaking that responds to this learning.¹²⁹ Clearly, this account simplifies and abbreviates discussion of nuanced and rich debates surrounding disclosure and how effective corporate governance, compliance, and risk management prescriptions are across financial markets. But the point is simply that the historic lack of a real federal regulatory regime for cryptocurrency exchanges creates a significant challenge for venues seeking to navigate the complex terrain of a hyper-centralized organization.¹³⁰ Without a system of oversight detailing how an organization transacting in digital assets ought to be set up, safeguarded, and operated, alongside mechanisms for requiring high-quality disclosure (that attracts liability for mistakes and misrepresentation), crypto-exchanges are essentially left to decide these matters for themselves in *ad hoc* and idiosyncratic ways. With the exception of Coinbase (a publicly traded company), the difficulty of bringing outside scrutiny to analyze internal exchange practices can leave crypto-exchanges less accountable to market discipline or regulatory action

127. See Karmel, *supra* note 52, at 326–33 (noting the significance of listing requirements as a complement and a near proxy for federal regulation).

128. See, e.g., Invs.' Exch., LLC for Registration as a Nat'l Sec. Exch., Exchange Act Release No. 34-78101, 81 Fed. Reg. 41142, 41142–43 (Jun. 17, 2016), <https://www.govinfo.gov/content/pkg/FR-2016-06-23/pdf/2016-14875.pdf> [<https://perma.cc/DJ89-4SME>] (showing an example of the kinds of disclosures that a prospective exchange must provide when seeking to become authorized as a national securities exchange).

129. Press Release, Sec. & Exch. Comm'n, SEC Proposes to Expand and Update Regulation SCI (Mar. 15, 2023), <https://www.sec.gov/news/press-release/2023-53> [<https://perma.cc/WM6D-NXMZ>].

130. As discussed earlier, certain states like New York and Wyoming do provide for a system of oversight for firms engaging in various digital asset-related activities. See *supra* note 9 and accompanying text.

designed to address specific emerging risks.¹³¹ The cost of limited regulatory standardization (e.g., on disclosure, reporting, governance, and risk management) leaves customers potentially facing a unique confluence of risks/benefits depending on where they choose to transact. While this means that customers might be able to pick and choose—voting with their feet to select an exchange that best conforms to their risk preferences—it also requires customers to do the work of understanding how each exchange operates and perform this research at their own expense in the absence of detailed disclosures and professional/public certifications.¹³²

It may be argued, of course, that exchanges should look to existing regulatory practices with respect to securities or commodities venues when determining how best to hone their internal governance. That is, diligent cryptocurrency exchanges could privately just replicate existing rules and regulations applicable to more traditional venues with respect to matters such as governance, risk management, and compliance. Such a move reflects the practical reality that crypto venues have aspects in common with more conventional exchanges.¹³³ Most fundamentally, both kinds seek to intermediate transactions in different assets by bringing buyers and sellers together, selling ancillary products and services, and seeking to do so in trusted ways that can generate network effects and efficiencies.¹³⁴ Sharing such functional commonalities, crypto-venues might save themselves time and transaction costs by imitating governance practices that have shown themselves as useful to promoting market quality and customer protection in traditional commodities or securities markets.

While such a pathway is appealing, it is also incomplete and lacking necessary nuance. Crucially, it fails to account for the governance demands needed to address the risks of a highly centralized trading venue. As detailed earlier, cryptocurrency venues tend to be much more consolidated than traditional ones.¹³⁵ As discussed here, they collapse a host of functions into a single (or closely connected group) entity—interspersing activities like marketing products to customers, market making, venture funding, custody,

131. See, e.g., Telis Demos, *Crypto's Transparency May Be Part of the Problem Right Now*, WALL ST. J. (Nov. 17, 2022, 7:43 AM), <https://www.wsj.com/articles/cryptos-transparency-may-be-part-of-the-problem-right-now-11668692632> [<https://perma.cc/V86W-X54J>] (noting the lack of transparency and standardization impacting crypto exchanges).

132. *Id.* (noting the work that customers have to do to analyze crypto data). On platform risks and customer due diligence see Cornish, Panjwani & Surface, *supra* note 100.

133. Yadav, *supra* note 14.

134. For discussion of the commonalities between traditional and crypto-exchanges, see Yadav, *supra* note 14.

135. *Id.* at 4–10.

clearing, and settlement.¹³⁶ Conventions for custody of crypto assets—with exchanges commonly tasked with holding private keys—differ from well-established practices for custody of securities or commodities that tend to reside with professional custodians and held in accordance with strict rules for safekeeping.¹³⁷ Modalities for clearing and settlement also diverge. Unlike securities and commodities trading, crypto trades usually settle instantly on the books of the venue, requiring customer positions to be funded before the fact, instead of money and assets moving over the course of multiple days after a bargain is reached.¹³⁸ Importantly, crypto trading is open to everyday retail customers, putting an exchange in direct contractual contact with mom-and-pop traders. On traditional exchanges, by contrast, entry is generally restricted to authorized brokerage firms and investment professionals.¹³⁹

Put differently, crypto-exchanges and regulators cannot assume that risks specific to their highly consolidated, digitally-native model can be effectively addressed by importing traditional norms to a crypto-venue wholesale. As discussed earlier, certain complex risks arising on account of an interplay of multiple functions together (e.g., custody, proprietary market making) are generally carefully controlled or otherwise considered anathema (e.g., proprietary in-house market making) in the context of traditional, regulated securities and commodities markets.¹⁴⁰

The significance of a hyper centralized operating model—and the need for largely unregulated venues to internalize the costs for implementing governance practices to address the relatively novel risks involved—holds a bleak prognosis for industry reform. Broadly, venues have two options. One, they can diligently deploy resources in investigating the complex and moving risks created within the crypto-industry and in devising best-in-class, tailored governance tools to address them. These might include

136. See, e.g., Capital Commitment Blog, *SEC Clamps Down on Custody Rule*, PROSKAUER (Dec. 11, 2019), <https://www.proskauer.com/blog/sec-clamps-down-on-custody-rule> [<https://perma.cc/V9S8-EJSF>]; 17 C.F.R. § 275.206(4)-2 (2010).

137. Levitin, *supra* note 9, at 885.

138. *Coinbase Markets Trading Rules*, *supra* note 18, at section 1.8 (on instant settlement in cryptocurrency exchange trading). On the traditional settlement cycle in equities markets for example, see DTCC Connection Staff, *DTCC Ramps up Industry T+1 Testing*, DDTC (Jan. 23, 2023), <https://www.dtcc.com/dtcc-connection/articles/2023/january/23/dtcc-ramps-up-industry-t1-testing> [<https://perma.cc/F9VU-WXL8>].

139. See, e.g., NYSE Rule 7.30, 2 N.Y.S.E. Guide (CCH) (July 2017), <https://nyseguide.srorules.com/rules/52dd0a347d461000bdc8005056883b3a02a> [<https://perma.cc/MF4A-TKP3>].

140. See, e.g., STEPHEN W. POSER, MARKET MAKERS IN FINANCIAL MARKETS: THEIR ROLE, HOW THEY FUNCTION, WHY THEY ARE IMPORTANT, AND THE NYSE DMM DIFFERENCE, NYSE (2021), https://www.nyse.com/publicdocs/nyse/NYSE_Paper_on_Market_Making_Sept_2021.pdf [<https://perma.cc/CX6B-3SXC>] (noting the role of market makers hosted (not owned) the NYSE to facilitate trading).

structural shifts to institutionally wall-off certain functions from one another (e.g., for a venture arm to be separately funded and operated from the trading arm), detailed data gathering and public disclosure, and/or holding thick buffers of cash and safe assets to protect against default.¹⁴¹ By emphasizing safety, the venue might be able to attract attention from risk-averse customers as well as promote itself to regulators as a credible actor.

But a venue can instead take another approach. That is, it can adopt a more strategic posture toward governance and risk management, designed to lower the cost to itself, instituting only necessary protections to ensure exchange function rather than what might be optimal. This second approach promises a number of private advantages for a venue. For a start, it recognizes the fact that crypto trading platforms have not been subject to a system of comprehensive federal oversight.¹⁴² This leaves room for venues to avoid strictly observing traditional governance norms without paying the full price.¹⁴³ Their more consolidated structure also offers scope to debate how existing practices might be applied to a crypto-exchange, and whether/what different and distinctive protective measures are needed—with this lack of clarity justifying exchanges in pursuing a more idiosyncratic approach to governance.¹⁴⁴ Because requirements for disclosure and transparency are also unreliable across most major crypto-exchanges, and because consolidated venues create complex hybridized risks, detecting bad conduct becomes expensive for everyday customers unless regulators invest systematically in uncovering misdeeds or it ends up in a judicial process like bankruptcy (e.g., FTX).¹⁴⁵ Finally, fierce competition between crypto-venues alongside the known pay-offs of a hyper-centralized model (and the costs and uncertainty involved in abandoning it) can push a venue in favor of doing less rather than more.

141. For discussion, see Yadav, *supra* note 14.

142. Note that the SEC has been pursuing enforcement actions designed to apply and extend existing securities-based regimes to crypto-trading. For an early example, see Press Release, Sec. & Exch. Comm'n, SEC Charges Crypto Trading Platform Beaxy and Its Executives for Operating an Unregistered Exchange, Broker, and Clearing Agency (Mar. 29, 2023), <https://www.sec.gov/news/press-release/2023-64> [<https://perma.cc/7RJ8-UBML>].

143. See Declaration of John J. Ray III in Support of Chapter 11 Petitions and First Day Pleadings, *In re* FTX Trading Ltd., No. 22-11068-JTD (Bankr. D. Del. 2022) (No. 92), 2022 WL 17268174 (detailing the abject governance at FTX International, which lacked a competent and functional board, legal and compliance personnel).

144. See Mengqi Sun, *Crypto Exchange Kraken Settles Alleged Sanctions Violations*, WALL ST. J. (Nov. 29, 2022, 1:51 PM), <https://www.wsj.com/articles/crypto-exchange-kraken-settles-alleged-sanctions-violations-11669680264> [<https://perma.cc/ZK7T-32FD>]; Nikhilesh De & Cheyenne Ligon, *Kraken Under Investigation for Alleged Sanctions Violations: Report*, COINDESK (May 11, 2023, 12:01 PM), <https://www.coindesk.com/policy/2022/07/26/kraken-under-investigation-for-alleged-sanctions-violations-report/> [<https://perma.cc/UV66-5FUB>].

145. See, e.g., Declaration of John J. Ray III, *supra* note 143 (detailing the abject governance at FTX International, which lacked a competent and functional board, legal and compliance personnel).

Where other exchanges are not subject to requirements to implement strong internal controls, the competitive threat they pose to a diligent exchange's business can make investing in governance reform much less appealing economically. Without exchanges collectively motivated to coordinate on governance reform to address the risks of their specific, centralized business model, single venues arguably have little incentive to step forward and do so by themselves. These dynamics should increase the pressure on federal regulators to devise effective and well-adapted regulatory solutions—as without such progress, private efforts in bringing about governance reform are likely to be overly costly for single actors and unlikely to succeed in creating industry-wide shifts in behavior.

CONCLUSIONS

Cryptocurrency exchanges have shown themselves to be essential in the creation of a popular and increasingly more mainstream market for digital assets. Though exchanges perform a host of familiar functions in familiar ways, their rapid rise from esoteric start-ups into household names has been enabled by a unique organizational model that relies on firm centralization to a far greater degree than what is seen (or allowed) in more traditional securities or commodities exchanges. As detailed in this Article, this hypercentralization has arguably emerged as a consequence of venues needing to rapidly attract liquidity in novel asset classes outside of the purview of a comprehensive system of oversight. To avoid the time and cost of settling on blockchains, exchanges have developed their own far more user-friendly conventions, where transactions are concluded and settled virtually instantly and typically in-house. Yet, this market structure brings a number of novel risks for the industry as well as for regulators. The collapse of FTX visibly reveals an organizational structure that is vulnerable to deep conflicts, opacity, and whose risks reveal the product of a fusion of disparate business activities working alongside and against each other. As analyzed here, the paradox of centralization within crypto-markets highlights problems that exchanges themselves lack the motivation and the tools to address effectively. Without countervailing pressure through a detailed framework of thoughtful, responsive federal oversight, firms have every incentive to prioritize a risky governance model that best enables them to grow, outrun their competitors, capture market share, and tie customers into practices that cultivate them as repeat players.

While the goal of this Article is to highlight the phenomenon of hypercentralization in the cryptocurrency market and to detail its rationales and risks, the main takeaway here lies in underscoring the need for

thoroughgoing, informed regulation to address fragilities and conflicts of interest in crypto-exchange design. Some reform measures could look to existing, common-sense practices long used in more traditional securities or commodities markets. For example, firms might introduce a high-caliber board of directors, competent legal and compliance departments, measures to mitigate technological failures like hacking or cyberthreats, a cushion of safe assets to protect against large withdrawals, alongside regular reporting to regulators, and a regime to maintain accountability. But a reflexive instinct to transplant existing rules to crypto-exchanges wholesale also misses the point—and the opportunity to calibrate regulation to fit this novel type of organization. In other words, substantive regulatory engagement with the specifics of crypto-exchange design alongside some policy creativity are necessary. Acknowledging that many crypto-exchanges have evolved into complex firms, interfacing with everyday customers, engaging with globally dispersed ventures as part a highly centralized firm structure, regulators can ill-afford to wait for another FTX-like crisis before acting.