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DECENTRALIZED FINANCE: REGULATING CRYPTOCURRENCY EXCHANGES

KRISTIN N. JOHNSON*

ABSTRACT

Global financial markets are in the midst of a transformative movement. The creation of Bitcoin and Facebook's proposed distribution of Diem mark a watershed moment in the evolution of the financial markets ecosystem. Purportedly, peer-to-peer distributed digital ledger technology eliminates legacy financial market intermediaries such as investment banks, depository banks, exchanges, clearinghouses, and broker-dealers.

Yet careful examination reveals that cryptocurrency issuers and the firms that offer secondary market cryptocurrency trading services have not quite lived up to their promise. Notwithstanding crypto-enthusiasts' calls for disintermediation, evidence reveals that platforms that facilitate cryptocurrency trading frequently employ the long-adopted intermediation practices of their traditional counterparts. In fact, when emerging technologies fail, cryptocoin and token trading platforms partner with and rely on traditional financial services firms. As a result, these platforms face many of the

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risk-management threats that have plagued conventional financial institutions as well as a host of underexplored threats. Automated or algorithmic trading strategies, accelerated high frequency trading tactics, and sophisticated Ocean's Eleven-style cyberheists leave crypto-investors vulnerable to predatory practices.

Early responses to fraud, misconduct, and manipulation emphasize intervention when originators first distribute cryptocurrencies—the initial coin offerings. This Article rejects the dominant regulatory narrative that prioritizes oversight of primary market transactions. Instead, this Article proposes that regulators introduce formal registration obligations for cryptocurrency intermediaries—the exchange platforms that provide a marketplace for secondary market trading. This approach recognizes the dynamic nature of cryptocurrency secondary market actors seeking to achieve disintermediation yet balances the potential benefits of trading intermediaries with normative regulatory goals—protecting investors from fraud, theft, misconduct, and manipulation; enforcing accountability; preserving market integrity; and addressing enterprise and systemic risk-management concerns.

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INTRODUCTION

Despite federal and state regulators' warnings and mounting civil and criminal enforcement actions, investors continue to flock to cryptocurrency markets, buying coins and tokens in initial coin offerings (ICOs).¹ At its high-water mark in 2021, exponential growth characterized the near one-trillion-dollar cryptocurrency market.² As governments, private stakeholders, and academics cast a spotlight on ICOs, a shadow fell, obscuring nefarious activity on secondary trading market platforms.

Media reports chronicle the endemic challenges in cryptocurrency secondary markets. Bitfinex, one of the world's largest cryptocurrency exchanges, is a prominent example. Founded in 2012, Bitfinex has survived *Ocean's Eleven*-style heists that emptied hundreds of millions of dollars of customer assets from its coffers.³ Periodic cyberattacks have temporarily paralyzed Bitfinex's platform, suspending trading and halting customer withdrawals.⁴ Yet, these incidents are only the tip of the iceberg.

Bad actors swarm secondary market trading in cryptocurrency markets. Traditional banks are reticent to permit cryptocurrency exchanges to open accounts; thus, these platforms often rely on

1. See Jake Frankenfield, *Initial Coin Offering (ICO)*, INVESTOPEDIA (Sept. 26, 2020), <https://www.investopedia.com/terms/i/initial-coin-offering-ico.asp> [https://perma.cc/VT78-LB7R] ("An Initial Coin Offering (ICO) is the cryptocurrency industry's equivalent to an Initial Public Offering (IPO).").

2. *Global Charts: Total Market Capitalization*, COINMARKETCAP, <http://coinmarketcap.com/charts/> [https://perma.cc/NS33-QDQ7].

3. Nathaniel Popper, *Warning Signs About Another Giant Bitcoin Exchange*, N.Y. TIMES (Nov. 21, 2017), <https://www.nytimes.com/2017/11/21/technology/bitcoin-bitfinex-tether.html> [https://perma.cc/77A6-4GZ7].

4. Daniel Palmer, *Major Crypto Exchanges Bitfinex and OKEx Hit by Service Denial Attacks*, COINDESK (June 12, 2020, 3:27 PM), <https://www.coindesk.com/major-crypto-exchanges-bitfinex-and-okex-hit-by-traffic-denial-attacks> [https://perma.cc/42EN-2MLP]; Andrey Shevchenko, *Crypto Exchanges OKEx and Bitfinex Suffer Simultaneous DDoS Attacks*, COINTELEGRAPH (Feb. 28, 2020), <https://cointelegraph.com/news/crypto-exchanges-okex-and-bitfinex-suffer-simultaneous-ddos-attacks> [https://perma.cc/KS5P-T4FA]. For examples of earlier cyberattacks, see Steven Russolillo, *Hackers Swipe More Than \$40 Million of Bitcoin from Cryptocurrency Exchange*, WALL ST. J. (May 8, 2019, 2:27 AM), https://www.wsj.com/articles/hackers-swipe-more-than-40-million-of-bitcoin-from-cryptocurrency-exchange-11557296830?mod=article_inline [https://perma.cc/H4RJ-7ZGD].

“shadow banks.”⁵ For example, Bitfex initially routed customer transactions through a Taiwanese bank to Wells Fargo.⁶ Then, on April 18, 2017, Wells Fargo began blocking Bitfinex wire transfers.⁷ Bitfinex pivoted to a Puerto Rican bank—Noble Bank.⁸ On October 1, 2018, Noble Bank lunged toward bankruptcy.⁹ Bitfinex transferred \$850 million to a Panamanian nonbank payment processing platform—Crypto Capital.¹⁰ Another fleeting solution. Within a year, the Polish government arrested Crypto Capital’s President Ivan Manuel Molina Lee for his role laundering money on behalf of an international drug cartel.¹¹ Bitfinex shocked the cryptoworld, announcing that the \$850 million in customer funds held by Crypto Capital had vanished.¹²

Beyond Bitfinex’s firm-specific risk-management concerns—the conflicts of interest, woefully deficient compliance controls, anemic consumer protection policies, and remarkably inadequate cybersecurity measures—the entire industry grapples with operational and systemic risks: fake bank accounts, mismanagement of

5. Paul Vigna, *Lack of Banking Options a Big Problem for Crypto Businesses*, WALL ST. J. (May 17, 2019, 12:34 PM), <https://www.wsj.com/articles/lack-of-banking-options-a-big-problem-for-crypto-businesses-11558092600> [<https://perma.cc/F7RD-NYN6>].

6. *Id.*

7. *See id.*

8. Ana Berman, *Bloomberg: Puerto Rico’s Noble Bank Reportedly Loses Clients Tether, Bitfinex, Seeks Buyer*, COINTELEGRAPH (Oct. 2, 2018), <https://cointelegraph.com/news/bloomberg-puerto-ricos-noble-bank-reportedly-loses-clients-tether-bitfinex-seeks-buyer> [<https://perma.cc/D53Y-RUA9>].

9. *Id.*

10. Paul Vigna, *Bitfinex Used Tether Reserves to Mask Missing \$850 Million, Probe Says*, WALL ST. J. (Apr. 25, 2019, 11:21 PM), <https://www.wsj.com/articles/bitfinex-used-tether-reserves-to-mask-missing-850-million-probe-finds-11556227031> [<https://perma.cc/R4EW-4NDH>]; *see also* Press Release, N.Y. Att’y Gen., Attorney General James Announces Court Order Against “Crypto” Currency Company Under Investigation for Fraud (Apr. 25, 2019), <https://ag.ny.gov/press-release/2019/attorney-general-james-announces-court-order-against-crypto-currency-company> [<https://perma.cc/G4YV-63A6>].

11. Samuel Haig, *Bitfinex Cries Fraud as Crypto Capital Executive Indicted by US*, COINTELEGRAPH (Oct. 30, 2019), <https://cointelegraph.com/news/bitfinex-cries-fraud-as-crypto-capital-executive-indicted-by-us> [<https://perma.cc/M65Y-SVWE>].

12. Steve Ehrlich, *After an \$850 Million Controversy, What Everyone Should Know About Bitfinex, Tether and Stablecoins*, FORBES (May 2, 2019, 9:09 AM), <https://www.forbes.com/sites/stevenehrlich/2019/05/02/after-an-850-million-controversy-what-everyone-should-know-about-bitfinex-tether-and-stablecoins/?sh=19d2f02e492f> [<https://perma.cc/4GTT-BH75>].

customer funds, blatant theft, garden-variety fraud, and exploitative and abusive trading strategies.¹³

Stunningly, none of the three hundred trading platforms facilitating cryptocurrency secondary market transactions has obtained the requisite approval from federal or state authorities to operate as an exchange.¹⁴ Regulators have formally prosecuted only a handful of trading platforms.¹⁵ Most troubling, however, are the breadth and depth of these challenges among the small group of actors that has captured the greatest market share in global cryptocurrency secondary trading markets. Why have Congress and regulators failed to impose order in the Wild West of cryptocurrency secondary market trading?

Financial services regulation is complex and growing more complex each day.¹⁶ Among other challenges, regulators do not always understand *what* exactly (transactions, other activities, or attributes) gives rise to regulatory intervention.¹⁷ Complicated financial products precipitated the financial crisis that began in 2007,¹⁸ and, in the wake of the crisis, many were disillusioned.

13. David Floyd, *Fraudulent Trading Drove Bitcoin's \$150-to-\$1,000 Rise in 2013: Paper*, INVESTOPEDIA (June 25, 2019), <https://www.investopedia.com/news/bots-drove-bitcoins-150to1000-rise-2013-paper/> [<https://perma.cc/JQZ3-W3BB>].

14. *See Today's Cryptocurrency Prices by Market Cap*, COINMARKETCAP, <http://coinmarketcap.com/> [<https://perma.cc/RU94-8KH3>]; *see also* Nathan Reiff, *How Much of All Money Is in Bitcoin?*, INVESTOPEDIA (June 21, 2020), <https://www.investopedia.com/tech/how-much-worlds-money-bitcoin/> [<https://perma.cc/DA2X-CL5R>].

15. *See, e.g.*, Press Release, U.S. Commodity Futures Trading Comm'n, CFTC Orders Bitcoin Exchange Bitfinex to Pay \$75,000 for Offering Illegal Off-Exchange Financed Retail Commodity Transactions and Failing to Register as a Futures Commission Merchant (June 2, 2016), <https://www.cftc.gov/PressRoom/PressReleases/7380-16> [<https://perma.cc/DCZ9-FUAS>].

16. *See* Shaanan Cohny, David Hoffman, Jeremy Sklaroff & David Wishnick, *Coin-Operated Capitalism*, 119 COLUM. L. REV. 591, 603 (2019); *see also* *Examining Facebook's Proposed Cryptocurrency and Its Impact on Consumers, Investors, and the American Financial System: Hearing Before the H. Comm. on Fin. Servs.*, 116th Cong. (2019) (statement of Chris Brummer, Professor of Law, Georgetown University Law Center) [hereinafter Statement of Chris Brummer], <https://financialservices.house.gov/uploadedfiles/hhrg-116-ba00-wstate-brummer-20190717.pdf> [<https://perma.cc/T7EU-5NEJ>] (describing the structure of Facebook's proposed Diem network); *id.* (statement of Katharina Pistor, Edwin B. Parker Professor of Comparative Law and Director, Center on Global Legal Transformation, Columbia Law School) [hereinafter Statement of Katharina Pistor], <https://financialservices.house.gov/uploadedfiles/hhrg-116-ba00-wstate-pistork-20190717.pdf> [<https://perma.cc/5LJG-CT2P>].

17. *See* Chris Brummer & Yesha Yadav, *Fintech and the Innovation Trilemma*, 107 GEO. L.J. 235, 263-64 (2019).

18. *See, e.g.*, Saule T. Omarova, *The Quiet Metamorphosis: How Derivatives Changed the*

Legacy financial institutions and other market participants' avaricious, self-serving, and predatory behavior initiated a polarized debate regarding the federal government's \$700 billion bailout of Wall Street intermediaries.¹⁹ Developers began to imagine a financial services industry without traditional intermediaries—depository banks, investment banks, stock exchanges, brokers, and dealers.

Innovative financial technology (fintech) products and firms aimed to disrupt conventional financial markets and displace legacy financial institutions.²⁰ Programmers introduced alternative financial products and platforms, namely peer-to-peer distributed digital ledger platforms that originate and distribute cryptocurrencies.²¹

Since the publication of the Bitcoin blockchain White Paper in 2010, markets have witnessed the origination of more than five thousand cryptocurrencies.²² In the ensuing decade, regulators have scrambled to keep pace. Distributed digital ledger technology and the popular subset of blockchain-based technologies are among the

"*Business of Banking*," 63 U. MIA. L. REV. 1041, 1041 (2009).

19. See David M. Herszenhorn, *Congress Approves \$700 Billion Wall Street Bailout*, N.Y. TIMES (Oct. 3, 2008), <https://www.nytimes.com/2008/10/03/business/worldbusiness/03iht-bailout.4.16679355.html> [<https://perma.cc/K6J8-TUHM>].

20. Brummer & Yadav, *supra* note 17, at 263-64; Rory Van Loo, *Making Innovation More Competitive: The Case of Fintech*, 65 UCLA L. REV. 232, 232 (2018); William Magnuson, *Regulating Fintech*, 71 VAND. L. REV. 1167, 1167 (2018); Adam J. Levitin, *Pandora's Digital Box: The Promise and Perils of Digital Wallets*, 166 U. PA. L. REV. 305, 305-06 (2018); Jeanne L. Schroeder, *Bitcoin and the Uniform Commercial Code*, 24 U. MIA. BUS. L. REV. 1, 1 (2016); Angela Walch, *The Bitcoin Blockchain as Financial Market Infrastructure: A Consideration of Operational Risk*, 18 N.Y.U. J. LEGIS. & PUB. POL'Y 837, 837 (2015).

21. This Article refers to distributed digital technology protocols as "enterprises." A rich literature explores the development of entities operating in a manner that is colloquially described as partnerships, trusts, and other business organizational forms notwithstanding their failure to formally adopt (and in some cases they even reject) the notion that they operate pursuant to a conventional business structure; an even more interesting discussion emerges upon recognizing that these entities increasingly rely on algorithms to make fundamental operational and investment decisions. See Shawn Bayern, *Are Autonomous Entities Possible?*, 114 NW. U. L. REV. ONLINE 23, 24-25 (2019) (responding to criticism from Lynn Lopucki); see also Lynn M. Lopucki, *Algorithmic Entities*, 95 WASH. U. L. REV. 887, 887 (2018).

22. *Compare Historical Snapshot-01 January 2017*, COINMARKETCAP, <http://coinmarketcap.com/historical/20170101/> [<https://perma.cc/78XM-6FGQ>] (listing 636 coins on the market in 2017), with *Historical Snapshot-06 January 2019*, COINMARKETCAP, <http://coinmarketcap.com/historical/20190106/> [<https://perma.cc/5GUS-3RAA>] (listing slightly over two thousand coins on the market in 2019).

most innovative technologies in the financial markets ecosystem.²³ Central banks, national governments, and significant financial institutions increasingly signal an interest in the origination, distribution, and exchange of proprietary cryptocurrencies.²⁴ Indisputably, these coins and tokens have moved from the shadows to center stage.

In the summer of 2019, for example, Facebook released a White Paper announcing plans to issue a stablecoin—Diem, a global

23. While many use the language “blockchain technology” and “digital ledger technology” (DLT) interchangeably, the two are not synonymous. Media accounts, popular accounts, and the literature conflate the general theory of DLT with blockchain applications and, perhaps even more disappointingly, use the terms interchangeably. For the purposes of this Article, I will aim to use DLT to describe the foundational technology and blockchain to refer to specific protocols or applications. While DLT and blockchain are not synonymous, the distinctions are too technical to explore here and do not alter the analysis and conclusions presented in this Article.

For a useful introduction to DLT and an analysis of the epistemological challenges in the literature, see Carla L. Reyes, *If Rockefeller Were a Coder*, 87 GEO. WASH. L. REV. 373, 379-82 (2019) (describing DLT as “computer software that is distributed, runs on peer-to-peer networks, and offers a transparent, verifiable, tamper-resistant transaction-management system maintained through a consensus mechanism rather than by a trusted third-party intermediary that guarantees execution”); see also Angela Walch, *The Path of the Blockchain Lexicon (and the Law)*, 36 B.U. REV. BANKING & FIN. L. 713, 719-20 (2017) (“Blockchain technology, sometimes called ‘the blockchain’ or just ‘blockchain,’ is alternatively referred to as ‘distributed ledger technology’ (DLT), ‘shared ledger technology’ (SLT), ‘consensus ledger’ technology, ‘mutual distributed ledger’ technology, or even a decentralized or ‘distributed database.’” (footnotes omitted)).

For an interesting comparative discussion, see Samantha Stein, *Hashgraph Wants to Give You the Benefits of Blockchain Without the Limitations*, TECHCRUNCH (Mar. 13, 2018, 11:00 PM), <https://techcrunch.com/2018/03/13/hashgraph-wants-to-give-you-the-benefits-of-blockchain-without-the-limitations/> [<https://perma.cc/5V6L-RDJQ>]. While the bitcoin blockchain protocol is one of the most popular and well-known blockchain protocols, there are an increasing number of financial and nonfinancial blockchain protocols. Consider, for example, Ethereum (another exceedingly popular blockchain with diverse financial and nonfinancial applications), Hashgraph (a hashgraph algorithm), or an asynchronous Byzantine Fault Tolerance (aBFT) consensus mechanism based on a virtual voting algorithm combined with the gossip protocol or Directed Acyclic Graphs (DAGs). Cf. Press Release, Globe Newswire, *tune.fm Launches New Token Protocol on Hedera Hashgraph* (Aug. 5, 2020), <https://apnews.com/press-release/globe-newswire/3601a20bf7c29098f1df2eb77dfee4f9> [<https://perma.cc/XH8C-URZY>].

24. Anna Isaac & Caitlin Ostroff, *Central Banks Warm to Issuing Digital Currencies*, WALL ST. J. (Jan. 23, 2020, 11:15 AM), <https://www.wsj.com/articles/central-banks-warm-to-issuing-digital-currencies-11579796156> [<https://perma.cc/Y9EP-FS4D>]; Nathaniel Popper, *Central Banks Consider Bitcoin’s Technology, if Not Bitcoin*, N.Y. TIMES (Oct. 11, 2016), <https://www.nytimes.com/2016/10/12/business/dealbook/central-banks-consider-bitcoins-technology-if-not-bitcoin.html> [<https://perma.cc/9E5J-Y6HF>].

cryptocurrency designed to displace existing government-issued fiat and introduce a frictionless international financial payment system.²⁵ Facebook's description depicts Diem as sharing attributes with a variety of traditional assets and financial services; according to Facebook, Diem is a currency or cash-equivalent cryptowallet and private payment platform.²⁶

Simply stated, Diem defies the rigid, siloed designations characteristic of the laws governing financial markets. Distributed digital ledger protocols enable developers to create multifaceted entities and products that play many roles. Diem operates as the issuer, the investment bank or underwriter for the initial offering of Diem, the broker-dealer who executes Diem trades for Diem holders, and the exchange platform that facilitates Diem secondary market transactions.²⁷

Achieving regulatory aims may be difficult, if not impossible, if lawmakers and regulators do not understand exactly which entity attributes or characteristics give rise to regulation. For nearly a century, financial regulators have ordered markets based on the role that intermediaries play in the development and execution of primary and secondary market transactions.²⁸ Determining the

25. Jeff Horwitz & Parmy Olson, *Facebook Unveils Cryptocurrency Diem in Bid to Reshape Finance*, WALL ST. J. (June 18, 2019, 6:59 PM), <http://www.wsj.com/articles/facebook-unveils-crypto-wallet-based-on-currency-libra-11560850141> [<https://perma.cc/52Z2-GRDX>]. Diem is, in fact, Facebook's fourth attempt at introducing an alternative financial services platform.

26. *Examining Facebook's Proposed Cryptocurrency and Its Impact on Consumers, Investors, and the American Financial System: Hearing Before the H. Comm. on Fin. Servs.*, 116th Cong. 2 (2019) (statement of David Marcus, Head of Calibra, Facebook), <https://financialservices.house.gov/uploadedfiles/hhrg-116-ba00-wstate-marcusd-20190717.pdf> [<https://perma.cc/5CKE-YL89>] (describing how Diem will be linked to a number of different real world assets); Sherman Lee, *Explaining Stable Coins, the Holy Grail of Cryptocurrency*, FORBES (Mar. 12, 2018, 12:15 AM), <https://www.forbes.com/sites/shermanlee/2018/03/12/explaining-stable-coins-the-holy-grail-of-cryptocurrency/?sh=f2547ca4fc64> [<https://perma.cc/TK7F-FB4N>] ("A 'stable coin' is a cryptocurrency that is pegged to another stable asset, like gold or the U.S. dollar. It's a currency that is global, but is not tied to a central bank and has low volatility. This allows for practical usage of using cryptocurrency like paying for things every single day."). The structure of Diem operates in tandem with cryptowallets distributed by affiliated subsidiary Novi. See generally NOVI, <http://www.novi.com/> [<https://perma.cc/7HRG-VNY9>] ("A connected wallet for a connected world.").

27. LIBRA ASS'N MEMBERS, WHITE PAPER 4-5 (2020), https://wp.diem.com/en-US/wp-content/uploads/sites/23/2020/04/Libra_WhitePaperV2_April2020.pdf [<https://perma.cc/L6CY-4T5F>].

28. See generally Saule T. Omarova, *New Tech vs. New Deal: Fintech as a Systemic Phenomenon*, 36 YALE J. ON REGUL. 735 (2019) (describing the New Deal legislation as point

proper timing, scope, and emphasis of regulatory intervention are questions that scholars, practitioners, and regulators have wrestled with for decades.

As the pace of innovation accelerates, the divergence between the limits of existing regulation and the creativity spurring alternative fintech-inspired financial products and intermediaries becomes increasingly salient.²⁹ Despite growing complexity, conventional wisdom continues to suggest that the existing regulatory framework sufficiently addresses normative goals such as customer protection and market integrity.³⁰

Yet, the existing framework does not envision fluid intermediaries that have the ability to transform.³¹ Developers' continuous improvement of application programming interface (API) may enable some cryptocurrency exchanges to create a dynamic operational or governance infrastructure; in other words, a platform that relies on intermediary-like functions may evolve or undertake a metamorphosis that reduces or eliminates reliance on intermediation, shedding the features of centralization and permitting peer-to-peer, decentralized transactions. Consequently, questions emerge regarding the efficacy of applying our existing regulatory framework to cryptocurrency secondary market transactions. The dynamic nature or potential for centralized trading infrastructure to morph into decentralized infrastructure remains undertheorized.³² This Article helps to fill this gap.

This Article makes three critical contributions. First, this Article challenges regulatory approaches that prioritize the supervision and enforcement of primary market transactions. While regulators generally agree on the normative goals of regulation, opinions diverge regarding the optimal approach for achieving these aims. The consensus that drives the dominant narrative portraying

of departure for analysis).

29. See CONGR. RSCH. SERV., IF11195 FINANCIAL INNOVATION: REDUCING FINTECH REGULATORY UNCERTAINTY 1 (2019).

30. *But see infra* note 424 and accompanying text.

31. Statement of Katharina Pistor, *supra* note 16, at 9.

32. *Chairman's Testimony on Virtual Currencies: The Roles of the SEC and CFTC: Hearing Before the S. Comm. on Banking, Hous. & Urb. Affs.*, 115th Cong. 2 (2018) (statement of Jay Clayton, Chairman, SEC), <https://www.sec.gov/news/testimony/testimony-virtual-currencies-oversight-role-us-securities-and-exchange-commission> [<https://perma.cc/CSV6-SKPM>].

primary market regulation—chiefly mandatory disclosure—as the “anointed” regulatory approach stems from a belief that imposing and enforcing material disclosure reduces asymmetries of information, fraud, manipulation, and exploitation of unwitting individual investors. In the context of cryptocurrency markets, emphasis on primary market transactions means regulating ICOs. Yet, evidence from Bitfinex and other platforms demonstrates the perilous consequences of neglecting secondary market infrastructure and the regulation of trading intermediaries.

Second, this Article identifies a transformative attribute of cryptocurrency trading platforms that confounds efforts to apply existing regulation. Cryptocurrency secondary market platforms have the capacity to change; they are dynamic intermediaries, meaning the operational attributes of broker-dealers, exchanges, and clearinghouses developed on distributed digital ledger protocols may gradually evolve.

Inspired by the goals that prompted the creation of cryptocurrency, programmers continuously adapt distributed digital ledger platforms in an effort to minimize the attributes that impede the execution of transactions “on-chain.” In other words, distributed digital ledger platforms aim to achieve *disintermediation*, eliminating the need to shift any aspect of trade execution clearing and settlement “off-chain.”³³ Unlike conventional intermediaries, dynamic intermediaries that service cryptocurrency markets may require differing regulatory interventions based on the level of disintermediation that each has achieved.

Finally, this Article proposes a regulatory response to the undertheorized dynamics of decentralization in cryptocurrency secondary markets. Notwithstanding the goals of decentralization and the dynamic attributes of distributed digital ledger platforms, almost all cryptocurrency broker-dealers, clearinghouses, and exchanges currently operating in markets rely on various elements of traditional intermediation. For example, some platforms rely on centralized order books; others centralize aspects of trade execution or settlement. Decentralization is, thus, often aspirational.

33. See *infra* notes 244-46.

The limitations of existing regulation leave customers, markets, and citizens unprotected from the well-established enterprise and systemic risks that arise from intermediation in conventional and cryptocurrency markets (intermediary risks). While the market for cryptocurrency remains relatively small, enterprise risk management failures may be contained. As the market expands, however, cryptocurrency exchanges' risk management failures may engender systemic risk management concerns.

This Article recommends employing a registration process whereby platforms signal and can subsequently amend registration forms indicating the specific financial product or service they offer and the extent of their reliance on intermediation. Even firms that claim to have achieved disintermediation or decentralization would register to indicate their status. Such an approach creates an immediate pathway to enable regulators to impose order in secondary cryptocurrency markets.

Part I of this Article briefly describes the history and philosophy of the regulatory framework that governs conventional secondary market transactions. This Part focuses on securities markets, but notes that similar norms motivate regulation in the market for commodities and other asset classes. It argues that the dominant narrative in securities markets regulatory discourse prioritizes primary market transactions, relegating secondary market transactions and (perhaps more importantly) secondary market intermediaries to less attentive regulation. Self-governance is the ethos of secondary market transaction regulation, and, as such, our regulatory framework expressly delegates notable supervisory and enforcement authority to market participants. Adopting such a perspective may undermine regulators' efforts to achieve normative goals.

Part II introduces the general attributes of cryptocurrencies and a developing taxonomy of centralized and decentralized cryptocurrency exchanges. This Part argues that many of the exchanges that describe themselves as decentralized or disintermediated continue to rely on some aspect of off-chain or traditional intermediation. Several exchanges market themselves to trading communities as decentralized distributed digital ledger platforms; market participants' use of the term "decentralized" is, however, a misnomer, a mistake, and, in some instances, an active misrepresentation

of the operational infrastructure of the exchange. Regulators must refuse to elevate form over substance and investigate the central operational mechanics of the platforms and interrogate the cryptocurrency platforms' plans to minimize or eliminate attributes that centralize trading.

Part III contends that cryptocurrency secondary market actors face many of the same risks and concerns that conventional market participants struggle to address within their firms and across the industry. As the Bitfinex example illustrates, regulation (or the lack thereof) casts cryptocurrency trading markets into the shadows and invites variegated forms of manipulation and misconduct. The automation or integration of increasingly sophisticated algorithms in trading markets has altered the nature of secondary market trading, resulting in market conditions that may disadvantage less sophisticated trading counterparties. Coupled with automation, high frequency trading (HFT) strategies accelerate the pace of trading. HFT strategies may employ algorithms or bots or co-locate their server closer to an exchange to take advantage of the delay between a buyer or seller placing an order and the execution of the trade (latency). More specifically, this Part explores controversial trading tactics such as front-running, ping-pong, and spoofing.

Finally, this Part posits that a third class of pernicious concerns challenges cryptocurrency secondary trading markets—cybersecurity threats. Evidence of the harms and losses that result from these enterprise risk-management failures should raise alarms. These risks will increase as cryptocurrency markets grow and likely create spillover effects and systemic risks that impact other areas of financial markets.

Part IV proposes that regulators require market participants to self-designate the regulatory agency that they believe ought to supervise their activities. This know-your-regulator approach acknowledges that cryptocurrency platforms may operate on a spectrum, offering diverse financial products and services with varying levels of intermediation. The self-designation process requires a platform to submit to a specific regulator or indicate why the platform believes that its operations are not subject to regulatory oversight.

This proposal parallels the existing Commodity Futures Trading Commission (CFTC) practice of self-certification. The CFTC has had moderate success employing the self-certification process to regulate Bitcoin futures exchanges. To ensure proper alignment between regulated entities and regulators, limit territorial disputes among federal regulatory agencies, and militate against regulatory capture, this Article further proposes that each regulatory agency direct the review of self-designation applications to its Financial Services Office of Innovation (FSOI). The FSOI will evaluate know-your-regulator registrations and report to its agency and to the Financial Stability Oversight Council (FSOC) regarding registration applications and the agency's approach to processing, assessing, and managing self-designation submissions.

Part V addresses the benefits and limitations of the proposal and responds to concerns that regulatory arbitrage, competition, and costs may stymie adoption of the proposal. While each of these concerns requires thoughtful consideration, careful construction of the self-designation process and periodic review and assessment may address several of these concerns.

I. INTERMEDIATION: A FUNCTIONAL ANALYSIS

Mandatory disclosure serves as a theoretical and practical linchpin in capital markets regulation. Unless an offering is otherwise exempt from registration, the Securities Act of 1933 (Securities Act) requires issuers who seek to raise capital to register the securities with the Securities and Exchange Commission (SEC) prior to offering the securities to investors for sale.³⁴ Mandatory disclosure is the normative principle and the central objective of the registration process. To complete the registration process, issuers must compile and distribute extensive disclosures describing, among other matters, the nature of the issuer's business; the educational and professional profiles of executives appointed to senior management positions and individuals selected to serve on the board of directors; tangible and intangible property; risk factors; and the

34. *See generally* Securities Act of 1933, 15 U.S.C. §§ 77a-77mm; *see also* PATRICK S. COLLINS, REGULATION OF SECURITIES, MARKETS, AND TRANSACTIONS 31 (2011).

financial health—current and forecasted earnings and revenues—of the firm.³⁵

Notwithstanding an enduring debate regarding the limits of mandatory disclosure, regulators, legislators, and commentators' commitment to this regulatory paradigm persists. Requiring disclosure of material information regarding issuers of equity and debt securities mitigates inherent asymmetries of information in registered public offerings.³⁶

Parallel regulation imposing continuous, periodic disclosure for publicly traded securities enhances the efficiency, fairness, and integrity of secondary market transactions.³⁷ The thread of mandatory disclosure weaves the two federal securities laws governing public offerings and trading in secondary markets together.³⁸ Consistent with the regulatory emphasis on mandatory disclosure, regulators disproportionately allocate supervision and enforcement resources to the oversight of disclosure-centered aspects of primary market transactions.³⁹

This standard capital markets regulation narrative mistakenly signals that mandatory disclosure is a panacea. This Part contends that myopically focusing on the disclosure obligations that comprise the registration process in primary market transactions may obscure market misconduct in secondary markets, permitting predatory and fraudulent practices to flourish.

35. See COLLINS, *supra* note 34, at 22.

36. See Andrew A. Schwartz, *Mandatory Disclosure in Primary Markets*, 2019 UTAH L. REV. 1069, 1071-72.

37. See *id.*

38. Securities Exchange Act of 1934, 15 U.S.C. § 78l(b) (requiring registration in order to be part of a national exchange); *id.* § 78l(g) (requiring registration of securities by issuers that have assets in excess of \$10 million and that have a class of equity securities held by at least two thousand record holders); *id.* § 78o(d) (requiring supplementary and periodic information of issuers that have filed a registration statement registering securities with the SEC in a public offering).

39. Schwartz, *supra* note 36, at 1071-72.

A. Traditional Intermediaries

U.S. capital markets promote an efficient allocation of capital.⁴⁰ Entrepreneurs seek access to capital markets to raise funds by issuing equity interests (shares of stock) or debt securities.⁴¹ Investors exchange their savings for equity or debt interests distributed by issuers.⁴² Issuers receive an infusion of capital and investors hope to receive a return on their investments that exceeds savings rates.⁴³

Purchasing securities endows investors with certain rights commonly associated with the class of securities acquired; these rights often include (but may not be limited to) the right to share in the issuer's profits (dividends), the right to vote on certain governance issues (voting rights), and the right to participate in the appreciation of the valuation of the firm.⁴⁴ We describe the origination and distribution of equity or debt securities from the issuer to investors as primary market transactions; we refer to subsequent resales among investors and related trading activities as secondary market transactions.⁴⁵

For over 150 years, Congress abstained from formally intervening in the regulation of capital markets. In the fall of 1929, intense market speculation and pervasive fraud led to staggering losses for investors, long-lasting industrial decline, and widespread unemployment.⁴⁶ Depressed macroeconomic conditions created political momentum for the adoption of federal regulation in banking and capital markets.⁴⁷

40. See EUGENE F. FAMA & MERTON H. MILLER, *THE THEORY OF FINANCE* 4-15 (1972) (explaining the wealth allocation model for utility maximization).

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

42. See *id.*; FAMA & MILLER, *supra* note 40, at 4-15; Joseph E. Stiglitz, *Pareto Optimality and Competition*, 36 J. FIN. 235, 247 (1981).

43. Fama, *supra* note 41, at 383.

44. See GARY STRUMEYER, *THE CAPITAL MARKETS* 21 (Sarah Swamy ed., 2017).

45. See *id.*

46. Kimberly Amadeo, *Stock Market Crash of 1929 Facts, Causes, and Impact*, BALANCE (Sept. 2, 2020), <https://www.thebalance.com/stock-market-crash-of-1929-causes-effects-and-facts-3305891> [<https://perma.cc/7PWG-Q5GW>].

47. See U.S. Senate Hist. Off., *Subcommittee on Senate Resolutions 84 and 239*, <http://www.senate.gov/artandhistory/history/common/investigations/Pecora.htm> [<https://perma.cc/27VA-GWRC>].

Sensational investigative hearings revealed that more than half of the \$25 billion in securities distributed between the end of World War I and the stock market crash of 1929 were worthless.⁴⁸ Detailed accounts of issuers' intentional dissemination of false and misleading information⁴⁹ punctuated spectacular evidence of fraud and stunning acts of avarice. During this period, securities listed on the New York Stock Exchange declined from a pre-crash high of \$89 billion to \$15 billion in 1932.⁵⁰ The legislative history of the Securities Act and the Exchange Act of 1934 (Exchange Act) reveals disturbing illustrations of issuers preying on unwary investors as well as the limitations of state securities regulation commonly known as blue-sky laws. One critical investigative report suggested that "had there been full disclosure," issuers' schemes "could not long have survived the fierce light of publicity and criticism."⁵¹

Invoking the adage made popular by Justice Brandeis—"Sunlight is said to be the best of disinfectants; electric light the most efficient policeman"⁵²—Congress enacted the nation's first federal securities law—the Securities Act.⁵³ Consistent with the sharp criticisms in the volumes of evidence gathered by Congress, the legislative intervention expressly aimed to address fraud in primary market transactions by imposing mandatory disclosure requirements for issuers distributing securities to the public. An issuer's failure to register securities with the SEC prior to a public offering of the securities may lead to harsh, if not damning, liability.⁵⁴ Recognizing parallel concerns in secondary market transactions, Congress enacted the Exchange Act a year later, requiring marketplaces that facilitate the trading of securities distributed in a public offering to

48. H.R. REP. NO. 73-85, at 2 (1933).

49. See MICHAEL PERINO, *THE HELLHOUND OF WALL STREET: HOW FERDINAND PECORA'S INVESTIGATION OF THE GREAT CRASH FOREVER CHANGED AMERICAN FINANCE* 288 (2010).

50. JAMES D. COX, ROBERT W. HILLMAN & DONALD C. LANGEVOORT, *SECURITIES REGULATION 1-8* (8th ed. 2017).

51. See James Grant, *White Knight*, *FORBES* (May 12, 2002, 11:00 PM), <https://www.forbes.com/global/2002/0513/062.html#388b42a8605a> [<https://perma.cc/DCK2-4LWD>] (quoting Pecora Report).

52. LOUIS D. BRANDEIS, *OTHER PEOPLE'S MONEY AND HOW THE BANKERS USE IT* 92 (1914).

53. 15 U.S.C. §§ 77a-77mm.

54. See *id.* § 77f.

register with the SEC and submit to the agency's regulatory oversight.⁵⁵

As noted above, the registration requirements and liability provisions of the Securities Act mandate that, unless an exemption for an offering of securities applies, issuers must register securities with the SEC prior to sale.⁵⁶ In other words, in the absence of an exemption, an issuer must agree to submit to an onerous and expensive registration process that obligates the issuer to disclose material information regarding its business, executive managers, risks, and financial welfare, among other matters.⁵⁷

The mandatory disclosure requirements in the Securities Act advance normative objectives such as investor protection and promote the three central goals of securities market regulation—the maintenance of fair, orderly, and efficient markets that facilitate capital formation.⁵⁸ According to proponents of these norms, disclosure increases transparency, reduces asymmetries of information, and mitigates fraud and manipulation as well as other misconduct by issuers and affiliates.⁵⁹ Mandating registration and incorporating threshold disclosure requirements markedly reduces issuers' incentives to misrepresent material information, ameliorates the threat of fraud, and alleviates concerns that states with disparate state regulatory standards may compete to attract issuers, launching a regulatory race to the bottom.⁶⁰

Mandatory disclosure reduces the inherent informational advantages or asymmetries of information between the issuers and investors in capital markets. Entrepreneurs who rely on angel investors, venture capital funds, or multiple rounds of exempt private offerings may successfully extend the runway for their start-up firms.⁶¹ However, even the most successful start-ups find that

55. *Id.* §§ 78a-78qq.

56. *See* Schwartz, *supra* note 36, at 1079.

57. *See* STRUMEYER, *supra* note 44, at 121.

58. *About the SEC*, SEC, <https://www.sec.gov/about.shtml> [<https://perma.cc/2Y4D-7XFB>] (“The mission of the SEC is to protect investors; maintain fair, orderly, and efficient markets; and facilitate capital formation. The SEC strives to promote a market environment that is worthy of the public’s trust.”).

59. *See* Kristin N. Johnson, *Regulating Innovation: High Frequency Trading in Dark Pools*, 42 J. CORP. L. 833, 843 (2017).

60. *See id.*

61. *See* Elisabeth de Fontenay, *The Deregulation of Private Capital and the Decline of the*

private fundraising cannot compete with the breadth and depth of resources available in the public offering market.⁶²

In the absence of mandatory disclosures, investors may have limited access to the material information needed to make a reasonable investment decision. Moreover, one expects the insiders with access to material, nonpublic information about the issuer—the professional executives and members of the board of directors who manage the business affairs of the issuer—to engage in puffery when marketing the issuer’s securities to investors. Mandatory disclosure neutralizes insiders’ incentives to misrepresent material information regarding the issuer.⁶³

Finally, the stock market crash of 1929 and similar subsequent disruptions demonstrate that irrational investor exuberance, issuers’ self-interested incentives, and investors’ lack of access to material information undermine arguments in favor of adopting a *caveat emptor* or self-regulatory approach to govern primary market transactions.⁶⁴ Thus, instead of relying on issuer self-governance, federal mandatory disclosure requirements introduce an efficient, uniform regulatory metric. Mandatory disclosure enables authorities to evaluate an issuer’s compliance, creates a point of departure for investor assessment of the merits of investing in the security, and provides a focus on securities fraud litigation claims.

While the issuer bears primary responsibility for ensuring accurate disclosure of material information, a small, well-known cohort of financial institutions serve as intermediaries in both primary and secondary market transactions.⁶⁵ Congress and regulators have increasingly demanded that intermediaries adopt affirmative measures to promote disclosure norms. In primary markets, for example, intermediaries may face strict liability for promoting the sale of unregistered securities.⁶⁶

Public Company, 68 HASTINGS L.J. 445, 447 (2016).

62. *See id.* at 448.

63. *See* Victor Brudney, *Insiders, Outsiders, and Informational Advantages Under the Federal Securities Laws*, 93 HARV. L. REV. 322, 326 (1979).

64. *See* Gary F. Goldring, *Mandatory Disclosure of Corporate Projections and the Goals of Securities Regulation*, 81 COLUM. L. REV. 1525, 1527 (1981).

65. CLAIRE A. HILL & RICHARD W. PAINTER, *BETTER BANKERS, BETTER BANKS: PROMOTING GOOD BUSINESS THROUGH CONTRACTUAL COMMITMENT* 5 (2015).

66. *See* 15 U.S.C. § 77e(a), (c).

Most issuers who seek to launch a public offering will engage a classic financial markets intermediary—an investment bank. Serving as underwriters, investment banks have traditionally occupied an important role in the initial public offering (IPO) market.⁶⁷ For more than two hundred years, investment banking firms have served as elite, dominant intermediaries in IPO markets.⁶⁸ These firms offer access to valuable networks, industry expertise, and the funding required for international road shows marketing an issuer's IPO.⁶⁹ These attributes enable the issuer to market an IPO to diverse and geographically dispersed investors. The investment bank relies on its network of investor-contacts, including high-net-worth individuals, family offices, private equity, and institutional funds.⁷⁰

The most striking attributes of investment banking intermediation in IPO markets may, however, be compensation and risk exposure.⁷¹ Traditionally, an investment bank enters into a firm commitment agreement with an IPO issuer; if the anticipated offering reaches the requisite size, the issuer may also seek to list the offering on a national securities exchange.⁷² Under the terms of the agreement, the investment bank agrees to underwrite the offering, meaning the investment bank enters into a contract committing to act as the sole investor or acquirer of the entire allotment of the IPO.⁷³

Despite the contractual commitment, both the issuer and underwriter understand that the investment bank fully intends to identify investors who will agree to purchase predetermined allocations of the IPO allotment ahead of the issuer's distribution of the shares to the underwriter.⁷⁴ Presumably, the investment bank will merely

67. HILL & PAINTER, *supra* note 65, at 5.

68. In 2006, the six largest investment banking firms accounted for 81.9 percent of the industry's capital markets offerings. SEC. INDUS. ASS'N, *SECURITIES INDUSTRY YEARBOOK 6-18* (Lisa Dabbraccio ed., 2006).

69. Andrew F. Tuch, *The Self-Regulation of Investment Bankers*, 83 *GEO. WASH. L. REV.* 101, 161 (2014).

70. See Bernard Black, *The Core Institutions that Support Strong Securities Markets*, 55 *BUS. LAW.* 1565, 1568 (2000).

71. Tuch, *supra* note 69, at 161.

72. *Id.* at 114-15.

73. *Id.*

74. See ANTHONY SAUNDERS & MARCIA MILLON CORNETT, *FINANCIAL MARKETS AND*

serve as a matchmaker, facilitating the introduction of the issuer and institutional or other sophisticated investors interested in purchasing the shares.⁷⁵

Notwithstanding the parties' understanding, the investment bank has assumed notable risk. Having agreed to act as an underwriter or intermediary in the marketing and sales process, the investment bank will bear the risk that there is no market for the issuer's securities as well as the threat that market conditions or due diligence during the offering process may lead to a lower than anticipated valuation of the issuer's shares.⁷⁶ In addition to this sizable economic risk, agreeing to serve as an underwriter exposes the investment bank to civil liability under federal securities laws in connection with the offering.⁷⁷

Unsurprisingly, in exchange for assuming the risk of underwriting an offering, investment banks receive staggering compensation.⁷⁸ To mitigate its risk exposure, an investment bank may enter into an agreement with a syndicate of investment banks and allocate the IPO shares as well as the risk exposure related to the offering among the members of the syndicate.⁷⁹

Finally, intermediation in IPO markets has an expressive function. In their service as underwriters, investment banks perform a gatekeeping role. Relationship managers within the investment bank aim to identify a continuous stream of issuers whose business models will engender market interest.⁸⁰ After general investigations, the investment bank employs a valuation methodology to determine the probability of demand for the issuers' shares.⁸¹ The valuation also offers an important indicator for the potential pricing for the issuer's shares.⁸²

INSTITUTIONS 251-52 (5th ed. 2012).

75. *Id.*

76. Andrew F. Tuch, *Securities Underwriters in Public Capital Markets: The Existence, Parameters and Consequences of the Fiduciary Obligation to Avoid Conflicts*, 7 J. CORP. L. STUD. 51, 55 (2007).

77. *See* 15 U.S.C. §§ 78a-78qq.

78. *See* Tuch, *supra* note 69, at 161.

79. Tuch, *supra* note 76, at 56.

80. *See id.* at 61.

81. *See id.* at 58-59.

82. *See id.*

An underwriter's reputational contribution may be one of its most significant contributions to the IPO marketing campaign.⁸³ Often, the lead underwriter's reputation attracts investors and influences broader market interest in the offering.⁸⁴ Perhaps most importantly, investors trust underwriters to accurately price the issuer's shares.⁸⁵ Underwriters with strong reputations for identifying issuers whose shares appreciate rapidly or perform well over the long run often have little difficulty attracting investors or persuading the investors to commit to purchase an allotment of the IPO shares.⁸⁶

For each of the capital markets transactions described above as well as the broader universe of primary and secondary market transactions, investment banks and similar financial institutions function as market intermediaries. The capital markets division of the investment bank facilitates primary market transactions.⁸⁷ The brokerage division of the same bank executes secondary market transactions on behalf of individual and institutional accounts.⁸⁸ In the absence of these intermediaries, it may be difficult, if not impossible, for issuers or institutional market participants to execute sizable, complex capital markets transactions.

Financial institutions that operate as intermediaries play a significant role in secondary market transactions. For example, broker-dealers, often a division within the same investment bank that serves as underwriter for an issuer's IPO, execute secondary market transactions in the issuer's registered, listed securities.⁸⁹ In securities markets, issuers are no longer a party to secondary market transactions. Yet, issuers of publicly traded securities may remain subject to mandatory continuous disclosure obligations.⁹⁰

Arguably, the central actor in secondary market transactions is neither the issuer nor the trading counterparties. Rather, the securities exchange has historically played a prominent role in creating a forum or marketplace for secondary market transactions.

83. See Tuch, *supra* note 69, at 161.

84. See *id.* at 161-62.

85. See Tuch, *supra* note 76, at 60.

86. See *id.* at 52.

87. See *id.* at 52-53.

88. See *id.*

89. See *id.*

90. See 15 U.S.C. § 78o(d).

Securities exchanges are a critical infrastructure resource and the focal point of the Exchange Act. The next Section examines the role of securities exchanges in secondary market transactions. It contends that a seismic shift in the structure of markets challenges the underlying assumptions in secondary markets regulation.

B. Governance and Economics of Secondary Market Trading

In primary market transactions, an issuer distributes its equity or debt securities in a public or private offering.⁹¹ In secondary market transactions, market participants trade the securities previously distributed by an issuer.⁹² While primary and secondary market transactions are distinct, two significant threads—mandatory disclosure and registration—weave the two classes of transactions together. These transparency-oriented requirements for issuers (under the Securities Act)⁹³ and broker-dealers and exchanges (under the Exchange Act)⁹⁴ establish a normative thread. Thus, in certain respects, the Exchange Act reinforces the commitment to continuous disclosure of material information.⁹⁵

At the same time, the Exchange Act incorporates oversight regulation of secondary market activities (securities trading) and intermediaries (brokers, dealers, exchanges, and clearinghouses).⁹⁶ These regulatory measures aim to ensure fair, orderly, and efficient trading in secondary markets.⁹⁷ Yet, unlike the Securities Act's disclosure-centered orientation,⁹⁸ the Exchange Act reflects a broader focus on market regulation by establishing the SEC and

91. Leslie Kramer, *Primary vs. Secondary Capital Markets: What's the Difference?* INVESTOPEDIA (Oct. 2, 2020), <https://www.investopedia.com/ask/answers/012615/whats-difference-between-primary-and-secondary-capital-markets.asp> [<https://perma.cc/6LAG-535Q>].

92. *Id.*

93. *See generally* 15 U.S.C. § 77a-77mm.

94. *See generally id.* § 78a-78qq.

95. *See supra* note 38 and accompanying text.

96. § 78o(b).

97. *See* SEC, STRATEGIC PLAN: FISCAL YEARS 2014-2018, at 3 (2016), <https://www.sec.gov/about/sec-strategic-plan-2014-2018.pdf> [<https://perma.cc/FJ4V-9BQ3>] (“The mission of the SEC is to protect investors, maintain fair, orderly, and efficient markets, and facilitate capital formation.”); Janet Austin, *What Exactly Is Market Integrity? An Analysis of One of the Core Objectives of Security Regulation*, 8 WM. & MARY BUS. L. REV. 215, 222-24 (2017).

98. *See supra* Part I.A.

introducing proxy and tender offer regulation, as well as articulating general prohibitions against fraud, insider trading, and market manipulation.⁹⁹ The registration, supervision, and oversight of the intermediaries that execute day-to-day transactions (brokers and dealers) and those organizations that facilitate trading (clearing-houses or exchanges) may, however, be the statute's most important contributions.¹⁰⁰

Brokers and dealers execute secondary market transactions on behalf of clients or for their own proprietary accounts.¹⁰¹ These firms, colloquially described as broker-dealers, submit to the regulatory authority of the SEC. Section 15(a) of the Exchange Act requires broker-dealers to register with the SEC prior to engaging in the business of purchasing and selling securities (excluding certain transactions or securities, such as intrastate transactions or exempt securities).¹⁰² Under section 15(b), the SEC may censure broker-dealers or revoke or suspend broker-dealers' registration.¹⁰³

In some respects, secondary market actors such as broker-dealers and exchanges also serve as gatekeepers enforcing the mandatory disclosure paradigm. For example, section 12(a) of the Exchange Act prohibits a broker or dealer from executing securities transactions on a national securities exchange unless the security is exempt from registration or registered with the SEC.¹⁰⁴ Alternative trading platforms facilitate trading unregistered securities, exempt securities, or securities sold pursuant to a statutory or regulatory safe harbor. Such resales may be limited based on the volume, the type of investor executing the transaction in the securities, holding periods, or other transaction-related limits.¹⁰⁵ The prohibition on

99. § 78o(b).

100. See Austin, *supra* note 97, at 222.

101. Section 3(a)(4) of the Exchange Act defines a "broker" as any person who engages in the business of effecting transactions in securities for the account of others and section 3(a)(5) defines a "dealer" as any person who engages in the business of buying and selling securities for her own account. § 78c(a)(4)-(5). In contemporary financial markets, financial institutions often offer these services through a single business division that fills customer orders from an intrafirm inventory. Consequently, regulators and market participants describe the firms as broker-dealers.

102. *Id.* § 78o(a).

103. *Id.* § 78o(b)(4).

104. *Id.* § 78l(a).

105. See *id.*

broker-dealer transactions in section 12(a) of the Exchange Act¹⁰⁶ prevents issuers who distribute unregistered securities from accessing the liquidity, economic, and governance benefits that national securities exchanges engender for the issuers of registered, listed securities.¹⁰⁷

For over two hundred years, broker-dealers and exchanges have had a prominent role in regulating secondary market transactions. Notwithstanding the mandate in the Exchange Act granting the SEC supervisory authority over broker-dealers and exchanges, the agency has continuously acquiesced to the nation's 150-year tradition of permitting broker-dealers and exchanges to operate as self-regulatory organizations (SROs) or private trade industry associations.¹⁰⁸ While deferential to the SEC's interpretations and guidance on federal securities law, SROs operate as the primary supervisors of broker-dealers. SROs adopt, implement, and enforce rules governing eligibility, conduct, capitalization, and similar matters.¹⁰⁹ This collaborative governance approach continues to be a hallmark of U.S. securities regulation.

In contemporary markets, the Financial Industry Regulatory Authority (FINRA) proposes and implements rules governing broker-dealer conduct and supervises the examination and licensing requirements for broker-dealers.¹¹⁰ FINRA evaluates broker-dealers' compliance with these obligations and enforces its adopted rules, adjudicating claims involving broker-dealers through its national dispute resolution forum.¹¹¹ The rules governing broker-dealer conduct aim to ensure that market transactions comply with the normative goals that frame the SEC's mission and inspired the adoption of federal securities laws—investor protection and maintenance of orderly, fair, and efficient capital markets.¹¹²

106. *Id.*

107. *See infra* notes 120-29 and accompanying text.

108. A broker-dealer must become a member of a SRO that will serve as a primary regulator, directly supervising the broker-dealer's compliance with SRO rules and indirectly monitoring the broker-dealer's compliance with federal statutes and SEC regulations. *See* § 78s.

109. *See id.*

110. Tuch, *supra* note 69, at 104-05.

111. *See* Jerry W. Markham & Daniel J. Harty, *For Whom the Bell Tolls: The Demise of Exchange Trading Floors and the Growth of ECNs*, 33 J. CORP. L. 865, 886-87 (2008).

112. Tuch, *supra* note 69, at 104-05.

While broker-dealers contribute to the efficient functioning of secondary markets, national and regional securities exchanges and clearinghouses create the marketplace where transactions transpire.¹¹³ Each securities exchange or clearinghouse provides a forum for buyers and sellers to submit indications of their interests to trade eligible securities.¹¹⁴ These trading venues facilitate the execution, clearing, and settlement of transactions.¹¹⁵ In this manner, exchanges and clearinghouses serve as critical infrastructure resources, improving the economics of trading and introducing a framework for self-governance.¹¹⁶

Economists have long observed that “[c]entralized trading engenders critical economic benefits such as price discovery, price accuracy, and liquidity.”¹¹⁷ In order to foster an orderly market that achieves these important economic goals, the Exchange Act limits the marketplaces that may trade publicly listed securities to registered national securities exchanges.¹¹⁸ Exchanges collect and distribute critical classes of data, such as information regarding the volume, timing, and pricing of submitted bids, offers, and executed orders.¹¹⁹

Aggregating this data improves price discovery,¹²⁰ increasing investors’ confidence regarding investment strategies. Enhanced price discovery reduces the spread between offers to buy and offers to sell for securities and lowers transaction costs, thereby improving the efficient functioning of secondary trading markets.¹²¹

113. See Markham & Harty, *supra* note 111, at 882-83.

114. See *id.*

115. See Robert R. Bliss & Robert S. Steigerwald, *Derivatives Clearing and Settlement: A Comparison of Central Counterparties and Alternative Structures*, 30 *ECON. PERSPS.*, No. 4, 2006, at 22, 22-23.

116. See *id.*

117. Johnson, *supra* note 59, at 840.

118. See *supra* notes 96-100 and accompanying text.

119. See Stanislav Dolgoplov, *Insider Trading and the Bid-Ask Spread: A Critical Evaluation of Adverse Selection in Market Making*, 33 *CAP. U. L. REV.* 83, 88-89 (2004) (defining the bid-ask spread as “the difference between the market maker’s ‘sell’ and ‘buy’ prices,” which “represents the ‘price for immediacy’ and the ‘cost of trading and the illiquidity of a market’” (footnotes omitted)).

120. See Merritt B. Fox, Lawrence R. Glosten & Gabriel V. Rauterberg, *The New Stock Market: Sense and Nonsense*, 65 *DUKE L.J.* 191, 222 (2015); *Definition of Price Discovery Process*, NASDAQ, <https://www.nasdaq.com/glossary/p/price-discovery-process> [<https://perma.cc/TDX5-8AD4>].

121. See Fox et al., *supra* note 120, at 254.

Consequently, secondary market trading on exchanges enhances price discovery.¹²²

In addition to enabling price discovery, centralizing trading on an exchange increases price accuracy.¹²³ Consolidating aggregated pricing information improves individual investors' and investment professionals' ability to price securities.¹²⁴ Market participants increasingly rely on analytical models to predict the prices of securities.¹²⁵ In many instances, greater volumes of data permit rapid, more accurate securities pricing.¹²⁶ Accurate pricing influences other economic attributes of a well-functioning market.¹²⁷

U.S. capital markets attract many issuers who seek to list their securities and investors interested in trading because market participants perceive the securities traded in U.S. capital markets as liquid, meaning one can quickly identify buyers or sellers who are willing to trade listed securities.¹²⁸ Thus, in liquid markets, an investor who submits an offer to sell a security promptly receives confirmation that the market has identified a party interested in buying the security.¹²⁹

“Liquidity generally describes the amount of time and effort required to identify” a counterparty who is ready and willing to enter into “a securities trade at a relatively stable price without sensitivity to the volume of the purchase or sale order.”¹³⁰ “For

122. Nazli Sila Alan & Robert A. Schwartz, *Price Discovery: The Economic Function of a Stock Exchange*, 40 J. PORTFOLIO MGMT. 124, 124 (2013) (defining an exchange according to its primary function of price discovery).

123. See *Definition of Price Discovery Process*, *supra* note 120.

124. See Markham & Harty, *supra* note 111, at 882-83.

125. See *id.* at 881, 884.

126. See *id.* at 885.

127. See *id.* at 882-85; Merritt B. Fox, Randall Morck, Bernard Yeung & Artyom Durnev, *Law, Share Price Accuracy, and Economic Performance: The New Evidence*, 102 MICH. L. REV. 331, 344-45 (2003).

128. See SAUNDERS & CORNETT, *supra* note 74, at 5-6.

129. *Id.* at 12 (defining liquidity as “[t]he ease with which an asset can be converted into cash at its fair market value”); see Markham & Harty, *supra* note 111, at 882-83.

130. Johnson, *supra* note 59, at 841; see William C. Dudley, President & CEO, Fed. Rsrv. Bank of N.Y., Remarks at the Federal Reserve Bank of Atlanta 2016 Financial Markets Conference (May 1, 2016), <https://www.newyorkfed.org/newsevents/speeches/2016/dud160501> [<https://perma.cc/KGF8-478K>] (describing market and funding liquidity). Market liquidity refers to:

[T]he cost—both in expense and time—of buying or selling an asset for cash. Market liquidity reflects a number of factors, including any direct transaction

highly liquid securities, one might expect that a broker who places an order to purchase [a security] will promptly receive confirmation that a counterparty accepts her bid (maximum price) at the stated asking price.”¹³¹ Consequently, one might describe so-called blue chip stocks with large market capitalizations listed on national securities exchanges as highly liquid.¹³²

Imagine that you wish to buy shares of Amazon.com, Inc. (Amazon.com), common stock on the Nasdaq securities exchange. In today’s increasingly digital market, an investor would enter her bid to purchase shares of Amazon.com on the app of her preferred broker-dealer on her mobile phone, computer, or personal tablet. The app may send a confirmation message via text or email within minutes.

In fact, the broker-dealer who submits such a request to a national securities exchange offering to purchase shares of Amazon.com at the prevailing market price may receive a confirmation within (fractions of) a second. There is also a significant possibility that the broker-dealer may have previously acquired shares of Amazon.com at a price slightly below the prevailing market price and, upon receiving the investor’s order, fill the investor’s order from its inventory. In the latter instance, the broker-dealer collects fees for executing the trade and receives as profit the difference (or spread) between the price that the investor bid and the lower price that the broker-dealer paid to acquire the shares of Amazon.com.¹³³

The contributions of exchanges extend beyond their role as auction houses; exchanges also regulate the broker-dealers who are members of the exchange. Typically, exchange governance measures

expense, such as brokerage costs; the price the transaction is executed at relative to the midpoint of the bid-ask spread; how much, if at all, the transaction moves the market price; and the immediacy or speediness with which the transaction can be completed.

Id. In addition, funding liquidity denotes the “ability of a financial entity to raise cash by borrowing on either an unsecured or a secured basis.” *Id.*

131. Johnson, *supra* note 59, at 841.

132. See *Blue Chip Stocks*, NASDAQ, <https://www.nasdaq.com/glossary/b/blue-chip-stock> [<https://perma.cc/8YCY-H4J8>] (defining blue chip stocks as “[c]ommon stocks of well-known companies with a history of growth and dividend payments”).

133. The descriptions of the transactions here are simplified for purposes of illustrating the basic mechanics of trading, the potential economic benefits of centralized trading, and the fees or expenses such transactions generate.

address capital requirements, risk management policies, and dispute resolution policies.¹³⁴ In addition, exchanges may initiate enforcement actions against members who violate SRO regulations or federal or state laws.¹³⁵ These regulations govern member firms' risk decisions (enterprise risk management) as well as risks across the market for specific asset classes.¹³⁶

Risks related to trading or the operational framework for trading might be described as member firm enterprise risks.¹³⁷ Market risk or the threat that acquired assets may suddenly decline in value offers an example of a member firm enterprise risk.¹³⁸ Trading inherently exposes firms to market risk; in a bilateral trading market, counterparty risk—the risk that the counterparty to a trade may default—also creates an enterprise risk for each member firm.¹³⁹ Depending on the size of the member firm that defaults, counterparty risk may also create systemic risk for other counterparties trading in the asset class.¹⁴⁰

Acting as a centralized market intermediary, an exchange may adopt policies or practices to mitigate certain market or trading risks. For example, exchanges may agree to act as guarantors for the transactions executed on their platforms.¹⁴¹ When an exchange agrees to act as a guarantor for transactions executed by its

134. See Markham & Harty, *supra* note 111, at 885-87.

135. See *id.* at 887.

136. See *id.*

137. See Bliss & Steigerwald, *supra* note 115, at 22-23.

138. *Id.* at 22-25 (arguing that the clearinghouse will only offer these benefits in markets that reflect conditions of complete information, but noting that market conditions, asymmetries of information, incentives to shift costs, and distributive effects on pricing of default risk may increase systemic risk); see also *id.* at 24-26 (“Credit risk, on the other hand, is centralized in the CCP [central counterparty] itself.”). Generally, clearinghouses only enter into matching transactions, meaning a clearinghouse will enter into an agreement with a member (Member A) acting as a protection seller only if the clearinghouse has already identified another member (Member B) who agrees to enter into a contemporaneous arrangement whereby the clearinghouse assigns its rights and obligations as a protection seller in the agreement with Member A to Member B. See *id.* at 24-25. By matching transactions and substituting members into its positions in agreements clearing and settling on its platform, the clearinghouse minimizes its exposure to counterparty default risk. *Id.* at 24 (“A CCP can be defined as ... [a]n entity that interposes itself between counterparties to contracts traded in one or more financial markets, becoming the buyer to every seller and the seller to every buyer.” (footnote omitted)).

139. See *id.* at 22-23.

140. See *id.* at 23-25.

141. See *id.* (explaining central counterparty-mediated securities transactions).

members, the exchange interposes itself as the counterparty in the transaction between the buyer and the seller to ensure the performance of both counterparties under the contract.¹⁴²

For example, in the transaction described above, a trader submits a bid to purchase Amazon.com stock at the prevailing market price. The trader places her order using a broker-dealers app on her mobile phone and, if the broker-dealer does not maintain a proprietary inventory of Amazon.com common stock, then the broker submits the bid to the exchange.

While the exchange matches the investor's bid with a proposed offer to sell at the prevailing market price, a series of back-office settlement procedures ensure that the Amazon.com stock will be registered in the investor's name when the investor delivers the anticipated funds. If either the seller or the buyer should default in her obligations related to the sale of the Amazon.com stock, the exchange, as a guarantor, will take on the obligations of the defaulting party and make the counterparty whole.¹⁴³ In essence, the exchange becomes the counterparty to each party to the transaction and accepts the contractual commitments of the counterparty.¹⁴⁴ If either party defaults, the exchange accepts responsibilities of the defaulting party.¹⁴⁵

Exchanges amass reserves of funds by collecting fees, assessments, fines, and penalties from members; and exchanges use the funds in reserve accounts to satisfy obligations that arise in the course of their operations.¹⁴⁶ Historically, exchanges have been organized as private associations, trusts, and partnerships; members shared responsibility for the losses related to operational risks.¹⁴⁷ Curiously, in recent years, exchanges have increasingly adopted the corporate form. Mergers and acquisitions among the largest securities exchanges in different parts of the world have

142. *See id.* at 23.

143. *See id.* at 23-25.

144. *See id.*

145. *See id.*

146. Fox et al., *supra* note 120, at 198; Craig Pirrong, *The Economics of Clearing in Derivatives Markets: Netting, Asymmetric Information, and the Sharing of Default Risks Through a Central Counterparty* 16 (Jan. 8, 2009) (unpublished manuscript), <https://ssrn.com/abstract=1340660> [<https://perma.cc/ZY2D-KN8Y>].

147. *See Pirrong, supra* note 146, at 2-3, 5, 18.

created an international conglomerate.¹⁴⁸ And perhaps most interestingly, a number of exchanges have elected to register shares of common stock for sale in public offerings as part of IPOs.¹⁴⁹

Notwithstanding these important shifts, classical trading industry norms continue to characterize exchange governance. Exchanges adopt trading and governance guidelines to ensure members' risk practices align with the exchanges' risk management policies.¹⁵⁰ For example, exchanges may impose limits on trades that involve leveraged or structured trading strategies, such as margin trading, as well as enforce guidelines regarding the valuation of assets offered as collateral.¹⁵¹ In the event that the exchange experiences a liquidity crisis, members contribute to guarantee funds to preserve the solvency and integrity of the exchange.¹⁵²

Because exchanges are SROs, the SEC carefully monitors any formal or informal rulemaking practices.¹⁵³ While securities exchanges enjoy broad rulemaking and enforcement authority, their governance and risk management policies remain subject to the supervision of the SEC.¹⁵⁴ As discussed above, section 6 of the Exchange Act requires "exchanges" to register with the SEC and subjects these entities to mandatory regulations including rules governing broker-dealer capitalization and broader exchange governance.¹⁵⁵

148. See, e.g., Markham & Harty, *supra* note 111, at 908-10 (discussing the various mergers of the NYSE and Nasdaq between 2000 and 2008 in response to ECNs).

149. See Cohn et al., *supra* note 16, at 608-09 (describing and comparing the "traditional IPO" with the newer ICO).

150. Markham & Harty, *supra* note 111, at 885-87.

151. See Bliss & Steigerwald, *supra* note 115, at 25.

152. See *id.*

153. U.S. SEC. & EXCH. COMM'N, *supra* note 97, at 15-16.

154. Compare Securities Act of 1933, Pub. L. No. 73-22, 48 Stat. 74, 74 (stating the Act's purpose is "[t]o provide full and fair disclosure of the character of securities"), with Securities Exchange Act of 1934, Pub. L. No. 73-291, 48 Stat. 881, 881 (stating the Act's purpose is "[t]o provide for the regulation of securities exchanges ... to prevent inequitable and unfair practices").

155. Regulation of Exchanges and Alternative Trading Systems, Exchange Act Release No. 34-407605 (Dec. 8, 1998) ("The Commission believes that its regulation of markets should both accommodate traditional market structures and provide sufficient flexibility to ensure that new markets promote fairness, efficiency, and transparency. In adopting a new regulatory framework for alternative trading systems today, the Commission has incorporated suggestions and responded to requests for clarification made by commenters. The Commission believes that this regulatory approach effectively addresses commenters' concerns while

The statutory definition of exchange casts a wide net capturing “any organization, association, or group of persons, whether incorporated or unincorporated, which constitutes, maintains, or provides a marketplace or facilities for bringing together purchasers and sellers of securities.”¹⁵⁶ Interpreting the statutory definition of exchange, the SEC adopted a functional test—Rule 3b-16(a)—for assessing whether a trading platform fits within the statutory description of “a market place or facilities for bringing together purchasers and sellers of securities.”¹⁵⁷ The test evaluates whether the entity that facilitates trading performs functions commonly associated with a stock exchange.¹⁵⁸

Rule 3b-16(a) articulates the SEC’s perspective that the term exchange includes any forum, “organization, association, or group of persons” that brings together buyers and sellers of securities (as the term is defined by federal securities laws) and uses established, nondiscretionary methods to facilitate trading.¹⁵⁹ Adopted in the late 1990s to address electronic communication networks, an emerging group of alternative trading systems, Rule 3b-16(a) extends the reach of the SEC’s supervisory authority to alternative trading venues that perform the functions of traditional exchanges.¹⁶⁰ Concluding that these trading venues operate as exchanges triggers the registration requirement in section 5 of the Exchange Act and subjects the trading venues to the economic and governance regulations that the Exchange Act imposes on registered exchanges.¹⁶¹

In recent years, the origination and trading of cryptocurrency have attracted the attention of investors, regulators, legislators, media, and commentators.¹⁶² With increasing frequency, regulators

carefully tailoring a regulatory framework that is flexible enough to accommodate the evolving technology of, and benefits provided by, alternative trading systems.”).

156. 15 U.S.C. § 78c(a)(1).

157. 17 C.F.R. § 240.3b-16(a) (2019).

158. *Id.*; § 240.6a-1(a).

159. § 240.3b-16(a).

160. *See id.*

161. *See* 15 U.S.C. § 78e.

162. *See generally, e.g., Examining Facebook’s Proposed Digital Currency and Data Privacy Considerations: Hearing Before the S. Comm. on Banking, Hous., & Urb. Affs.*, 116th Cong. (2019); Sarah Jane Hughes & Stephen T. Middlebrook, Feature, *Advancing a Framework for Regulating Cryptocurrency Payments Intermediaries*, 32 *YALE J. REGUL.* 495 (2015); Gregory Meyer, *U.S. Derivatives Regulator Looks to Calm Cryptocurrency Fears*, *FIN. TIMES* (Jan. 31, 2018), <https://ft.com/content/db9d547e-06b4-11e8-9650-9c0ad2d7c5b5> [<https://perma.cc/S5NP->

have signaled that cryptocurrency bears the attributes of regulated asset classes and, therefore, that issuers, traders and marketplaces that facilitate trading must comply with the regulatory obligations applicable to the distribution and trading of these assets.¹⁶³

Should regulators conclude that certain cryptocurrencies are securities as defined in federal securities law, a host of questions emerge. Issuers may face registration requirements under the Securities Act for any forthcoming public offering of the assets.¹⁶⁴ Even after the assets are freely trading among market participants, the firms that facilitate secondary market trading and the trading venues where transactions are executed may face liability for failure to register as broker-dealers or exchanges, respectively.¹⁶⁵

This Part has offered a brief introduction to these obligations as well as the economic and governance benefits engendered in U.S. secondary trading markets. While many of these benefits and limits are well studied and well settled in capital markets, we are only beginning to apply many of these norms, regulations, and economic theories in cryptocurrency markets. The next Part examines the market for this emerging asset class and begins to explore assumptions regarding the benefits and limits of applying federal securities law to this asset class.

II. CRYPTOCURRENCY PRIMARY AND SECONDARY MARKET TRANSACTIONS

The creation of cryptocurrency, an alternative medium of exchange, promises to alter the role of intermediaries in financial markets. Proponents praise cryptocurrency initiatives.¹⁶⁶ Skeptics express deep distrust.¹⁶⁷ Illegal Ponzi and pyramid schemes, scams,

3L9G]; *Cryptocurrency Comparison*, IG, <https://www.ig.com/en/cryptocurrency-trading/cryptocurrency-comparison> [<https://perma.cc/P9AL-6C8X>].

163. See, e.g., Jay Clayton & J. Christopher Giancarlo, *Regulators Are Looking at Cryptocurrency*, WALL ST. J. (Jan. 24, 2018, 6:26 PM), <http://www.wsj.com/articles/regulators-are-looking-at-cryptocurrency-1516836363> [<https://perma.cc/KA98-8AAY>].

164. See *supra* note 34 and accompanying text.

165. See *supra* notes 97-103 and accompanying text.

166. See, e.g., DON TAPSCOTT & ALEX TAPSCOTT, *BLOCKCHAIN REVOLUTION: HOW THE TECHNOLOGY BEHIND BITCOIN IS CHANGING MONEY, BUSINESS, AND THE WORLD* (2016).

167. See, e.g., Dave Michaels & Paul Vigna, *Facebook Pressed on Protections for Cryptocurrency Users*, WALL ST. J. (July 17, 2019, 4:44 PM), <https://www.wsj.com/articles/facebook->

and misconduct have been all too prevalent in cryptocurrency coin and token offerings.¹⁶⁸ In response, Congress has proposed legislation.¹⁶⁹ Regulators have issued formal guidance¹⁷⁰ and initiated enforcement actions.¹⁷¹ State attorneys general have launched investigations.¹⁷²

Creators of blockchain, the technology that permits the creation of cryptocurrencies, posit that a permissionless or publicly accessible ledger that relies on a network of participants to verify and record

pressed-on-protections-for-cryptocurrency-users-11563396239 [https://perma.cc/WY2X-PFUC]; Nathaniel Popper, *Regulators Have Doubts About Facebook Cryptocurrency. So Do Its Partners.*, N.Y. TIMES (June 25, 2019), https://nyti.ms/2X1d0qv [https://perma.cc/V8Z2-G4YS].

168. See, e.g., Defendant Charged in Fraudulent ICO Ordered to Pay \$450,000, SEC Release No. 24842, 2020 WL 3447978 (June 23, 2020), https://www.sec.gov/litigation/litreleases/2020/lr24842.htm [https://perma.cc/4P8Z-MT4L]; SEC Charges Founder of Purported Blockchain Marketplace for Fraudulent ICO, SEC Release No. 24723 (Jan. 21, 2020), https://www.sec.gov/litigation/litreleases/2020/lr24723.htm [https://perma.cc/PXE9-MJZ9]; SEC Charges Former Bitcoin-Denominated Exchange and Operator with Fraud, SEC Release No. 24078, 2018 WL 992274 (Mar. 23, 2018), https://www.sec.gov/litigation/litreleases/2018/lr24078.htm [https://perma.cc/YD4R-FGXK].

169. Jason Brett, *Two New Bills in Congress Offer Clarity for Blockchain Tokens and Crypto Exchanges*, FORBES (Sept. 25, 2020, 11:06 AM), https://www.forbes.com/sites/jasonbrett/2020/09/24/two-new-bills-in-congress-offer-clarity-for-blockchain-tokens-and-crypto-exchanges/?sh=1d90ab6f2e00 [https://perma.cc/54YN-69CD].

170. See, e.g., SEC, Framework for “Investment Contract” Analysis of Digital Assets (Apr. 3, 2019), https://www.sec.gov/corpfin/framework-investment-contract-analysis-digital-assets [https://perma.cc/GFG8-2DB9]; Report of Investigation Pursuant to Section 21(a) of the Securities Exchange Act of 1934: The DAO, SEC Release No. 81207 (July 25, 2017) [hereinafter DAO Report], https://www.sec.gov/litigation/investreport/34-81207.pdf [https://perma.cc/43GX-SABR]; Public Statement, SEC, SEC Statement Urging Caution Around Celebrity Backed ICOs (Nov. 1, 2017), http://www.sec.gov/news/public-statement/statementpotentially-unlawful-promotion-icos [https://perma.cc/6UBN-U6NB]; Public Statement, SEC, Statement on Potentially Unlawful Online Platforms for Trading Digital Assets (Mar. 7, 2018), http://www.sec.gov/news/public-statement/enforcement-tm-statement-potentially-unlawful-online-platforms-trading [https://perma.cc/MFL6-K8JF].

171. See 2019 SEC DIV. OF ENF’T ANN. REP. 12, https://www.sec.gov/files/enforcement-annual-report-2019.pdf [https://perma.cc/3NAK-DSNJ]; 2018 SEC DIV. OF ENF’T ANN. REP. 7-8, https://www.sec.gov/files/enforcement-annual-report-2018.pdf [https://perma.cc/Z95V-2QYD].

172. See, e.g., Nikhilesh De, *New York AG Report Faults Crypto Exchanges for Manipulation Risks*, COINDESK (Sept. 19, 2018, 7:31 PM), https://www.coindesk.com/new-york-ags-office-takes-aim-at-crypto-exchanges-in-new-report [https://perma.cc/3TFL-BXPC]; Press Release, N.J. Off. of the Att’y Gen., New Jersey Bureau of Securities Orders Two Online Cryptocurrency Promoters to Stop Offering Unregistered Securities in the State (Aug. 7, 2019), http://www.nj.gov/oag/newsreleases19/pr20190807a.html [https://perma.cc/3WUX-2KNW]; Press Release, Md. Off. of the Att’y Gen., Attorney General Frosh Announces Coordinated Cryptocurrency Crackdown (Aug. 14, 2019), http://www.marylandattorneygeneral.gov/Press/2019/081419a.pdf [https://perma.cc/572K-JNJF].

data or transactions can replace the various firms and institutions that intermediate financial market transactions.¹⁷³ In some instances, advocates argue, the decentralization of certain financial arrangements may remove the transactions from the ambit of regulatory oversight.¹⁷⁴

In the wake of blockchain's development, a vibrant debate has ensued; the debate has intensified as the futurists and visionaries committed to publicly accessible, permissionless, or decentralized blockchains contend with for-profit businesses. The latter increasingly capture the open-source projects and divert community-developed technology to private, permissioned blockchains.

This Part explores recently articulated infrastructure-based classifications—centralized or decentralized—for cryptocurrency coin or token transactions. These classifications have received a great deal of attention from regulators, practitioners, and academics. In addition, this Part focuses on the platforms or cryptocurrency exchanges that facilitate secondary market trading.

Based on continuing infrastructure developments, these platforms have the capacity to adapt, reducing and possibly eliminating intermediation in secondary market trading. The unique features of permissionless, public blockchains that enable secondary market trading demonstrate potential to achieve disintermediation. Careful evaluation also reveals the perils that arise in secondary market cryptocurrency transactions and the potential for decentralized cryptocurrency exchanges to exacerbate these concerns.

A. *Cryptocurrency Primer*

Cryptocurrency is a medium of exchange.¹⁷⁵ Market participants may use cryptocurrencies in transactions as a cash equivalent or a form of payment in a manner similar to long-recognized government-issued fiat or money, such as the U.S. dollar, euro, or Japanese yen.¹⁷⁶ Similar to conventional forms of money or cash,

173. See, e.g., SATOSHI NAKAMOTO, BITCOIN: A PEER-TO-PEER ELECTRONIC CASH SYSTEM 1 (2008), <https://bitcoin.org/en/bitcoin-paper> [<https://perma.cc/9JRW-93FK>].

174. See *infra* notes 205-08 and accompanying text.

175. Kevin V. Tu & Michael W. Meredith, *Rethinking Virtual Currency Regulation in the Bitcoin Age*, 90 WASH. L. REV. 271, 279 (2015).

176. Public Statement by Jay Clayton, Chairman, SEC, Statement on Cryptocurrencies and

cryptocurrencies enable market participants to purchase or sell valuables or engage in a variety of other financial transactions.¹⁷⁷ Unlike conventional forms of legal tender or fiat, no sovereign government issues or guarantees the value of cryptocurrency.¹⁷⁸ Cryptocurrencies enable parties to transact on peer-to-peer platforms, creating a pathway to transfer value to anyone capable of receiving the value anywhere in the world.¹⁷⁹

Unlike sovereign currency or government-issued fiat, developers create cryptocurrencies. For example, in 2008, a developer who adopted the pseudonym Satoshi Nakamoto published a whitepaper entitled *Bitcoin-A Peer-to-Peer Electronic Cash System*.¹⁸⁰ The developer outlined an innovative, decentralized protocol or blockchain that facilitated the generation and distribution of the cryptocurrency known as Bitcoin.¹⁸¹

Admittedly, this description reveals only one of the many functions of cryptocurrencies in financial markets. In the decade since the introduction of Bitcoin, the universe of coins and tokens has experienced exponential growth. Cryptocurrencies with a wide array of functions have inundated various corners of financial markets. The universe of cryptocurrencies is continually expanding.¹⁸² Today, the classes of cryptocurrency include, among others, a great variety of coins, alt-coins, stablecoins, and tokens.¹⁸³ While entrepreneurs continue to originate a significant percentage of cryptocurrency offerings, the universe of issuers increasingly includes various institutions such as multinational businesses, central banks, governments, and nonprofit entities.¹⁸⁴

Initial Coin Offerings (Dec. 11, 2017), <http://www.sec.gov/news/public-statement/statement-clayton-2017-12-11> [<https://perma.cc/5Q3C-PKZ7>].

177. *Id.*

178. DON TAPSCOTT & ALEX TAPSCOTT, *WORLD ECON. F., REALIZING THE POTENTIAL OF BLOCKCHAIN* 5 (June 28, 2017), http://www3.weforum.org/docs/WEF_Realizing_Potential_Blockchain.pdf [<https://perma.cc/N7RW-R53G>]. For further description of what virtual currency is, see Hughes & Middlebrook, *supra* note 162, at 504-05.

179. Public Statement by Jay Clayton, *supra* note 176.

180. See generally NAKAMOTO, *supra* note 173.

181. See *id.*

182. See *supra* text accompanying notes 25-27.

183. See Capital.com Research Team, *Types of Cryptocurrencies: Explaining the Major Types of Cryptos*, CAPITAL (Nov. 1, 2019), <https://capital.com/types-of-cryptocurrencies> [<https://perma.cc/T34P-NGBZ>].

184. See Bob Mason, *The Next Cryptocurrency Evolution: Countries Issue Their Own Digital*

For financial market regulators, the rapid development of a diverse spectrum of cryptocurrencies poses a notable challenge. U.S. financial markets benefit from thoughtfully balancing principles of federalism as well as a regulatory framework characterized by intervention based on the type of financial product (class of assets), transaction (activity), or market participant.¹⁸⁵ Consequently, as described in the previous Part, determining that an asset is a security subjects the issuer to the registration requirements of section 5 of the Securities Act.¹⁸⁶ Any subsequent resale of unregistered securities are likely subject to resale limitations,¹⁸⁷ and registered securities are subject to continuous reporting obligations,¹⁸⁸ exchange listing requirements (for relevant offerings),¹⁸⁹ and secondary market transaction restrictions imposed on registered broker-dealers or securities exchanges.¹⁹⁰

Structuring regulation in this manner yields the many benefits described in the previous Part.¹⁹¹ Mandatory disclosure may enhance investor protection and economic efficiency;¹⁹² and the philosophy of prioritizing issuer registration of public offerings and registration of broker-dealers and exchanges may promote fair and orderly markets.¹⁹³ However, dogmatic attempts to apply this regulatory framework in cryptocurrency markets reveals its limitations.

The architects of cryptocurrency markets intentionally developed assets and marketplaces for trading these assets that do not fit neatly into preexisting regulatory categories.¹⁹⁴ The diversity of

Currency, FXEMPIRE, <https://www.fxempire.com/education/article/the-next-cryptocurrency-evolution-countries-issue-their-own-digital-currency-443966> [<https://perma.cc/52XZ-LSUQ>].

185. See *supra* Part I.A.

186. See *supra* notes 155-61 and accompanying text; see also 15 U.S.C. § 78l(a).

187. See 17 C.F.R. § 230.905 (2019).

188. See 15 U.S.C. § 78m.

189. See U.S. Sec. & Exch. Comm'n, *Listing Standards*, INVESTOR.GOV, <https://www.investor.gov/introduction-investing/investing-basics/glossary/listing-standards> [<https://perma.cc/846N-9Q55>].

190. See, e.g., 15 U.S.C. § 78o.

191. See *supra* Part I.

192. See *supra* notes 58-66 and accompanying text.

193. See *supra* notes 96-112 and accompanying text.

194. See M. Todd Henderson & Max Raskin, *A Regulatory Classification of Digital Assets: Toward an Operational Howey Test for Cryptocurrencies, ICOs, and Other Digital Assets*, 2019 COLUM. BUS. L. REV. 443, 444-46; see also Kristin N. Johnson, *Regulating Cryptocurrency Secondary Market Trading Platforms*, U. CHI. L. REV. ONLINE (Jan. 7, 2020), <https://lawreview.blog.uchicago.edu/2020/01/07/298/> [<https://perma.cc/22R3-P6GS>].

features of cryptocurrencies defies the taxonomy of existing financial products, transactions, and actors.¹⁹⁵ Thus, a one-size-fits-all approach is unlikely to offer a solution to address regulatory concerns in cryptocurrency markets.

The diversity of cryptocurrencies is not the only barrier to effectively regulating this nascent market. Financial market regulation is deeply fragmented.¹⁹⁶ Jurisdictional limitations based on the attributes of a regulated financial product, transaction or activity coupled with our commitment to principles of federalism may result in regulatory gaps creating opportunities for arbitrage in shadow markets.¹⁹⁷ For some cryptocurrency developers, the regulatory gaps serve as an invitation to create an alternative financial system that defies the existing regulatory framework.

More specifically, the blockchain protocol represents an affirmative attempt to eliminate the storied intermediaries that have centralized transactions.¹⁹⁸ According to cryptocurrency advocates, at best, intermediaries profit richly by extracting fees from the unwary.¹⁹⁹ At worst, the intermediaries prey upon the public with impunity and, in the event of severe market disruption, externalize the costs of self-interested misconduct.²⁰⁰

In response to concerns, cryptocurrency communities developed the blockchain protocol, a peer-to-peer method of transacting without relying on intermediation.²⁰¹ For example, instead of relying on a legacy financial institution to act as an underwriter and orchestrate a public offering of securities, an issuer may directly distribute to investors coins or tokens that represent an equity investment in the issuer's firm using blockchain's permissionless, open-source, distributed ledger.²⁰² As the Bitcoin white paper and

195. See *Cryptocurrency Comparison*, *supra* note 162.

196. U.S. GOV'T ACCOUNTABILITY OFF., GAO-19-157SP, HIGH-RISK SERIES: SUBSTANTIAL EFFORTS NEEDED TO ACHIEVE GREATER PROGRESS ON HIGH-RISK AREAS 91 (2019).

197. See *id.*

198. See TAPSCOTT & TAPSCOTT, *supra* note 166, at 5.

199. See Deniz Kahramaner, *The Future of Crypto Trading: Decentralized Exchanges*, MEDIUM (Jan. 4, 2018), <https://denizkahramaner.medium.com/the-future-of-crypto-trading-decentralized-exchanges-30b41a20dd01> [<https://perma.cc/F5Q6-RT28>].

200. See Kahramaner, *supra* note 199; see also TAPSCOTT & TAPSCOTT, *supra* note 166, at 5; Dolgoplov, *supra* note 119, at 86-87.

201. See TAPSCOTT & TAPSCOTT, *supra* note 166, at 4-5.

202. See *id.* at 5.

many others explain, eliminating intermediaries in peer-to-peer cash transfers as well as other financial market transactions, such as capital formation and secondary market trading increases transparency, reduces transaction costs, and engenders greater democratic access to markets for all.²⁰³

Similar to many financial products created in the shadows of existing financial market regulation, questions regarding the operational architecture and functions of cryptocurrency have prompted jurisdictional conflicts among regulators and resistance from market participants. An early and frequent commentator on the question of regulating cryptocurrency, the SEC has announced its intentions to apply a well-established legal standard when evaluating whether a cryptocurrency may be subject to federal securities regulations.²⁰⁴ Other state and federal regulators with legitimate jurisdictional claims issued similar releases, fitting cryptocurrency into the widely adopted pre-existing regulatory frameworks applicable to the asset classes or transactions that they supervise.²⁰⁵

During a speech in the summer of 2018, the then-Director of the SEC's Division of Corporate Finance articulated an argument in favor of prioritizing the architecture of an individual blockchain in regulatory inquiries.²⁰⁶ In the speech, Director Hinman explained that the blockchain protocol that enables generation of cryptocurrency may become "sufficiently decentralized" that its infrastructure no longer creates the concerns that justify regulatory intervention.²⁰⁷ More specifically, Hinman acknowledged that the role of intermediaries may be reduced or eliminated when the underlying blockchain protocol adopted to distribute coins or tokens is a public, permissionless blockchain.²⁰⁸ Hinman referenced Bitcoin as an example of the kind of open-source protocol that has achieved the

203. NAKAMOTO, *supra* note 173; TAPSCOTT & TAPSCOTT, *supra* note 166, at 5.

204. William Hinman, Dir., Div. Corp. Fin., Sec. & Exch. Comm'n, Remarks at the Yahoo Finance All Markets Summit: Crypto: Digital Asset Transactions: When *Howey* Met *Gary (Plastic)* (June 14, 2018) (arguing that ICOs may be considered securities under the *Howey* "investment contract" test).

205. *See, e.g.*, Press Release, N.J. Off. of the Att'y Gen., *supra* note 172; Press Release, Md. Off. of the Att'y Gen., *supra* note 172.

206. *See* Hinman, *supra* note 204.

207. *Id.*

208. *See id.*

requisite on-chain transparency to eliminate the question of whether the coins could be deemed “securities” and subject to securities regulation.²⁰⁹

Unfortunately, Hinman’s explanation regarding the attributes of a “sufficiently decentralized”²¹⁰ protocol raise more questions than it resolves. Some rejoiced, interpreting Hinman’s remarks as an acknowledgment that “truly” decentralized platforms would be beyond the ambit of regulation.²¹¹ Others expressed dismay.²¹² Developers hoping to launch initial coin offerings queried which specific configurations might lead regulators to conclude that the protocol facilitating an ICO is “sufficiently decentralized.”²¹³

As questions emerged regarding the attributes of decentralization, the SEC and CFTC initiated prosecutions alleging that developers violated federal statutes by creating protocols for secondary market trading in securities and commodities markets.²¹⁴ The releases issued by the agencies announcing settlements related to these claims offered little clarity regarding the factors that led to the agencies’ conclusions that the traded assets were securities or commodities, triggering liability for developers whose platforms facilitated secondary market trading.²¹⁵ As the market for secondary trading platforms continues to grow, the evolution of decentralized

209. *See id.*

210. *Id.*

211. *See, e.g.*, Guillermo Jimenez, *A Brief History of the SEC’s Adventures in Cryptoland*, DECRYPT (Jan. 4, 2019), <https://decrypt.co/4371/a-brief-history-of-the-secs-adventures-in-cryptoland> [<https://perma.cc/G6LW-YHB7>].

212. *See, e.g.*, Olta Andoni & Donna Redel, *How the Incoming Administration Can Fix Crypto Regulation*, COINDESK (Dec. 14, 2020, 10:58 AM), <https://www.coindesk.com/biden-administration-crypto-regulation> [<https://perma.cc/D8GY-22WF>].

213. *See id.*; *see also* Johnson, *supra* note 194, at 36.

214. *See, e.g.*, Nikhilesh De, *ICO Project Enigma Settles SEC Charges over \$45M Token Sale*, COINDESK (Feb. 9, 2020, 2:32 PM), <https://www.coindesk.com/ico-project-enigma-settles-sec-charges-over-45m-token-sale> [<https://perma.cc/MVJ3-DG37>]; Chris Madill, *Crypto Fraudster CabbageTech Slapped with over \$1 Million in Fines in CFTC Case*, BITRATES (Aug. 26, 2018, 10:11 AM), <https://www.bitrates.com/news/p/crypto-fraudster-cabbagetech-slapped-with-over-1-million-in-fines-in-cftc-case> [<https://perma.cc/R2MV-NXAZ>].

215. *See* Press Release, U.S. Sec. & Exch. Comm’n, *ICO Issuer Settles SEC Registration Charges, Agrees to Return Funds and Register Tokens as Securities* (Feb. 19, 2020), <https://www.sec.gov/news/press-release/2020-37> [<https://perma.cc/WV3U-LSMU>]; Press Release, U.S. Commodity Futures Trading Comm’n, *CFTC Wins Trial Against Virtual Currency Fraudster* (Aug. 24, 2018), <https://www.cftc.gov/PressRoom/PressReleases/7774-18> [<https://perma.cc/Z42N-8ZVH>]; *see also* Andoni & Redel, *supra* note 212.

digital ledgers operating in this market reveals developers' growing momentum to build such an infrastructure.

B. Cryptocurrency Exchanges

Scholars collecting ethnographic data on the blockchain community have identified differing accounts of developers' incentives for creating blockchains. Some trace blockchain's philosophical underpinnings to the recent financial crisis and developers' frustration with the avarice of legacy financial institutions that act as intermediaries.²¹⁶ Others suggest that a libertarian philosophy inspired blockchain developers to create an alternative financial system.²¹⁷ Still others claim that the recent financial crisis inspired developers to consider pathways to create a store of value or medium of exchange free from the influence of any single sovereign government.²¹⁸

Despite differing political or philosophical motivations, early developers shared a common understanding of the architecture and governance of a blockchain; the operational paradigm of blockchains would be public or permissionless.²¹⁹ The ledger would be transparent, revealing verified transactions to anyone who could access the blockchain.²²⁰ The blockchain would be governed democratically by the network or community engaged in the enterprise of creating and sustaining the protocol.²²¹

Operational challenges, governance disputes, and schisms reveal diverging philosophies and motivations for integrating blockchain, further frustrating regulatory analysis. In the decade since the launch of the Bitcoin blockchain, governance questions have plagued the blockchain community.²²² Infrastructural challenges have limited many blockchain protocols from executing transactions

216. Syed Omer Husain, Alex Franklin & Dirk Roep, *The Political Imaginaries of Blockchain Projects: Discerning the Expressions of an Emerging Ecosystem*, 15 SUSTAINABILITY SCI. 379, 380 (2020); see also Kahramaner, *supra* note 199.

217. See KEVIN DOWD, NEW PRIVATE MONIES: A BIT-PART PLAYER? 38-39 (2014).

218. See TAPSCOTT & TAPSCOTT, *supra* note 166, at 4-5.

219. *Id.* at 5; Walch, *supra* note 20, at 844.

220. Brummer & Yadav, *supra* note 17, at 266-67; Magnuson, *supra* note 20, at 1185; TAPSCOTT & TAPSCOTT, *supra* note 166, at 5.

221. Walch, *supra* note 20, at 844-45.

222. TAPSCOTT & TAPSCOTT, *supra* note 166, at 3, 8.

in a completely transparent manner.²²³ While protocol developers' white papers promised transparency, executing transactions "on-chain" proved to be impractical and inefficient.²²⁴ Consequently, developers routed certain aspects of transactions "off-chain" and created procedures for determining which elements of transactions might remain on-chain and which might occur off-chain.²²⁵

Mounting procedural issues revealed a governance crisis in the blockchain community. While blockchain began as an open-source community developing permissionless distributed digital ledgers, software programmers affiliated with commercial enterprises and noncommercial institutions began adapting the publicly available code for proprietary projects.²²⁶ Financial services firms and entrepreneurs developing financial market transactions on blockchain promptly seized the mantle.²²⁷ Entrepreneurs and financial services firms began adapting digital ledgers, shifting the protocols from permissionless to permissioned, and integrating governance mechanisms.²²⁸ These market participants expressly aim to reintroduce aspects of intermediation that have generated revenues for legacy financial institutions.²²⁹

While critical questions remained unresolved for developers creating protocols or launching offerings associated with ICOs,²³⁰ the growing market for secondary trading poses marked difficulties for developers seeking to comply with legal standards or create

223. See, e.g., Walch, *supra* note 23, at 742-43; see also Johnson, *supra* note 194, at 41-42.

224. See Jake Frankenfield, *Off-Chain Transactions (Cryptocurrency)*, INVESTOPEDIA (Oct. 31, 2019), <https://www.investopedia.com/terms/o/offchain-transactions-cryptocurrency.asp> [<https://perma.cc/LEQ9-WPVN>].

225. *Id.*; see also Johnson, *supra* note 194, at 37-38.

226. See Walch, *supra* note 20, at 840-41, 849-50.

227. See *id.*

228. See *id.*

229. See *supra* Part I.A.

230. For developers orchestrating the launch of ICOs, regulators have declared that adopting an operational or governance approach that centralizes authority and decision-making aligns permissioned blockchains or the coins and tokens issued on these protocols with the types of investment arrangements subject to registration under the Securities Act. Applying the analysis of the seminal decision in *S.E.C. v. Howey*, regulators characterize ICO issuers as promoters of "securities" in contexts when the role of coins or tokens purchasers is analogous to passive investors who face asymmetries of information when making investment decisions. See *infra* note 418 and accompanying text.

platforms that would not be subject to the registration requirements of the Exchange Act.²³¹

Notwithstanding Bitcoin's promise and developers' aspirations for cryptocurrency to democratize access to finance, cryptocurrency markets continue to rely on intermediation for important aspects of secondary market trade execution and settlement. In fact, many of the earliest and largest cryptocurrency exchanges operate as for-profit businesses; they collect hefty fees to facilitate cryptocurrency trading and distribute profits to the individual entrepreneurs and investors who own the platform.²³² These platforms are proprietary, permissioned blockchain ledgers that execute transactions using efficient operational procedures that are far from transparent.²³³

Coinbase, Gemini, Bittrex, and Binance are all examples of centralized exchanges.²³⁴ Users deposit their funds directly into a pooled wallet that is controlled by the exchange; the exchange takes custody of traders' deposited assets, and the exchange directly engages in matching buy and sell orders.²³⁵

Centralized exchanges create accounts that store customer funds.²³⁶ The exchanges maintain "hot" wallets connected to the platform's network to facilitate trading.²³⁷ Centralized exchanges generally enable traders to execute, clear, and settle buy/sell orders.²³⁸ As custodians of financial assets, centralized exchanges must comply with state and federal laws relevant to the custody,

231. See, e.g., Press Release, Sec. & Exch. Comm'n, ICO Issuer Settles SEC Registration Charges, Agrees to Return Funds and Register Tokens as Securities (Feb. 19, 2020), <https://www.sec.gov/news/press-release/2020-37> [<https://perma.cc/WV3U-LSMU>] (describing a run-in between Enigma and the SEC).

232. See Nathan Reiff, *What Are Centralized Cryptocurrency Exchanges?*, INVESTOPEDIA (June 25, 2019), <https://www.investopedia.com/tech/what-are-centralized-cryptocurrency-exchanges/> [<https://perma.cc/95M4-HMK9>].

233. See Johnson, *supra* note 194, at 37-38.

234. See, e.g., Laura M., *Gemini vs Coinbase: Is Gemini a Better Coinbase Alternative?*, BITDEGREE (Sept. 9, 2020), <https://www.bitdegree.org/crypto/tutorials/gemini-vs-coinbase> [<https://perma.cc/R65M-CGGE>].

235. Reiff, *supra* note 232.

236. *Id.*

237. See Will Kenton, *Hot Wallet*, INVESTOPEDIA (June 30, 2020), <https://www.investopedia.com/terms/h/hot-wallet.asp> [<https://perma.cc/GAQ4-6BWA>].

238. See Reiff, *supra* note 232.

exchange, and transfer of assets including federal anti-money-laundering and know-your-customer user-verification obligations.²³⁹

Having abandoned aspects of the public, permissionless blockchain envisioned by early theorists and developers, centralized exchanges relinquished the benefits of transparent, permissionless trading. Incorporating certain aspects of intermediation, these exchanges inherited the attendant operational challenges that have long plagued legacy financial institutions.²⁴⁰

First, centralized cryptocurrency exchanges create single points of failure. Centralized exchanges are susceptible to hacks, shutdowns, insider trading, scams, and withdrawal latencies.²⁴¹ International media coverage has chronicled the cybersecurity breaches at Mt. Gox, Shapeshift, Bitfinix, Poloniex, QuadrigaCX, and Bithumb.²⁴² Hackers stole more than \$4 billion in cryptocurrencies from centralized exchanges between 2011 and 2017.²⁴³

Second, similar to legacy exchanges, centralized cryptocurrency exchanges typically charge transaction fees.²⁴⁴ Trading on centralized exchanges may be less transparent because the exchange may permit the execution and settlement of trades off-chain, meaning the information regarding the transaction may not be broadcast to the entire blockchain network and may not be authenticated on the blockchain network.²⁴⁵ Settling trades off-chain creates concerns, including whether or not traders are offered the most competitive pricing.²⁴⁶

239. See TradePassionate, *Decentralized Exchanges—Don't Overlook KYC/AML Policies*, MEDIUM (Aug. 14, 2018), <https://medium.com/@tradepassionate/decentralised-exchanges-don't-overlook-kyc-aml-policies-ef1e6b406de4> [<https://perma.cc/BVH8-XYE2>].

240. The following discussion draws on prior work. See Johnson, *supra* note 194, at 37-38.

241. See Kahramaner, *supra* note 199.

242. See *Crypto Exchange: Hacks in Review*, COINTELEGRAPH, <https://cointelegraph.com/magazine/crypto-exchange-hacks/> [<https://perma.cc/K7ET-U7WK>]; Erik Voorhees, *Looting of the Fox: The Story of Sabotage at ShapeShift*, BITCOIN.COM (Apr. 19, 2016), <https://news.bitcoin.com/looting-fox-sabotage-shapeshift/> [<https://perma.cc/U5Z5-HP4R>]; Tim Copeland, *The Complete Story of the QuadrigaCZ \$190 Million Scandal*, DECRYPT (Mar. 13, 2019), <https://decrypt.co/5853/complete-story-quadrigacx-190-million> [<https://perma.cc/X883-AJ8P>].

243. Johnson, *supra* note 194, at 37.

244. See Totle, *Crypto Trading Fees Explained and How to Minimize Them*, MEDIUM (Dec. 5, 2018), <https://medium.com/totle/crypto-trading-fees-explained-and-how-to-minimize-them-203f0938f2f1> [<https://perma.cc/TZ2D-3NLE>].

245. See Frankenfield, *supra* note 224.

246. *Id.*

Centralized exchanges may act as broker-dealers, maintaining an inventory of various cryptocurrencies and satisfying customer orders from their own inventory at the prices determined by the exchange.²⁴⁷ In the absence of a consolidated pricing index, traders may be unaware that the executed transaction price is higher than the average market price for the same cryptocurrency.

Finally, on centralized exchanges, retail traders also pay market-taker fees. On legacy securities exchanges, for example, the maker-taker structure of market pricing provides a transaction rebate to market-makers who provide liquidity by “making” a trade.²⁴⁸ In this context, the market-maker posts a trade and the taker completes the transaction.²⁴⁹ The market-maker receives a rebate for introducing the transaction and the taker pays a fee to execute the transaction.²⁵⁰

In recent years, developers have released white papers and introduced a number of decentralized cryptocurrency exchanges (DEXs).²⁵¹ All transactions are authenticated by the network’s community.²⁵² Theoretically, DEX users execute transactions without the assistance of intermediaries and store funds and assets in their own wallets, transacting in a genuinely trustless manner.²⁵³ DEXs do not maintain custody of traders’ assets or wallets.²⁵⁴ Traders connect hardware wallets or software wallets to the DEX smart contract to execute trading transactions.²⁵⁵ Depending on the DEX framework, the trader either stores customer tokens or releases the customer’s tokens to the DEX’s smart contract until a particular trade is executed and settled.²⁵⁶

247. See *supra* notes 123-29 and accompanying text.

248. Andrew Bloomenthal, *What Market-Taker Fees Mean for You*, INVESTOPEdia (June 22, 2020), <https://www.investopedia.com/articles/active-trading/042414/what-makertaker-fees-mean-you.asp> [<https://perma.cc/2DPQ-WZQ9>].

249. *Id.*

250. *Id.*

251. See *What Is a Dex: Decentralized Exchanges Explained*, LEDGER (Oct. 9, 2020), <https://www.ledger.com/academy/crypto/what-is-a-dex-decentralized-exchanges-explained> [<https://perma.cc/4E7M-AU9P>].

252. *Id.*

253. *Id.*

254. *Id.*

255. See *id.*

256. See Nuke Token, *How to Trade on a DEX (Decentralized Exchange)*, MEDIUM (June 24, 2019), <https://medium.com/@NukeTokenOfficial/how-to-trade-on-a-dex-decentralized-ex>

On decentralized exchanges, makers and takers act independently. The DEX protocol does not support market orders; however, liquidity pools and automated market-maker applications may approximate the benefits of market orders.²⁵⁷ DEXs create liquidity pools.²⁵⁸ Rather than rely on a market-maker to create liquidity, traders stake (lock-up) tokens in a smart contract-based liquidity pool. When a trade is executed, the reward for creating liquidity reverts to the pool and participants share the financial benefits of creating liquidity pro rata based on their contributions to the pool.²⁵⁹ DEX traders may, however, pay higher transaction fees due to the operational mechanics of executing all elements of a trade on-chain.²⁶⁰ DEX traders pay substantially higher network fees known as “gas” because the operational infrastructure of the exchanges requires additional steps for verification and posting transactions to the exchange network.²⁶¹

A DEX may adopt one of the following approaches for matching buyers and sellers: on-chain order books or off-chain order relay with on-chain settlement. With on-chain order books, the DEX hosts the order book on the exchange platform.²⁶² The DEX distributes orders across the network and the user releases custody of her tokens to the DEX smart contract.²⁶³ Maintaining an on-chain order book creates notable inefficiencies, imposing high friction costs and leading to latency that enables market participants to engage in

change-2cc38054d8bb [https://perma.cc/P9B5-L5B5].

257. See, e.g., WILL WARREN & AMIR BANDEALI, *OX: AN OPEN PROTOCOL FOR DECENTRALIZED EXCHANGE ON THE ETHEREUM BLOCKCHAIN 1* (2017), https://0x.org/pdfs/0x_white_paper.pdf [https://perma.cc/ASX2-EBX2].

258. See, e.g., Nikolai Kuznetsov, *DeFi Liquidity Pools, Explained*, COINTELEGRAPH (Jan. 28, 2021), <https://cointelegraph.com/explained/defi-liquidity-pools-explained> [https://perma.cc/99GK-HEXF].

259. See *id.*

260. See Leslie Ankney, *No More Trading or Listing Fees? Decred Releases New DEX Proposal*, FORBES (Feb. 4, 2019, 11:00 AM), <https://www.forbes.com/sites/leslieankney/2019/02/04/no-more-trading-or-listing-fees-decred-releases-new-dex-proposal/#3929f8b235d9> [https://perma.cc/89FV-M69Y].

261. See *What Is Gas?*, ETH GAS STATION (July 31, 2019), <https://ethgasstation.info/blog/what-is-gas/> [https://perma.cc/9L6D-DNVV].

262. See Richard Chen, *A Comparison of Decentralized Exchange Designs*, MEDIUM (Apr. 18, 2019), <https://thecontrol.co/a-comparision-of-decentralized-exchange-designs-1deef249f56a> [https://perma.cc/84A2-WDY3].

263. See *id.*

predatory trading behavior.²⁶⁴ Modifying and cancelling trades present significant challenges.²⁶⁵ Higher trading volumes consume a large amount of network bandwidth.²⁶⁶

A second approach involves DEX using off-chain order relay with on-chain settlement. Under this approach, the trader allows the DEX contract to access their token balance.²⁶⁷ The trader then creates an order specifying a desired exchange rate, expiration time, and cryptographically signs their exchange order with their private key.²⁶⁸ The order is not broadcast across the network. The order is sent across a communication medium; relayers, such as Relay Radar, are used to find, match, and fill orders as they go across a communication medium.²⁶⁹ Relayers do not execute trades; rather, relayers recommend a best available price to a trader who then decides whether to take the order.²⁷⁰ A trader who intercepts the message and decides to fill the order, submits the signed order to the DEX smart contract.²⁷¹ The DEX smart contract authenticates the trader's signature, makes sure the order has not expired, verifies that the order has not already been filled, and then transfers the tokens for value and settles the exchange on-chain.²⁷²

DEXs may provide increased security, and the automated market maker features in these platforms may increase fairness and incorporate circuit-breakers to better govern trading dynamics. Unlike a centralized exchange, a DEX is not a single point of failure and is,

264. *See id.*

265. *See* Jack Yeu, *Are Decentralized Exchanges Built Equal?*, MEDIUM (Dec. 4, 2019), <https://medium.com/switchco/are-decentralized-exchanges-built-equal-213e70a95a03> [<https://perma.cc/5ULL-5UAG>].

266. *See id.*

267. *See* Usman Fazil, *Diving Deep into Ox Protocol*, MEDIUM (Apr. 26, 2018), <https://medium.com/coinmonks/diving-deep-into-ox-protocol-547efb83ffed> [<https://perma.cc/3GM7-B576>].

268. *See id.*

269. *See* Radar Relay, *On Radar and Relayers*, MEDIUM (Aug. 24, 2017), <https://medium.com/@RADARRELAY/on-radar-and-relayers-30423f506587> [<https://perma.cc/2B4M-QLR2>].

270. *See* Radar Relay, *RADAR RELAY, The First Open Order Book Relay, Relaunches Decentralized Exchange with a Modern Swap Interface*, PR NEWSWIRE (May 11, 2020, 8:00 AM), <https://www.prnewswire.com/news-releases/radar-relay-the-first-open-order-book-relay-relaunches-decentralized-exchange-with-a-modern-swap-interface-301056312.html> [<https://perma.cc/N33M-EDE8>].

271. *See* Fazil, *supra* note 267.

272. *See id.*

therefore, far less susceptible to the various security and risk-management concerns that plague centralized exchanges.²⁷³

Consider the example of Uniswap:

Uniswap is the largest decentralized cryptocurrency exchange by volume and a leader in decentralized finance (DeFi). The Uniswap platform is supported by a protocol that uses Automated Market Makers (AMMs) and liquidity pools to facilitate peer-to-peer trading. Liquidity providers add tokens to Uniswap pools and are rewarded with a fee proportional to their share of the pool. In September 2020, Uniswap launched its UNI governance token and airdropped 400 UNI—worth approximately \$1,400 at the time of transfer—to every platform user.

... Cryptocurrency exchanges emulate this marketplace dynamic, offering a trading venue for digital assets[.]

... [C]oncerns over individual user autonomy are reportedly driving the development of decentralized exchanges (DEXs). These emerging alternatives are built with blockchain technology and use smart contracts to execute transactions between buyers and sellers in an automated fashion.

... DEXs have faced growing pains, being bound by the limitations of blockchain technology. Network scalability, segmented liquidity, and disjointed user experience have posed significant hurdles to widespread DEX adoption. To address these shortcomings, protocols like Uniswap are developing tools to improve the functionality of DEXs....

Uniswap is a decentralized exchange protocol that operates on the Ethereum blockchain. The platform enables peer-to-peer (P2P) trades that execute without order books or an intermediary.... Anyone can swap tokens, contribute tokens to a pool and earn fees, or list a token on Uniswap. Almost any ERC-20 token is exchangeable using Uniswap, and there are no listing fees.

... There are more than 22,000 Uniswap pools, which minimize this misalignment between buyer and seller market orders by creating a deep reservoir of assets to trade, which ensures liquidity. Uniswap's Automated Market Maker technology

273. See Jan Wozniak, *Thoughts on Decentralized Exchanges and Real World Usage of Their Own Tokens*, MEDIUM (Sept. 18, 2018), <https://medium.com/trivial-co/thoughts-on-decentralized-exchanges-and-real-world-usage-of-their-own-tokens-d0a6a16f5d3d> [<https://perma.cc/A52S-MYT4>].

algorithmically analyzes liquidity pools to offer the most appropriate prices for specific trades.

... The key innovation that makes the Uniswap protocol work is Automated Market Maker (AMM) technology. An AMM is a smart contract that manages the Uniswap pools that furnish the tokens to effectuate a trade. When a trade is made, the AMM algorithm determines the price based on supply and demand between tokens in these liquidity pools.²⁷⁴

The developing definitions for each of the two classes of exchanges described in this Part may offer a path for governing cryptocurrency secondary market trading. Distinguishing between these two classes of exchanges, however, may be insufficient to articulate a set of formal rules governing cryptocurrency secondary market trading platforms. There may be a need to create new rules that recognize the distinctions between centralized and decentralized exchanges and to distinguish these types of exchanges from traditional securities and commodities exchanges.

Reflecting on Director Hinman's comments, are decentralized exchanges that execute transactions on chain "sufficiently decentralized?"²⁷⁵ Even if the operational mechanics of these publicly accessible, permissionless, censorship resistant, and trustless trading venues may prompt answers in the affirmative, there may be good reason to continue to evaluate the benefits of regulatory oversight. The next Part identifies risk management concerns that create challenges for market participants and the exchanges that enable conventional secondary market trading. Curiously, many of these concerns persist in cryptocurrency markets, even when the exchanges facilitating trading may be characterized as decentralized.

274. Cryptopedia Staff, *What Is Uniswap? A Breakdown*, CRYPTOPEDIA (Mar. 13, 2021), <https://www.gemini.com/cryptopedia/uniswap-decentralized-exchange-crypto-defi> [<https://perma.cc/PLK9-EN2S>].

275. *See supra* note 207 and accompanying text.

III. MARKET EVOLUTION AND FRAGILITY

Similar to the market for conventional financial products, cryptocurrency secondary markets and the firms that operate in these markets face notable and endemic risks. Within each class of risks, there are ancillary concerns that may individually or in the aggregate become enterprise risks. As noted in Part I, exchanges incur market risk by acquiring securities and maintaining a proprietary portfolio of assets to satisfy orders executed on their platform;²⁷⁶ thus, decisions regarding which securities to acquire, how long to maintain the securities in an exchange's inventory, and whether to extend credit to counterparties trading on their platforms create risks.²⁷⁷

Cryptocurrency exchanges also facilitate a diversity of transactions that create risks. For example, traders executing transactions on cryptocurrency exchanges may act as broker-dealers, acquiring cryptocurrency for their proprietary portfolios. Firms operating as broker-dealers on cryptocurrency exchanges may execute or permit clients to structure leveraged transactions or complex derivatives transactions. Such policies may create enterprise risks for individual broker-dealers and, in the event that the exchange guarantees trades executed on its platform, solvency risks for the exchange.²⁷⁸ In addition to risks that arise from leveraged or structured derivative transactions, the business model for these exchanges requires the platforms to facilitate the exchange of a diversity of coins or tokens creating endemic exchange rate risks.²⁷⁹

276. Market risk describes the possibility that an investor may experience losses resulting from a sharp decline in the value of assets (shares of stock, commodities, or derivatives) in the investor's portfolio. See James Chen, *Market Risk*, INVESTOPEDIA (Jan. 31, 2020), <https://www.investopedia.com/terms/m/marketrisk.asp> [<https://perma.cc/3XQ3-9W9N>].

277. Credit risk refers to the possibility that a lender will default on an outstanding debt obligation. See *The Causes and Effects of the AIG Bailout: Hearing Before the H. Comm. on Oversight and Gov't Reform*, 110th Cong. 37 (2008) (statement of Eric R. Dinallo, Superintendent, New York Insurance Department) ("For a large, large, large percentage of credit default swaps, you're required to have absolutely no collateral or capital behind them."); Frank Partnoy, *Financial Derivatives and the Costs of Regulatory Arbitrage*, 22 J. CORP. L. 211, 219 n.48 (1997).

278. See *supra* notes 137-46 and accompanying text.

279. See generally DAVID W. PERKINS, CONG. RSCH. SERV., R45427, CRYPTOCURRENCY: THE ECONOMICS OF MONEY AND SELECTED POLICY ISSUES 23 (2020) ("[T]he existence of multiple

Cryptocurrency exchanges navigate this diverse array of risks. The aggregation of these enterprise risks may, however, undermine a firm's operational integrity and lead to a solvency crisis. In 2013, for example, Mt. Gox—the world's largest cryptocurrency exchange at the time—declared bankruptcy.²⁸⁰ Swarmed by hackers and subject to stunning acts of fraud, theft, and mismanagement, Mt. Gox lost over 850,000 Bitcoins worth more than \$8.5 billion today.²⁸¹

As financial markets expand to include a greater diversity of intermediaries, the interconnectedness between and among intermediaries may influence individual firm enterprise risk and market stability. This Part examines three common intermediary risk-management concerns that threaten market stability in emerging cryptocurrency markets. Each of these concerns poses a threat to the operational infrastructure of cryptocurrency exchanges. This Section argues that enterprise or systemic risk that results from the failure of a systemically significant cryptocurrency broker-dealer or the interconnectedness among market intermediaries may disrupt cryptocurrency markets and lead to spillover effects that destabilize broader financial markets.

The next three Sections begin to outline risk management concerns and responses to risk management concerns in emerging cryptocurrency markets. In truth, certain of the trading strategies described below are still quite novel in conventional securities and commodities markets.²⁸² Thus, the discussion is developing as the market for cryptocurrencies matures.

A. Automating Risk

Following the Flash Crash in 2010, algorithmic trading is one of the most rapidly expanding and closely monitored financial markets trading strategies in the world.²⁸³ In a quiet revolution, computer-

currencies adds difficulty to buyers and sellers making exchanges; all buyers and sellers must be aware of and continually monitor the value of different currencies relative to each other.”).

280. Floyd, *supra* note 13.

281. *Id.*

282. See *infra* Part III.A.

283. See Charles R. Korsmo, *High-Frequency Trading: A Regulatory Strategy*, 48 U. RICH. L. REV. 523, 526-28 (2014).

based trading programs are rapidly replacing human traders.²⁸⁴ “These changes mark the end of the era of specialists and physical execution of trades on legacy exchanges.”²⁸⁵ Moreover, computer-based trading programs have had a significant impact on the volume and speed of securities market transactions.²⁸⁶

Due to the efficiencies and reduced costs, algorithmic trading has seized an increasingly dominant role in financial markets.²⁸⁷ Historically, executing trades required relaying orders to buy or sell a security to an intermediary such as a broker-dealer; the broker-dealer would manually enter the solicited trade and, based on the asset price reflected in the exchange order book, identify a counterparty willing to execute a trade for the solicited asset.²⁸⁸

Today, investors may program trading platforms to execute automated trading strategies.²⁸⁹ These trading bots have the capacity to evaluate vast volumes of data and respond in fractions of a second to the release of information in markets.²⁹⁰ Algorithmic trading automates trade execution, reducing if not eliminating the role of intermediaries, and calculates market, credit, and other risks of conventional and complex, structured, or leveraged trades.²⁹¹ The introduction of artificial intelligence (AI) and algorithmic trading strategies has led to even more sophisticated automated trading programs.²⁹²

284. See *The Stockmarket Is Now Run by Computers, Algorithms and Passive Managers*, ECONOMIST (Oct. 5, 2019), <https://www.economist.com/briefing/2019/10/05/the-stockmarket-is-now-run-by-computers-algorithms-and-passive-managers> [<https://perma.cc/WSH3-49H4>].

285. Johnson, *supra* note 59, at 854.

286. See *The Stockmarket Is Now Run by Computers, Algorithms and Passive Managers*, *supra* note 284.

287. *Id.*

288. See *What Is an Automated Market Maker?*, COINMARKETCAP, <https://coinmarketcap.com/alexandria/glossary/automated-market-maker-amm> [<https://perma.cc/5VH5-RZBD>]; *The Stockmarket Is Now Run by Computers, Algorithms and Passive Managers*, *supra* note 284; RISHI K. NARANG, *INSIDE THE BLACK BOX: A SIMPLE GUIDE TO QUANTITATIVE AND HIGH FREQUENCY TRADING* 42-45 (2d ed. 2013).

289. See NARANG, *supra* note 288, at 43-45 (describing various questions and concerns that programmers must consider when designing and training data-driven algorithms for trading).

290. See *id.*

291. See Yesha Yadav, *How Algorithmic Trading Undermines Efficiency in Capital Markets*, 68 VAND. L. REV. 1607, 1611-12 (2015).

292. AI methodologies rely on supervised and unsupervised learning. See generally ETHEM ALPAYDIN, *INTRODUCTION TO MACHINE LEARNING* (3d ed. 2014). In supervised learning, the algorithm is trained with well-labeled and classified data, whereas there are no training data

Similar to legacy securities exchanges, centralized and decentralized exchanges may permit automated or algorithmic trading.²⁹³ These platforms may also continue to rely on order books or an electronic equivalent to determine asset prices for the orders submitted for execution on the exchange.²⁹⁴

A number of decentralized exchanges are, however, experimenting with automated order books described as automated market makers. Financial market participants first introduced the notion of automated market makers (AMM) in the early 1990s.²⁹⁵ Introducing an AMM renders manual order books obsolete and accelerates the execution of trades, making price discovery more efficient and, arguably, more accurate.²⁹⁶ AMMs also reduce the potential for human error that plagues manual order entry.²⁹⁷ Unfortunately, early AMM systems were also susceptible to manipulation.²⁹⁸

An increasing percentage of decentralized exchanges endeavoring to transition operational mechanics on chain have identified AMM as a possible replacement for off-chain, centralized order books.²⁹⁹ Developing AMM systems, decentralized exchanges increase transparency and reduce the transaction risks that arise from intermediation.³⁰⁰ In addition, AMM systems may serve as liquidity pools that may be pre-funded on-chain.³⁰¹ Thus, for decentralized

in unsupervised learning. For accessible explanations of supervised and unsupervised learning, see Bernard Marr, *Supervised V Unsupervised Machine Learning—What’s the Difference?*, FORBES (Mar. 16, 2017, 3:13 AM), <http://www.forbes.com/sites/bernardmarr/2017/03/16/supervised-v-unsupervised-machine-learning-whats-the-difference/> [<https://perma.cc/F7KG-424B>]; Devin Soni, *Supervised vs. Unsupervised Learning*, MEDIUM (Mar. 22, 2018), <http://towardsdatascience.com/supervised-vs-unsupervised-learning-14f68e32ea8d> [<https://perma.cc/T5ZZ-7WHX>]. Unsupervised learning infers information from the data set and can be highly resource intensive, as the data set is tested against a massive number of potential patterns. See Marr, *supra*; Soni, *supra*.

293. While centralized exchanges function through the use of third-party intermediaries, such intermediaries can be human or algorithmic. Reiff, *supra* note 232 (explaining that the primary difference between centralized and decentralized exchanges is the presence or absence, respectively, of a middleman).

294. See, e.g., Radar Relay, *supra* note 270.

295. *What Is an Automated Market Maker*, *supra* note 288.

296. See *id.*

297. See *id.*

298. *Id.*

299. *Id.*

300. See *id.*

301. See *id.*

exchanges the users of the exchange may provide the liquidity pool for executing transactions.³⁰² Users may even earn passive income by providing the deposits that create the liquidity pool.³⁰³ Uniswap, for example, has implemented an AMM that “allows its users to both supply liquidity to earn passive income or exchange between various assets.”³⁰⁴ As the next Section explains, certain classes of cryptocurrency traders may gain significant benefits as they adopt automated trading strategies in cryptocurrency markets.³⁰⁵ Others discover that these practices enable sophisticated trading counterparties to target and profit from the trading of less sophisticated market participants.³⁰⁶

B. Accelerating Risk

The advent of HFT strategies increases the speed for order execution in secondary markets.³⁰⁷ While there is no universal definition for the specific activities that constitute HFT, theorists and regulators identify several common attributes.³⁰⁸ As a recent SEC report explains, common functional characteristics of HFT strategies include:

- (1) the use of extraordinarily high speed and sophisticated programs for generating, routing, and executing orders;
- (2) use of co-location services and individual data feeds offered by exchanges and others to minimize network and other latencies;
- (3) very short time-frames for establishing and liquidating positions;
- (4) the submission of numerous orders that are

302. *Id.*

303. *Id.*

304. *Id.*

305. *See infra* Part III.B.

306. *See Marr, supra* note 292; *Soni, supra* note 292.

307. *See Korsmo, supra* note 283, at 528; *see also* GARY SHORTER & RENA S. MILLER, CONG. RSCH. SERV., R43608, HIGH-FREQUENCY TRADING: BACKGROUND CONCERNS, AND REGULATORY DEVELOPMENTS 10 (2014), <https://fas.org/sgp/?%20crs/misc/R43608.pdf> [<https://perma.cc/SF9H-FCX8>] (noting that firms using HTF can “execute trades within microseconds or milliseconds”).

308. There is no formal, universally adopted definition of HFT. *See* SHORTER & MILLER, *supra* note 307, at 5. Acknowledging the definitional ambiguity, the SEC describes HFT traders as “professional traders acting in a proprietary capacity that engage in strategies that generate a large number of trades on a daily basis.” Concept Release on Equity Market Structure, 75 Fed. Reg. 3594, 3606 (proposed Jan. 21, 2010).

cancelled shortly after submission; and (5) ending the trading day in as close to a flat position as possible (that is, not carrying significant, unhedged positions overnight).³⁰⁹

One might ask what attracts investors to HFT strategies. Coupling algorithmic trading practices with HFT strategies generates significant profits.³¹⁰

Firms that adopt HFT strategies may submit significant numbers of orders for a small quantity of securities [(one hundred or two hundred shares)] over a relatively short window of time. After submitting the orders, HFT strategists quickly cancel the orders and benefit from the small discrepancies in the price[s] of the securities from the time of the submission of the orders to the moment when the HFT firm cancels the order[s]. Estimates report that HFT transactions now account for two-thirds of trading activity in the U.S. financial market. There are several different HFT strategies.³¹¹

Traders who employ HFT strategies successfully reduce latency.³¹² HFT strategies that rely on “algorithms submit and route

309. Concept Release on Equity Market Structure, 75 Fed. Reg. at 3606.

310. See SHORTER & MILLER, *supra* note 307, at 5, 10-11.

311. Johnson, *supra* note 59, at 856; Concept Release on Equity Market Structure, 75 Fed. Reg. at 3606, 3609; Graham Bowley, *Clamping Down on Rapid Trades in Stock Market*, N.Y. TIMES (Oct. 8, 2011), <http://www.nytimes.com/2011/10/09/business/clamping-down-on-rapid-trades-in-stock-market.html> [<https://perma.cc/2TFY-QF6V>] (High frequency “trading ... now accounts for two of every three stock market trades in America.”). HFT firms employ market-making, arbitrage, structural, and directional strategies. Market-making strategies passively capitalize on liquidity rebates; arbitrage takes advantage of discrepancies in rates, prices, and other market conditions; structural strategies, like co-location, capture profits based on structural market vulnerabilities; and directional strategies rely on more traditional investment principles such as anticipating price movement based on the conclusion that the stock price for a security does not represent the fundamental value of the security. See PWC, AN OBJECTIVE LOOK AT HIGH-FREQUENCY TRADING AND DARK POOLS 5 (2015), <http://www.pwc.com/us/en/pwc-investor-resource-institute/publications/assets/pwc-high-frequency-trading-dark-pools.pdf> [<https://perma.cc/WV55-C9FC>].

312. Michael J. McGowan, *The Rise of Computerized High Frequency Trading: Use and Controversy*, 16 DUKE L. & TECH. REV. 1, 11 (2010) (“Some of the most popular HFT strategies include automated market making, low latency arbitrage, and liquidity rebate trading. Additionally, the practice of issuing ‘flash orders’ to high-frequency traders and the use of certain Alternative Trading Systems (ATSs) by those competing with HF traders have come under increasing scrutiny in recent months. These computerized ‘neural networks’ and ‘genetic algorithms’ permit computers to create new rules and automatically change

trades at exponentially faster speeds than human traders negotiating the purchase or sale of securities on an exchange trading floor. HFT strategies may execute hundreds of trades in the space of milliseconds or microseconds.”³¹³ Others adopt strategies such as algorithmic trading programs, direct market access, and co-location.³¹⁴

Co-location service arrangements enable HFT firms to place their proprietary servers in close physical proximity to securities exchanges’ servers; closer proximity reduces the time required to match bids or asks, leading to lower latency.³¹⁵

Media reports suggest that centralized cryptocurrency exchanges are permitting HFT trading on their platforms. According to one media account, “[a] handful of cryptocurrency exchanges are rolling out the red carpet for high-frequency traders.”³¹⁶ Gemini, a popular cryptocurrency exchange created in 2014 by Cameron and Tyler Winklevoss, is currently offering co-location to traders operating near its data centers in the New York and Chicago areas.³¹⁷

underlying assumptions about the markets. They then evolve by letting different rules compete, and combining the most successful outcomes.”); see also Andrew J. Keller, *Robocops: Regulating High Frequency Trading After the Flash Crash of 2010*, 73 OHIO STATE L.J. 1457, 1464-69 (2012) (describing various HFT strategies).

313. Johnson, *supra* note 59, at 856; see Charles Duhigg, *Stock Traders Find Speed Pays, in Milliseconds*, N.Y. TIMES (July 23, 2009), <https://www.nytimes.com/2009/07/24/business/24trading.html> [<https://perma.cc/6YSH-7WK5>].

314. See *id.*; Korsmo, *supra* note 283, at 563-64 (“A second HFT-related market practice that has come under fire as ‘unfair’ is co-location. In seeking to reduce latency, HFTs will often seek to place their computers as physically close to an exchange’s data center as possible. Doing so minimizes the distance data needs to travel between computers, and thus—due to the finite speed of electronic signals—the communications delay. Many trading centers rent ‘rack space’ on-site, so that HFTs and other proprietary traders can locate their computers at the exchange, right next to the exchange’s own servers. Exchanges must receive SEC approval for offering co-location services, and the SEC requires that ‘terms of co-location services must not be unfairly discriminatory, and the fees must be equitably allocated and reasonable.’” (footnotes omitted)).

315. See PwC, *supra* note 311, at 2, 4; Concept Release on Equity Market Structure, 75 Fed. Reg. at 3608 (“Some proprietary firm strategies may exploit structural vulnerabilities in the market or in certain market participants. For example, by obtaining the fastest delivery of market data through co-location arrangements and individual trading center data feeds ... proprietary firms theoretically could profit by identifying market participants who are offering executions at stale prices.”).

316. Anna Baydakova, *High-Frequency Trading Is Newest Battleground in Crypto Exchange Race*, COINDESK (July 8, 2019, 3:48 PM), <https://www.coindesk.com/high-frequency-trading-is-new-battleground-in-crypto-exchange-race> [<https://perma.cc/J5HR-CV2C>].

317. *Id.*

In a report exploring the gaps in regulating cryptocurrency secondary market trading, Timothy Massad describes increasing interconnectedness among cryptocurrency exchanges permitting concerning HFT practices:

The same firms that co-locate at a cryptointermediary may co-locate at our major securities or derivatives intermediaries. Banks and brokers may engage in transfers of customer funds to and from crypto intermediaries. Technology vendors that work for crypto intermediaries may also work for other exchanges, trading platforms, banks or brokers.³¹⁸

Even in established securities and commodities markets, HFT tactics may pose risk management and other concerns. The use of HFT strategies to engage in tactics such as front-running or

318. TIMOTHY G. MASSAD, IT'S TIME TO STRENGTHEN THE REGULATION OF CRYPTO-ASSETS, ECONOMIC STUDIES AT BROOKINGS 24 (2019), <https://www.brookings.edu/wp-content/uploads/2019/03/Timothy-Massad-Its-Time-to-Strengthen-the-Regulation-of-Crypto-Assets-2.pdf> [<https://perma.cc/M5ZN-VKSC>].

spoofing³¹⁹ exacerbates the likelihood that HFT strategies may destabilize highly volatile cryptocurrency secondary markets.

Pinging, another technique used by HFT firms, involves placing small test orders in the market at a number of different price levels and then quickly canceling orders that are not filled. At first, the trader may suffer a small loss, but will then adjust their position and earn a larger profit. Some scholars refer to pinging as a form of “high-speed front running,” and liken it to the use of a radar or sonar system—hence the term pinging.³²⁰

319. Spoofing refers to a bluffing tactic whereby traders submit and cancel a series of bids for the purpose of gaining an advantage in the market price. See Lindsay Whipp & Kara Scannell, *Flash-Crash' Trader Navinder Sarao Pleads Guilty to Spoofing*, FIN. TIMES (Nov. 9, 2016), <http://www.ft.com/content/a321031a-a6cb-11e6-8898-79a99e2a4de6> [<https://perma.cc/FMU2-G2S3>] (discussing a futures trader's part in the Flash Crash); see also Yun-Yi Wang, *Strategic Spoofing Order Trading by Different Types of Investors in the Futures Markets*, 2016 EUR. FIN. MGMT. ASSN. 2, https://www.efmaefm.org/OEFMAMEETINGS/EFMA%20ANNUAL%20MEETINGS/2016-Switzerland/papers/EFMA2016_0171_fullpaper.pdf [<https://perma.cc/D2MQ-QWAS>] (“‘Spoofing orders’ are orders that are submitted into the market, with no intention of the order being executed, as a means of injecting misleading information with regard to the demand or supply of an asset, with the ultimate aim of coercing other traders to trade in a particular way. ‘Spoofers’, that is, those submitting spoofing trading orders, will subsequently submit their real orders, in order to take advantage of the price changes resulting from trading by other market participants in response to their earlier spoofing orders.”); Richard Satran, *Spoofing or Just Fast Trading? Chicago Case Helps Unwrap Mystery*, REUTERS (Nov. 19, 2015), <http://blogs.reuters.com/financial-regulatory-forum/2015/11/19/spoofing-or-just-fast-trading-chicago-case-helps-unwrap-mystery/> [<https://perma.cc/7NZ5-5JJH>] (“Spoofing involves traders entering and quickly canceling large orders in an attempt to manipulate prices.”); Larry Schneider, *“Spoofing” and Disruptive Futures Trading Practices*, N.Y. INST. OF FIN., <https://perma.cc/TYS2-4LLF>; Bradley Hope, *As ‘Spoof’ Trading Persists, Regulators Clamp Down*, WALL ST. J. (Feb. 22, 2015, 10:34 PM), <http://www.wsj.com/articles/how-spoofing-traders-dupe-markets-1424662202> [<https://perma.cc/JP2G-C3VP>]; see also Steven McNamara, *The Law and Ethics of High-Frequency Trading*, 17 MINN. J.L. SCI. & TECH. 71, 114-15 (2016) (“‘Spoofing’ would involve making an offer to buy (a bid) at \$15.12, then executing the opposite transaction, selling the security at this price, after other players in the market have raised their bids in response to the higher offer. Finally, the original offer to buy at \$15.12 will be cancelled before other parties can act on it.” (footnotes omitted)).

320. Johnson, *supra* note 59, at 879-80; see Gregory Scopino, *The (Questionable) Legality of High-Speed “Pinging” and “Front Running” in the Futures Markets*, 47 CONN. L. REV. 607, 612-13 (2015). While some see pinging as a legitimate tactic in modern trading, many complain that it takes advantage of the market and those who do not have access to such techniques. See *id.* at 625-26. For example, a primary issue is that computer programs, effectively algorithms and artificial platforms, bait institutional and traditional investors into placing large numbers of orders and then canceling the vast majority of them quickly. *Id.* at 624.

Regulators are concerned that these tactics may also enable insider trading.³²¹ These concerns include scenarios in which traders, engaging in nefarious trading practices, frequently inundate cryptocurrency exchanges and clearinghouses with fictitious trades to manipulate the price of listed cryptocurrencies.³²² Such practices would undermine the price discovery and price accuracy processes.³²³ Furthermore, algorithmic trades often have substantial correlations; thus, “shocks that hit a small number of very active HFT traders could detrimentally affect the entire market.”³²⁴ Regulators are also concerned that cryptocurrency exchanges may have experienced rapid but short-lived price declines because of errors or malfunctions arising from market participants’ reliance on automated trading.³²⁵

Notwithstanding, the case for regulatory oversight will not appeal to everyone. Many may not applaud regulatory intervention that reduces fraud and manipulation. Some reject regulation as inconsistent with the antiestablishment principles that motivate the creation and development of cryptocurrency.³²⁶ Others may be attracted to cryptocurrency secondary markets because they desire to engage in conduct that would be prohibited in the secondary markets for traditional legacy asset classes.³²⁷

The operational mechanics of the protocols for decentralized exchanges further exacerbate concerns. Censorship resistance is a key feature of these public, permissionless exchange networks.³²⁸ Recall traders executing transactions on decentralized exchanges

321. See *Commerce, Justice, Science, and Related Agencies Appropriations for 2015: Hearing Before the Subcomm. on Com., Just., Sci. & Related Agencies of the H. Comm. on Appropriations*, 103th Cong. 195 (2014) (statement of Eric Holder, Jr., Att’y Gen. of the United States); SHORTER & MILLER, *supra* note 307, at 20-21.

322. See SHORTER & MILLER, *supra* note 307, at 41.

323. *Id.* at 8-9.

324. *Id.* at 27.

325. See Matt Egan, *Flash Crash: Could It Happen Again?*, CNNMONEY (May 6, 2014, 3:58 PM), <http://money.cnn.com/2014/05/06/investing/flash-crash-anniversary/> [<https://perma.cc/7LNY-FTXA>].

326. See TAPSCOTT & TAPSCOTT, *supra* note 166, at 5-6; Walch, *supra* note 20, at 871.

327. See *supra* note 166 and accompanying text.

328. Cyrus Younessi, *An Introduction to Censorship-Resistant Store of Value*, MEDIUM (June 18, 2018), <https://medium.com/scalar-capital/an-introduction-to-censorship-resistant-store-of-value-c5f4a24ca8a0> [<https://perma.cc/F4LH-6ACV>].

generally retain custody of their funds.³²⁹ Censorship resistance reinforces the notion that only the account holder may access any funds or assets that may be used to trade on the exchange.³³⁰ This feature prevents third parties such as financial market intermediaries, banks, or exchanges facilitating secondary market trading from confiscating the assets of platform users.³³¹

Censorship resistance and the operational mechanisms of trustlessness create latency in cryptocurrency secondary market trading.³³² As noted above, for traders implementing HFT strategies, latency provides opportunities for deploying front-running trading tactics.³³³ In the fall of 2020, an academic study revealed that high frequency traders have leveraged a combination of commonly used tactics to introduce a front-running and back-end attack that sandwiches targeted trading victims' transactions.³³⁴ According to the study,

To make their sandwich, a predatory trader first observes a blockchain P2P network for a victim transaction and then rushes to squeeze it by placing one order just before the transaction (i.e. front-run) and one order just after it (i.e. back-run). If the target transaction is going to increase (decrease) the price of an asset, the adversary can place an order before which buys (sells) the asset in question, and an order afterward which sells (buys) the asset again.³³⁵

Referring to the Uniswap decentralized exchange, the authors underscore that decentralized exchanges that rely on AMM for

329. See *supra* notes 251-56 and accompanying text.

330. Younessi, *supra* note 328.

331. *Id.*

332. In the absence of the centralized exchange acting as an intermediary, the mechanisms for confirming sufficient available funds and distributing funds in exchange for cryptocurrency on DEXs is a multistage process that creates latency. See Frank Edwood, *Why Low Latency Is Important for Cryptocurrency Exchanges, Explained*, COINTELEGRAPH (Oct. 23, 2020), <https://cointelegraph.com/explained/why-low-latency-is-important-for-cryptocurrency-exchanges-explained> [<https://perma.cc/5H8X-GTCC>].

333. See *supra* notes 310-17 and accompanying text.

334. Liyi Zhou, Kaihua Qin, Christof Ferreira Torres, Duc V Le & Arthur Gervais, *High-Frequency Trading on Decentralized On-Chain Exchanges*, CORNELL UNIV. (Sep. 29, 2020), <https://arxiv.org/abs/2009.14021> [<https://perma.cc/GG7A-PDN5>].

335. *Id.*

liquidity offer empirical evidence of the proliferation of these practices.³³⁶ Transactions executed on decentralized exchange protocols supported by smart contracts that rely on AMMs for liquidity and integrate censorship-resistant features that eliminate intermediation seem to fit neatly into SEC Director Hinman's definition of "sufficiently decentralized,"³³⁷ however, these platforms may also facilitate unfair trading conduct that undermines the normative ethos of trading markets and undercut cryptocurrency theorists' promises to democratize finance.

C. Cyber-Risks

During the ten-year period since Bitcoin's creation, hackers have launched fifty-six reported cyberattacks against cryptocurrency exchanges, initial coin offerings, and other digital currency platforms around the world.³³⁸ These incidents have resulted in over \$1.63 billion in losses.³³⁹ In January 2018, Coincheck, one of Japan's leading cryptocurrency trading exchanges, suffered a loss of \$530 million in customer virtual currency assets after a successful cyber-attack.³⁴⁰ Unfortunately, for cryptocurrency market participants, these losses are not unprecedented.³⁴¹ Concerns regarding cybersecurity incidents are mounting.³⁴²

Cryptocurrency exchanges often lack the infrastructure of traditional financial institutions.³⁴³ Without internal governance processes, compliance policies, and risk management guidelines, cryptocurrency exchanges are more attractive to hackers and more

336. *Id.*

337. *See supra* notes 206-13 and accompanying text.

338. Steven Russolillo & Eun-Young Jeong, *Cryptocurrency Exchanges Are Getting Hacked Because It's Easy*, WALL ST. J. (July 16, 2018, 1:14 AM), <https://www.wsj.com/articles/why-cryptocurrency-exchange-hacks-keep-happening-1531656000> [<https://perma.cc/D8MV-V7G2>].

339. *Id.*

340. Takashi Mochizuki & Paul Vigna, *Cryptocurrency Worth \$530 Million Missing from Japanese Exchange*, WALL ST. J. (Jan. 26, 2018, 4:48 PM), <http://www.wsj.com/articles/cryptocurrency-worth-530-million-missing-from-japanese-exchange-1516988190> [<https://perma.cc/5MAT-U3QK>].

341. As noted above, when hundreds of millions of dollars disappeared from Mt. Gox's coffers, the cryptocurrency exchange filed for bankruptcy protection. *Id.*

342. *See* Jolana Kubicek, *Complications of Cryptocurrency: Financial and Cybersecurity Risk in the Age of Bitcoin* 30 (Apr. 2018) (M.S. dissertation, Utica College) (Proquest).

343. *See id.*

likely to suffer cybersecurity attacks.³⁴⁴ While it is beyond the scope of this Article, it is worth noting that unregulated cryptocurrency-exchange customers may have limited protection under federal banking regulation. Both regulators and cryptocurrency exchanges have indicated that the cash (U.S. dollars, euros, and so on) placed in the custody of cryptocurrency exchanges may be eligible for protection under the federal banking scheme supervised by the Federal Deposit Insurance Corporation.³⁴⁵ There is also near agreement that the cryptocurrency assets that exchanges may hold in their custody are not likely to receive protection under federal banking insurance policies.³⁴⁶

Simply stated, centralized exchanges are “vulnerable to attack.”³⁴⁷ In fact, as described above, third-party cryptocurrency services and individual wallets are “especially appealing” to hackers and “have become points of failure for the system.”³⁴⁸

Centralized cryptocurrency exchanges are “like sitting ducks” because cryptocurrency exchanges store currencies for their customers.³⁴⁹ If malicious actors attack, their ability to penetrate the cryptocurrency exchange platform provides unfettered access to customers’ assets if the assets are stored in hot wallets that connect to the platform through the internet.³⁵⁰

The cold wallet accountholder maintains a private key required to access the cryptocurrency stored in the wallet.³⁵¹ The cold wallet is offline when cryptocurrencies are not being transferred (deposited or debited) to and from the wallet.³⁵² However, there are notable costs associated with cold wallets. First, in order to execute trades holders of cold wallets must connect to the platform and submit orders.³⁵³ Consequently, cold wallet transactions operate on an inherent delay and internet outages may disrupt access to cold

344. *See id.*

345. *Cf. id.* at 15.

346. *Id.* at 30.

347. *Id.* at 57.

348. *Id.* at 58.

349. *See* Russolillo & Jeong, *supra* note 338.

350. *See id.*

351. *See* Kubicek, *supra* note 342, at 44-45.

352. *See id.*

353. *Id.* at 45.

wallets.³⁵⁴ Accessing a cold wallet may require significant planning and transactions may be delayed up to twenty-four hours.³⁵⁵ Cold wallet holders also risk the loss of all value in the cold wallet.³⁵⁶ If cold wallet users cannot authenticate their identification credentials, misplace passwords, or forget the responses to security imposed guardrails, their funds may be lost.³⁵⁷

D. Systemic Risk

The risks described above are not unique to cryptocurrency markets; automation, acceleration, and cyber-risks are ubiquitous and plague broker-dealers, exchanges, and clearinghouses servicing diverse asset classes across the financial services industry. This Section classifies the risks described above as enterprise risks and explains how enterprise risks may lead to endogenous or exogenous shocks that create systemic risks concerns. When risks threaten the stability or solvency of an individual firm, the threat is an enterprise risk. When an individual firm experiences an enterprise risk management failure, substantial losses occur.³⁵⁸

Financial markets provide an important infrastructure resource that facilitates the efficient and effective transfer of money and assets throughout the economy. When an event disrupts financial markets, the resulting negative externalities may spill over and affect broad segments of the economy. For example, market disruptions that cause financial market intermediaries to limit lending activities can affect commercial and individual borrowers across the country and create uniquely significant consequences for traditional commercial banks.³⁵⁹

354. *Id.*

355. *Id.* at 44-45.

356. *See id.*

357. *Id.*

358. Kristin N. Johnson, *Macroprudential Regulation: A Sustainable Approach to Regulating Financial Markets*, 2013 ILL. L. REV. 881, 903; *see* Stephen M. Bainbridge, *Caremark and Enterprise Risk Management*, 34 J. CORP. L. 967, 969 (2009); MILTON FRIEDMAN & ANNA JACOBSON SCHWARTZ, *A MONETARY HISTORY OF THE UNITED STATES 1867-1960*, at 308-09 (1963).

359. *See* FRIEDMAN & SCHWARTZ, *supra* note 358, at 309.

When a run on the bank occurs, depositors concerned about the bank's future solvency may demand that the bank return their cash deposits.³⁶⁰ As economists Milton Friedman and Anna Schwartz explain, a national market disruption may create "a contagion of fear" and lead to a series of bank failures.³⁶¹

Commentators use the term systemic risk to describe the concern that one systemically significant financial institution may become insolvent and initiate a cascade of losses or insolvencies across financial markets. Systemic risk concerns arise because the banking industry is inextricably interconnected. Traditional commercial banks hold deposit balances for other banks, lend to and borrow from each other, and make payments to one another through an interbank clearing system.³⁶²

Due to the interconnected contractual and economic nature of the relationships among the largest market participants, "one financial institution's default on its obligations adversely affects the financial institution's trading partners, hindering their ability to meet their obligations" and "so on down the chain of banks and beyond."³⁶³ "Systemic risk may also occur if an exogenous shock to the financial system causes widespread, contemporaneous losses across financial markets that trigger the collapse of one or more systemically significant financial institutions or a series of financial institutions."³⁶⁴

To mitigate the classic run on the bank scenario, regulatory efforts have historically focused on prudential measures such as boards' risk oversight, safeguarding financial institutions' solvency by imposing mandatory capital requirements, limiting the size or types of assets held by the bank, and limiting the classes of permissible transactions. While regulators established these mandates, authorities delegated primary risk-management oversight to market participants.³⁶⁵

360. *See id.*

361. *Id.*

362. Johnson, *supra* note 358, at 903-04; *see* Steven L. Schwarcz, *Systemic Risk*, 97 GEO. L.J. 193, 196, 199 (2008).

363. Johnson, *supra* note 358, at 904; Schwarcz, *supra* note 362, at 199 (quoting George G. Kaufman, *Bank Failures, Systemic Risk, and Bank Regulation*, 16 CATO J. 17, 20-21 (1996)).

364. Johnson, *supra* note 358, at 904; Schwarcz, *supra* note 362, at 202.

365. Johnson, *supra* note 358, at 904; Schwarcz, *supra* note 362, at 210-11.

Some commentators and regulators “question the decision to permit market participants to regulate activities that contribute to systemic risk concerns using internal governance mechanisms; others tout the benefits of self-regulation.”³⁶⁶

The failure of a systemically significant firm or the failure of several important firms in rapid succession may create disruption across financial markets.³⁶⁷ In other words,

localized economic shocks have the potential to crescendo into broader systemic crises. First, a firm’s financial integrity and its exposure to the risk of low-probability adverse events may lead to economic shocks. Second, the inter-institutional correlation among financial firms and markets may trigger events that disrupt a local, regional, or national economy.³⁶⁸

The failure of the American International Group (AIG) is one of the most infamous examples of an enterprise risk management failure leading to a market shock and engendering systemic risk concerns. In June 2008, AIG was a large diversified financial services firm with slightly more than \$1 trillion in assets;³⁶⁹ by the fourth quarter of 2008, AIG reported over \$61.7 billion in losses—the largest single quarter loss reported in the history of financial markets.³⁷⁰ In the years leading up to its solvency crisis, AIG’s

366. See Schwarcz, *supra* note 362, at 212 n.105.

367. *Id.* at 204. As Steven Schwarcz explains, such an event or series of events may lead to systemic risk, or

the risk that (i) an economic shock such as market or institutional failure triggers (through a panic or otherwise) either (X) the failure of a chain of markets or institutions or (Y) a chain of significant losses to financial institutions, (ii) resulting in increases in the cost of capital or decreases in its availability, often evidenced by substantial financial-market price volatility.

Id.

368. Kristin N. Johnson & Steven A. Ramirez, *New Guiding Principles: Macroprudential Solutions to Risk Management Oversight and Systemic Risk Concerns*, 11 U. SAINT THOMAS L.J. 386, 394 (2014); see Iman Anabtawi & Steven L. Schwarcz, *Regulating Systemic Risk: Towards an Analytical Framework*, 86 NOTRE DAME L. REV. 1349, 1351 (2011).

369. *Regulatory Reform: American International Group (AIG), Maiden Lane II and III*, FED. RSRV. SYS. (Feb. 12, 2016), <https://www.federalreserve.gov/regreform/reform-aig.htm> [<https://perma.cc/5SGM-6Z56>].

370. *AIG Enters Record Books with \$61.7 Billion Loss*, REUTERS (Mar. 2, 2009, 6:29 AM), <https://www.reuters.com/article/us-aig-results-sb/aig-enters-record-books-with-61-7-billion->

Financial Products unit had amassed a \$450 billion credit derivatives portfolio—an irresponsible bet that nearly caused the firm's collapse.³⁷¹ According to Federal Reserve Chair Ben Bernanke, AIG “exploited a huge gap in the regulatory system” and operated as an unregulated hedge fund.³⁷²

When the market moved against its large unhedged credit derivatives position, AIG lurched toward insolvency. The firm's unhedged exposure in the credit derivatives market led to an enterprise risk management failure.³⁷³ Due to the interconnected web of transactions among AIG and many of the largest financial institutions in the nation, had AIG failed and filed for bankruptcy protection, its counterparties would have suffered staggering losses and some may have faced their own individual solvency crisis.³⁷⁴ To avoid this outcome, the Federal Reserve granted AIG access to a \$152 billion credit facility.³⁷⁵ The Office of Thrift Supervision (OTS) criticized AIG's “risk-management, corporate oversight, and financial reporting,” and later issued a Supervisory Letter downgrading AIG's examination rating.³⁷⁶

Enterprise and systemic risk concerns arise, in part, due to the endemic asymmetries of information. One might assume that investors or customers who utilize cryptocurrency secondary markets have basic information regarding the fintech firms that execute

loss-idUSTRE5211X520090302 [https://perma.cc/UA44-VUCQ]. AIG underwrote \$450 billion of credit default swaps that obligated it to pay on pools of securities in the event that the primary obligees failed to pay. Lilla Zuill & Kristina Cooke, *AIG Failure Would Be Disastrous for Global Markets*, REUTERS (Mar. 2, 2009, 3:59 AM), <https://www.reuters.com/article/a-failure-would-be-distrarous-for-global-markets-idUKLNE52101620090302> [https://perma.cc/H7S8-E7W8]. The government pumped \$150 billion into AIG. *Id.*

371. See Zuill & Cooke, *supra* note 370.

372. *Economic and Budget Challenges for the Short and Long Term: Hearing Before the S. Comm. on the Budget*, 111th Cong. 19 (2009) (statement of Ben Bernanke, Chairman, Bd. of Governors of the Fed. Res. Sys.).

373. See Zuill & Cooke, *supra* note 370.

374. Robert O'Harrow, Jr. & Brady Dennis, *Downgrades and Downfall*, WASH. POST (Dec. 31, 2008), <https://www.washingtonpost.com/wp-dyn/content/article/2008/12/30/AR2008123003431.html?sid=ST2010062905395> [https://perma.cc/N9HH-WQ7E].

375. See *id.*

376. *American International Group's Impact on the Global Economy: Before, During, and After Federal Intervention: Hearing Before the Subcomm. on Capital Markets, Ins., and Gov't Sponsored Enters. of the H. Comm. on Fin. Servs.*, 111th Cong. 215 (2009) (statement of Scott M. Polakoff, Acting Dir., Off. of Thrift Supervision).

their trading transactions. In fact, most customers have exceptionally limited information regarding the firms upon which they rely.

Although economic models assume perfect information, consumers often lack information that they need to assess the quality of goods and services prior to purchasing them.³⁷⁷ Because goods and services vary based on the amount of information that consumers possess, economists group goods and services into three categories based on their attributes: (1) search goods and services; (2) experience goods and services; and (3) credence goods and services.³⁷⁸ For search goods and services, quality may be easily discerned prior to consumption.³⁷⁹ Financial markets offer credence goods and services, distinct from the markets for other goods and services; consequently, there are fewer straightforward methods to resolve information gaps. An illustration may be useful.

A consumer in the market for a used car, for example, distrusts the used car salesman's representations regarding the quality of the car. The used car salesman has more information about the car and has incentives to misrepresent, or at least remain silent about the car's defects. If the buyer wants to reduce the asymmetries of information, she can hire a mechanic to evaluate the car. She might also limit her search to a reputable used car showroom.

For customers entering into cryptocurrency trading transactions, there are far fewer tools to assess the quality of broker-dealers, clearinghouses, and exchanges. First, evidence from the recent financial crisis demonstrates that even reputation information may prove a challenging measuring stick for customers.³⁸⁰ During the recent financial crisis, several of the most storied broker-dealers

377. See George A. Akerlof, *The Market for "Lemons": Qualitative Uncertainty and Market Mechanism*, 84 Q.J. ECON. 488, 490-92 (1970); see also Henry N. Butler & Jason S. Johnston, *Reforming State Consumer Protection Liability: An Economic Approach*, 2010 COLUM. BUS. L. REV. 1, 59-60.

378. Butler & Johnston, *supra* note 377, at 59-60.

379. Phillip Nelson, *Information and Consumer Behavior*, 78 J. POL. ECON. 311, 312 (1970); see also Butler & Johnston, *supra* note 377, at 59. Experience goods and services can be accurately evaluated only after they have been purchased and experienced. Credence goods have qualities that cannot be observed. These goods and services require expert opinions.

380. See Noah Smith, *The Dirty Little Secret of Finance: Asymmetric Information*, BLOOMBERG (Aug. 11, 2016, 7:00 AM), <https://www.bloomberg.com/opinion/articles/2016-08-11/the-dirty-little-secret-of-finance-asymmetric-information> [<https://perma.cc/DPE2-LQNS>].

suffered debilitating losses due to their firms' excessive risk taking or enterprise risk management failures.³⁸¹

Second, asymmetries of information are more problematic in financial services markets because information is often the product that financial market services consumers seek to acquire. As one commentator explains:

People want cars and bananas and microwave ovens because those things are immediately useful. But most people who buy and sell financial assets have no intrinsic desire for the asset itself—they only care about how its value to other people will change in the future. That means that while information is important for many products, when it comes to financial markets, information *is* the product.³⁸²

If information is the asset, then there are even fewer tools available to financial market consumers than other types of consumers to mitigate asymmetries of information.

Third, asymmetries of information enable arbitrage. As described above, high frequency traders profit from latency, which is to say a delay between the time information is available regarding a pending trade and the execution of the trade.³⁸³ Traders who employ HFT strategies learn information regarding institutional investors' pending large block orders and enter into a series of smaller trades to purchase and sell the same securities ahead of the execution of the institutional investors' trade.³⁸⁴ This strategy increases the price of the security at little risk for the high frequency trader.³⁸⁵

IV. (RE-)ENVISIONING INTERMEDIARY REGULATION

The proliferation of innovative developments and technology in fintech is not surprising. Fintech entrepreneurs are persistent, in part, because of their attractive and highly lucrative incentives:

381. *See id.*

382. *Id.*; *see also* Sanford J. Grossman & Joseph E. Stiglitz, *On the Impossibility of Informationally Efficient Markets*, 70 AM. ECON. REV. 393, 393 (1980).

383. *See supra* Part III.B.

384. *See supra* Part III.B.

385. *See supra* Part III.B.

provide an alternative to costly and burdensome intermediation and displace traditional financial institutions marred by opportunistic behavior, avarice, and misconduct.

Facebook's distribution of the White Paper detailing the creation of Diem, a managed stablecoin, in 2019 illustrates this drive.³⁸⁶ During his testimony before Congress, the head of Diem and chief executive officer of Calibra, David Marcus, stated that Diem will democratize finance and increase access to banking for the thirty-three million unbanked and underbanked households in the United States³⁸⁷ and the 1.7 billion individuals globally who lack access to basic financial services.³⁸⁸ According to Marcus, Diem will enable frictionless and less expensive remittances between families in the U.S. and among friends, relatives, and other intimate relations in countries all over the world.³⁸⁹

While lawmakers and consumer advocates' skeptical response has (temporarily) stymied domestic and international adoption of Diem,³⁹⁰ it is worth noting that neither Facebook nor any of the myriad fintech firms competing to eliminate financial services intermediation, are sitting idle. On November 12, 2019, Facebook announced the launch of Facebook Pay on its original and WhatsApp applications.³⁹¹ In fact, Diem and Facebook Pay mark the fourth and

386. See *supra* notes 25-27 and accompanying text.

387. See FED. DEPOSIT INS. CORP., 2017 FDIC NATIONAL SURVEY OF UNBANKED AND UNDERBANKED HOUSEHOLDS 1 (2018), <http://www.fdic.gov/householdsurvey/2017/2017report.pdf> [<https://perma.cc/Y65A-5YGR>].

388. ASLI DEMIRGÜÇ-KUNT, LEORA KLAPPER, DOROTHE SINGER, SANIYA ANSAR & JAKE HESS, WORLD BANK GRP., THE GLOBAL FINDEX DATABASE 2017: MEASURING FINANCIAL INCLUSION AND THE FINTECH REVOLUTION 4 (2018), <http://documents1.worldbank.org/curated/en/332881525873182837/pdf/126033-PUB-PUBLIC-pubdate-4-19-2018.pdf> [<https://perma.cc/SM2J-YUM9>] (“[A]bout 1.7 billion adults remain unbanked—without an account at a financial institution or through a mobile money provider.”).

389. Alex Katsomitros, *Facebook's Foray into Financial Services Is Struggling to Gain Momentum—Here's Why*, WORLD FIN. (Jan. 6, 2020), <https://www.worldfinance.com/special-reports/facebooks-foray-into-financial-services-is-struggling-to-gain-momentum-heres-why> [<https://perma.cc/RUE7-2ZW8>].

390. See *id.*

391. Deborah Liu, *Simplifying Payments with Facebook Pay*, FACEBOOK NEWS (Nov. 12, 2019), <http://about.fb.com/news/2019/11/simplifying-payments-with-facebook-pay/> [<https://perma.cc/8ZZV-TJJW>]; see also Tom Warren, *Facebook Pay Is a New Payment System for WhatsApp, Instagram, and Facebook*, VERGE (Nov. 12, 2019, 12:33 PM), <https://www.theverge.com/2019/11/12/20961447/facebook-pay-whatsapp-instagram-messenger-features> [<https://perma.cc/5Z3H-7MEU>].

fifth, respectively, financial services platforms that Facebook has readied for launch.

This Part explores the need for federal intervention in cryptocurrency secondary market transactions. It argues that federal intervention should address enterprise and systemic risk concerns by correcting asymmetries of information in secondary market transactions and ensuring compliance with emerging industry norms. This Part evaluates three popular proposals and concludes that none of them successfully address both the asymmetries of information and risk management concerns. This Part concludes by proposing that financial regulators must collaborate to develop and deploy an *ex ante* registration process for fintech products and services enabling secondary market trading on distributed digital ledger technology platforms.

A. Ordering Markets: Proposed Reforms

A survey of the proposed responses to fintech's growing significance in financial markets reveals all-too-common responses to market regulation. Disillusioned by the financial services industry, fintech proponents contend that efforts to regulate are a by-product of industry capture. As such, some cryptocurrency proponents demand a *laissez-faire* approach. They argue that the code is law and criticize regulators' irreverent, clumsy, and underinformed interventions.

According to advocates, regulators may be unduly influenced by the industries that they regulate.³⁹² As a consequence, democratic processes are co-opted and financial services special interest groups exert significant influence over the development and implementation of financial services legislation and regulation.³⁹³ Consequently, capture may lead to policy choices that benefit industry participants rather than the public good.³⁹⁴ Examples following the recent financial crisis punctuate these claims.³⁹⁵ The question is not *which*

392. See Victor Fleischer, *Regulatory Arbitrage*, 89 TEX. L. REV. 227, 283-84 (2010).

393. See *id.*

394. See *id.*

395. See *id.* at 283-85.

example but how many examples may be required to prove the point.³⁹⁶

At the opposite end of the spectrum, detractors demand a formal prohibition preventing the origination, distribution, or secondary market trading of cryptocurrencies. In the wake of the exponential growth of cryptocurrencies in markets during the last several years, this approach is tantamount to willful blindness. Not only are cryptocurrency markets flourishing but, as Part II explained, a secondary market infrastructure now supports the market for native tokens.³⁹⁷ In other words, the horse is out of the gate.

An express prohibition is unlikely. The SEC has advocated for a more measured approach that may serve as an equally useful limiting rule. First, the SEC has clearly articulated its position. If the economic realities of a cryptocurrency are analogous to those of traditional securities—stocks or bonds—then the cryptocurrencies may be deemed securities and subject to federal securities laws.³⁹⁸

Consistent with its mission to protect investors and the integrity of markets, the SEC published the DAO report, an investigative report offering guidance on the application of section 5 of the Securities Act to ICOs issued by decentralized, autonomous organizations.³⁹⁹ Section 5 of the Securities Act requires market participants to register “securities” with the SEC prior to offering them for sale unless an exemption applies.⁴⁰⁰ Section 2(a)(1) defines the term “security” by enumerating a list of financial arrangements that Congress expressly intended to capture within the purview of the

396. Congress and the SEC’s mismanagement of proposed changes to the standards governing broker-dealers’ and investment advisers’ interactions with customers offers a less controversial example. For years prior to the adoption of the Dodd-Frank Act, advocates lobbied for either Congress to codify or the SEC to adopt regulations imposing fiduciary duties on broker-dealers and investment advisers. To its credit, Congress adopted section 913 of the Dodd-Frank Act and tasked the SEC with studying whether the legal standard of care applicable to broker-dealers and investment advisers was appropriate. Dodd-Frank Wall Street Reform and Consumer Protection Act, Pub. L. No. 111-203, § 913, 124 Stat. 1376, 1824-25 (2010). To consumer advocates’ chagrin, the statutory provision did not enact a standard nor did it require the SEC change the existing standard. *Id.* The SEC’s election not to change the standard deflated advocates’ campaign and generally marked the defeat of their efforts. See Hilary J. Allen, *Regulatory Sandboxes*, 87 GEO. WASH. L. REV. 579, 611 & n.187 (2019).

397. See *supra* Part II.

398. Henderson & Raskin, *supra* note 194, at 455.

399. DAO Report, *supra* note 170, at 1-2.

400. Securities Act of 1933 § 5, 15 U.S.C. § 77e(a).

statute.⁴⁰¹ A digital asset may be deemed a “security” and be subject to federal securities laws if the asset is one of the enumerated examples of “securities.”⁴⁰² Unsurprisingly, blockchain-based coins and tokens are not expressly listed among the enumerated examples of “securities” in section 2(a)(1).⁴⁰³ However, alongside the enumerated examples of asset classes commonly referred to as securities, Congress included, but did not define, a catch-all term: “investment contract.”⁴⁰⁴

In *SEC v. W.J. Howey Co.*, the Supreme Court articulated the legal standard for determining when a financial arrangement may be deemed an “investment contract” and, therefore, a “security.”⁴⁰⁵ As *Howey* and its progeny explain, a financial arrangement is an “investment contract” if the arrangement involves (1) an investment of money (2) in a common enterprise (3) with a reasonable expectation of profits (4) to be derived from the entrepreneurial or managerial efforts of others.⁴⁰⁶

The DAO Report confirms the SEC’s intentions to apply this well-established legal standard to coin offerings and signals that coin or token offerings with transactional attributes that satisfy the elements articulated in *Howey* will be deemed “investment contracts” and therefore “securities” subject to the registration requirements established under section 5 of the Securities Act.⁴⁰⁷

Second, a marked uptick in SEC enforcement actions buttresses the agency’s proclamation regarding cryptocurrencies.⁴⁰⁸ Unless an exemption applies, failure to register an offering of financial products that bears the attributes of the instruments enumerated in the definition of a “security” triggers strict liability under sections 5(a) and (c)⁴⁰⁹ and a host of remedies, including an investor’s right to rescind her purchase under section 12.⁴¹⁰ In recent enforcement

401. *Id.* § 77b(a)(1).

402. *See id.*

403. *Id.*

404. *Id.*

405. 328 U.S. 293, 298-99 (1946).

406. *Id.* at 301.

407. *See* DAO Report, *supra* note 170, at 10-11.

408. *See, e.g.,* Munchee Inc., Securities Act Release No. 10445, 2017 WL 10605969, at 2 (Dec. 11, 2017).

409. 15 U.S.C. § 77e(a), (c).

410. *Id.* § 77l.

actions against cryptocurrency broker-dealers and exchanges, the SEC has reiterated this perspective.⁴¹¹

While applying federal securities laws to cryptocurrency origination and secondary distribution is far from an express prohibition, the effects of imposing the onerous registration process indisputably introduces a speed bump for issuers, investors, broker-dealers, and exchanges.⁴¹² In fairness to market participants, neither of the approaches adopted by the SEC—informal guidance and regulation by enforcement—is a substitute for the public rulemaking process.⁴¹³

Moreover, the DAO Report announces the application of federal securities laws, yet fails to address concerns regarding the application of the standard.⁴¹⁴ Specifically, the DAO Report does not explain which attributes of a cryptocurrency offering satisfy the final two elements of the *Howey* test.⁴¹⁵ One may assume that the first two prongs of the *Howey* test—(1) an investment of money (2) in a common enterprise—are easily satisfied; in most instances, investors exchange money (government-issued fiat or other forms of cash, including other digital currencies) for cryptocurrencies.⁴¹⁶ Cryptocurrencies pool investors' money, establishing the horizontal or vertical commonality required under *Howey* and its progeny.⁴¹⁷ Thus, liability for ICO issuers rests on whether there is evidence of investors' reasonable expectation of profits derived from the managerial efforts of others.⁴¹⁸ Reasonable minds may disagree regarding the evidence that satisfies these final elements in the standard.⁴¹⁹

411. See, e.g., Munchee Inc., Securities Act Release No. 10445 at 2, 10.

412. See § 77e (describing liability for failure to register product as a "security").

413. See, e.g., *Commission Rulemaking Explained*, COMMODITY FUTURES TRADING COMM'N, <https://cftc.gov/LawRegulation/CommissionRulemakingExplained/index.htm> [<https://perma.cc/KK32-M7Y5>] (describing public notice and comment rulemaking process used by CFTC).

414. See DAO Report, *supra* note 170, at 1-2.

415. See *id.* at 11-12.

416. See *id.* at 11.

417. See, e.g., SEC v. Edwards, 540 U.S. 389, 392-93, 397 (2004); SEC v. ETS Payphones, Inc., 408 F.3d 727, 732 (11th Cir. 2005); SEC v. Infinity Grp. Co., 212 F.3d 180, 187-88 (3d Cir. 2000).

418. See Henderson & Raskin, *supra* note 194, at 455, 458, 461-62.

419. Compare SEC v. Glenn Turner Enters., 474 F.2d 476, 482 (9th Cir. 1973) (stating that the critical inquiry is "whether the efforts made by those other than the investor are the undeniably significant ones, those essential managerial efforts which affect the failure or success of the enterprise"), with Miller v. Cent. Chinchilla Grp., 494 F.2d 414, 417-18 (8th Cir. 1974) (holding chinchilla-raising investment opportunity was a pyramid scheme and concluding that promoters were liable based on the marketing materials' suggestion that only

As market participants and regulators observe, the operational mechanics of different coins and tokens create noteworthy variations among cryptocurrencies.⁴²⁰ Consequently, notwithstanding the DAO Report, market participants and issuers continue to lack clarity regarding which operational attributes establish that digital assets are investment contracts and therefore securities subject to the registration requirements imposed by section 5 of the Securities Act.⁴²¹ Moreover, market participants have become increasingly indignant as continued guidance, court decisions, and subsequent enforcement actions reflect inaccuracies regarding how cryptocurrencies operate,⁴²² conflicting suggestions regarding the structures that satisfy the final elements of the *Howey* standard, and muddled or incomplete information regarding what triggers liability in secondary market transactions.⁴²³

Reflecting on Facebook's Diem, Katharina Pistor poignantly observed during congressional hearings that "[e]xisting experience with attempts to regulate cryptocurrencies suggests that regulating Diem with the tools currently available would not be easy and might even be impossible."⁴²⁴

Finally, moderate commentators acknowledge the perils of an unregulated cryptocurrency market and the challenges of applying existing regulation to cryptocurrency markets.⁴²⁵ In a diverse set of proposals that all encourage light-touch regulation, proponents encourage various intermediate approaches to regulation, including

minimal efforts were required by potential investors to breed chinchillas).

420. See generally *Cryptocurrency Comparison*, *supra* note 162.

421. See Securities Act of 1933 § 5, 15 U.S.C. § 77e.

422. In the SEC's first enforcement action alleging a violation of section 5 of the Securities Act related to the sale of a cryptocurrency, both the federal district court's opinion and the SEC's briefs include several incomplete or erroneous descriptions of blockchain technology and the financial products distributed by the defendant Bitcoin Savings and Trust. See SEC v. Shavers, No. 4:13-CV-416, 2014 U.S. Dist. LEXIS 130781, at *3-4 (E.D. Tex. Sept. 18, 2014); see, e.g., Plaintiff's Motion for Summary Judgment or, in the Alternative, for Default Judgment at 19-21, SEC v. Shavers, 2014 U.S. Dist. LEXIS 130781.

423. See James J. Park, *When Are Tokens Securities? Some Questions from the Perplexed*, HARV. L. SCH. F. ON CORP. GOVERNANCE (Dec. 20, 2018), <https://corpgov.law.harvard.edu/2018/12/20/when-are-tokens-securities-some-questions-from-the-perplexed/> [<https://perma.cc/8A8R-K55Y>].

424. Statement of Katharina Pistor, *supra* note 16, at 9.

425. See Daniel Araya, *The Challenges of Cryptocurrency Regulation*, REGUL. REV. (Oct. 9, 2018), <https://www.theregview.org/2018/10/09/araya-challenges-cryptocurrency-regulation/> [<https://perma.cc/25CQ-KHMN>].

allowing cryptocurrency market participants to qualify for registered offering and secondary market trading exemptions⁴²⁶ or creating regulatory sandboxes to permit regulators to engage in regulatory experimentation.⁴²⁷

B. Self-Certification

In recent years, developers, investment bankers, hedge funds, and venture capital firms began engineering two new classes of blockchain-based assets—derivatives and exchange traded funds (ETFs).⁴²⁸ Creators posit that transforming cryptocurrencies or digital gold⁴²⁹ into these types of assets expands the ecosystem of financial products, platforms, and services; enhances price discovery and liquidity; and mitigates volatility.⁴³⁰ Yet, recent experience in financial markets suggests that even the most straightforward iterations of these two complex financial products—derivatives and ETFs—may create concerns for financial market integrity and stability.⁴³¹

Similar to the creation of cryptocurrencies, cryptocurrency exchanges, and clearinghouses, cryptocurrency ETFs present a notable challenge for federal financial markets regulators.⁴³² Financial markets statutes and regulations expressly establish transaction-centered mandates for federal regulatory agencies.⁴³³ These mandates apply to specific transactions with the understanding that regulators exercise authority over certain classes of

426. See, e.g., Johnson, *supra* note 194, at 26, 30.

427. Allen, *supra* note 396, at 580-81.

428. Cf. AJ Horch, *Here's Why Investors Started Pouring Trillions into Exchange-Traded Funds*, CNBC (May 29, 2020, 10:09 AM), <https://www.cnbc.com/2020/05/29/why-investors-are-pouring-trillions-into-exchange-traded-funds.html> [<https://perma.cc/2DNH-MCV3>] (describing reasons for the growth of ETFs in the 2010s).

429. NATHANIEL POPPER, *DIGITAL GOLD*, at x-xii, 8-11 (2015) (providing a carefully detailed narrative of the development of Bitcoin and its subsequent adoption by Cypherpunks).

430. See Horch, *supra* note 428 (describing ETFs as “typically low cost, low risk” funds).

431. See MARIA DEMERTZIS & GUNTRAM B. WOLFF, BRUEGEL, *THE ECONOMIC POTENTIAL AND RISKS OF CRYPTO ASSETS: IS A REGULATORY FRAMEWORK NEEDED?* 10-11 (2018), https://www.bruegel.org/wp-content/uploads/2018/09/PC-14_2018.pdf [<https://perma.cc/9NHQ-9XZN>].

432. Cf. *id.* at 5, 11 (discussing the challenge of classifying cryptoassets and the financial instability such assets may cause).

433. See, e.g., Securities Exchange Act of 1934 § 5, 15 U.S.C. § 78e.

entities, financial products, and transactions.⁴³⁴ New classes of cryptocurrency assets, however, may be fluid and defy this transaction-based regulatory approach.⁴³⁵

Notwithstanding the attractiveness of this approach in other asset classes, it is unlikely to serve regulators well in cryptoasset markets where assets may be more fluid or dynamic.⁴³⁶ Espousing a transaction-based approach in a market where financial products are rapidly evolving fails to acknowledge the convertible nature of the assets and exchanges in these shadow markets.⁴³⁷

Additionally, contentious conflicts regarding jurisdiction create frictions in the relationships among regulators.⁴³⁸ Territorial disputes among regulators and posturing may impede adoption of universally accepted terminology, delaying regulatory certainty.⁴³⁹ Regulators fiercely defend the scope of their authority and aggressively dissuade incursions.⁴⁴⁰ As described below, regulatory competition can undermine regulators' efforts to achieve the normative goals that motivate financial market regulation.⁴⁴¹

To enhance regulatory oversight of cryptocurrency exchanges and clearing platforms, this Article proposes that regulation should designate these assets as dynamic intermediaries and empower the developers of these assets to self-designate which federal regulatory authority they believe should supervise their market activities.

Market participants would designate their preferred regulator through a process known as "self-certification" under the

434. *See id.*

435. *See* Araya, *supra* note 425 (explaining that cryptoassets "can simultaneously function across multiple categories").

436. *See* Statement of Katharina Pistor, *supra* note 16, at 2, 9.

437. *See* Fleischer, *supra* note 392, at 229-30 (introducing "the first comprehensive theory of regulatory arbitrage, identifying the conditions under which arbitrage takes place and the various legal, business, professional, ethical, and political constraints on arbitrage").

438. *See* Kevin Wack, *Regulatory Competition Is Hot Again—and That's Worrisome*, AM. BANKER (Jan. 6, 2019, 10:00 PM), <https://www.americanbanker.com/news/regulatory-competition-is-hot-again-and-thats-worrisome> [<https://perma.cc/NM6C-LM5U>].

439. *See id.*

440. *See id.*; *see also* Marcelo Rezende, *The Effects of Bank Charter Switching on Supervisory Ratings* 20 (Fed. Rsv. Bd. Div. of Rsch. & Stat. & Monetary Affs. Working Paper No. 2014-20, 2014), <https://www.federalreserve.gov/pubs/feds/2014/201420/201420pap.pdf> [<https://perma.cc/7ZWK-DYKP>] (demonstrating that banks "almost surely receive good [supervisory] ratings after they switch charters").

441. *See infra* Part V.B.

regulations imposed by the CFTC under the Commodity Exchange Act (CEA) adopted by Congress in 1936.⁴⁴² Because this Article anticipates that multiple federal regulators will simultaneously create self-designation processes, outlining a detailed description of the operational language may not be particularly useful.

Regulators would implement this comprehensive self-designation process through a formal notice and comment rulemaking process.⁴⁴³ Under such a coordinated approach, each regulator, empowered by one of the several statutes in the patchwork of laws that govern financial markets would proceed according to its mandate.⁴⁴⁴ Even operating within this coordinated regulatory scheme, the ethos and regulatory culture of each agency will influence the details of the development, adoption, and implementation of the self-designation process. Thus, rather than attempt to propose specific operational language, this Section offers a soft definition of dynamic intermediaries, identifies the agencies that will create self-designation processes, and provides a general illustration of the CFTC's recent use of its self-certification process in cryptocurrency markets.

Because the concerns regarding cryptocurrency markets traverse the fragmented financial markets regulatory framework, this Article proposes a macroprudential solution.⁴⁴⁵ By imposing uniform, principles-based regulation on cryptocurrency exchanges operating

442. See U.S. COMMODITY FUTURES TRADING COMM'N, CFTC BACKGROUND ON SELF-CERTIFIED CONTRACTS FOR BITCOIN PRODUCTS (2017), https://www.cftc.gov/sites/default/files/idc/groups/public/@newsroom/documents/file/bitcoin_factsheet120117.pdf [<https://perma.cc/TYE8-2Q62>] [hereinafter CFTC BACKGROUND].

443. See *Commission Rulemaking Explained*, *supra* note 413.

444. Cf. Shelagh Dolan, *How the Laws and Regulations Affecting Blockchain Technology and Cryptocurrencies, Like Bitcoin, Can Impact Its Adoption*, BUS. INSIDER (Jan. 27, 2021, 3:36 PM), <https://businessinsider.com/blockchain-cryptocurrency-regulations-us-global> [<https://perma.cc/36GU-X5JN>] (describing state agencies empowered by law to regulate cryptocurrency).

445. Macroprudential policies mitigate the herding associated with prudential policies. See *supra* notes 365-68. Exploring macroprudential policy enables us to consider increasing capital requirements when the economy performs well or introducing techniques such as dynamic provisioning and capital buffers to moderate procyclical activities or create a fund to serve during economic downturns. See Kadija Yilla & Nellie Liang, *What Are Macroprudential Tools?*, BROOKINGS INST. (Feb. 11, 2020), <https://www.brookings.edu/blog/up-front/2020/02/11/what-are-macroprudential-tools/#:~:text=Macroprudential%20policies%20are%20fubabcuak%20policies,necessary%20for%20stable%20economic%20growth> [<https://perma.cc/7B3J-TEFM>]. Macroprudential tools may reduce incentives to adopt excessive leverage during periods of prosperity or to deleverage during economic downturns. See *id.*

in the marketplace, self-designation fills a risk oversight gap and addresses endogenous and exogenous enterprise and systemic risk as well as moral hazard concerns.

In response to the systemic risk concerns that led to the recent financial crisis, Congress adopted the Dodd-Frank Wall Street Reform and Consumer Protection Act in 2010.⁴⁴⁶ Acknowledging that fragmented regulatory oversight may invite market participants to engage in opportunistic behavior, Congress orchestrated market-wide regulatory intervention⁴⁴⁷ and created the Financial Stability Oversight Council (FSOC).⁴⁴⁸

The FSOC establishes a forum for the senior regulatory officials of the most significant financial markets regulators to act as a super regulator.⁴⁴⁹ Congress tasks the FSOC with identifying and mitigating systemic risk concerns that arise in individual asset classes as well as intermarket risks that emerge based on the interconnectedness among systemically significant financial institutions.⁴⁵⁰ Led by the U.S. Department of the Treasury, the FSOC has ten voting members and five nonvoting members.⁴⁵¹ The voting members

446. Dodd-Frank Wall Street Reform and Consumer Protection Act, Pub. L. No. 111-203, 124 Stat. 1376 (2010) (codified as amended in scattered sections of 7, 12, and 15 U.S.C.).

447. See Michael Barr, *The Dodd-Frank Act, One Year On*, BROOKINGS INST. (June 27, 2011), <https://www.brookings.edu/on-the-record/the-dodd-frank-act-one-year-on/> [<https://perma.cc/L4W8-VK6X>].

448. See 12 U.S.C. § 5321 (2018) (establishing the FSOC); see also Alan Beattie & Sarah O'Connor, *Bernanke Calls for Powerful Regulator*, FIN. TIMES (Mar. 10, 2009), <https://www.ft.com/content/6d4f943a-0d6e-11de-8914-0000779fd2ac> [<https://perma.cc/5EKY-LQ5G>] (highlighting Bernanke's support of a new overarching regulator to oversee all systemically harmful institutions); Hilary J. Allen, *Putting the "Financial Stability" in Financial Stability Oversight Council*, 76 OHIO STATE L.J. 1087, 1088-89 (2015) (arguing that the FSOC should be made a more effective financial regulator by making it less susceptible to politics).

449. See FINANCIAL STABILITY OVERSIGHT COUNCIL, 2019 ANNUAL REPORT, at i (2019), <https://home.treasury.gov/system/files/261/FSOC2019AnnualReport.pdf> [<https://perma.cc/H7S9-PZ4A>].

450. *Id.*

451. The voting members are:

- the Secretary of the Treasury, who serves as the Chairperson of the Council;
- the Chairman of the Board of Governors of the Federal Reserve System;
- the Comptroller of the Currency;
- the Director of the Consumer Financial Protection Bureau;
- the Chairman of the Securities and Exchange Commission;
- the Chairperson of the Federal Deposit Insurance Corporation;
- the Chairperson of the Commodity Futures Trading Commission;
- the Director of the Federal Housing Finance Agency;
- the Chairman of the National Credit Union Administration; and

include the Chairpersons of the SEC, the CFTC, and the Federal Reserve.⁴⁵²

Congress established the FSOC with supervisory authority and a mandate to mitigate systemic risk concerns.⁴⁵³ Notwithstanding this mandate, the FSOC's 2019 annual report mentions Bitcoin in passing but does not reference cryptocurrency, virtual currency, initial coin offerings, or cryptocurrency exchanges.⁴⁵⁴ The report does include a handful of references to "digital assets" and a passing recommendation to "federal and state regulators [to] continue to examine risks to the financial system posed by new and emerging uses of digital assets and distributed ledger technologies."⁴⁵⁵

The FSOC serves as the best platform for initiating a system-wide financial markets procedure to monitor and mitigate systemic risk concerns in cryptocurrency primary and secondary market trading.⁴⁵⁶ Specifically, the FSOC may orchestrate a coordinated effort among regulatory agencies to initiate development of self-designation policies. Given the unlikelihood that the FSOC would craft granular details and implementation process, this Article proposes the creation of a Financial Services Office of Innovation (FSOI).

Each relevant federal regulatory agency would create an FSOI or indicate an existing authority among its offices and divisions that would act as the FSOI equivalent.⁴⁵⁷ Among other mandates, the

-
- an independent member having insurance expertise who is appointed by the President and confirmed by the Senate for a six-year term.
- The non-voting members, who serve in an advisory capacity, are:
- the Director of the Office of Financial Research;
 - the Director of the Federal Insurance Office;
 - a state insurance commissioner designated by the state insurance commissioners;
 - a state banking supervisor designated by the state banking supervisors; and
 - a state securities commissioner (or officer performing like functions) designated by the state securities commissioners.

Id.

452. *See id.*

453. *See id.*

454. *See id.* at 96.

455. *Id.* at 7.

456. *Cf. id.* at 4 ("[FSOC] [m]ember agencies have also taken actions to reduce system risk in the financial system.").

457. In 2016, Republican Congressman Patrick McHenry introduced a bill proposing the creation of an FSOI within each federal financial markets regulatory agency. *See* Financial Services Innovation Act of 2016, H.R. 6118, 114th Cong. § 4 (2016).

FSOI would develop a self-designation form that would permit a cryptocurrency primary and secondary market participant to affirmatively indicate the financial market regulator that it believes should supervise its activities. Self-designation processes may permit participants to indicate more than one regulator; however, the process should require market participants to designate one agency who will serve as the primary regulator of their relevant activities.

Submission of a self-designation form would not be determinative. Based on the procedures developed collaboratively by the FSOI offices, self-designation processes would constitute a type of preregistration. Further, the self-certification process would only be effective once the FSOI for the firm's preferred regulator acquiesces. While the firm awaits confirmation by its preferred regulator, the firm may operate under the assumption that the self-designation process will conclude as anticipated. In the event that the preferred regulator does not acquiesce, the preferred regulator will issue a formal notice granting the firm ninety days to resubmit its self-designation to another regulatory agency. The FSOC will oversee individual agency procedures for evaluating self-designation forms to avoid attempts by market participants to manipulate the process and mitigate disputes among regulatory agencies.

For primary market offerings, this process will ensure that the SEC—assuming the cryptocurrency is a security—is on notice that the offering is in progress even if it is not a registered offering. If the agency concludes that the offering should be, however, a registered offering, then the issuer will have an opportunity to submit registration of the offering, essentially tolling the registration process. This approach enables the issuer to benefit from informal guidance that may alleviate the harsh consequences of discovering that an offering is subject to section 5 of the Securities Act *after* a distribution of the securities.

For cryptocurrency secondary market participants, the process complements the SEC's no action letter policy.⁴⁵⁸ Regulators may adopt policies that permit application to remain under review and choose not to publicly release the same for some minimum period while the submission is under consideration or in the event that

458. See *No Action Letters*, SEC (Mar. 23, 2017), <https://www.investor.gov/introduction-investing/investing-basics/glossary/no-action-letters> [<https://perma.cc/K2U3-MY4W>].

resubmission is required. In the event that the self-certification application applies to a public offering, there are other tools in the SEC's toolbox to address these concerns.

Self-designation must also facilitate the existing process for platforms that seek to operate as regulated entities. For example, the process may put the SEC on notice of a platform's intentions to register as a broker-dealer; the SEC will have an opportunity to guide the platform in its efforts to register as a broker-dealer and become a member of an SRO, such as the FINRA.⁴⁵⁹

How should regulators address a market participant that rejects the notion that it is subject to regulatory oversight? In such an instance, assuming investors in the United States or investors using U.S.-based accounts, the entity would be required to submit a self-designation form to the Office of Financial Research in the U.S. Department of the Treasury indicating the rationale for its conclusion. Such an approach enables regulators to, at a minimum, identify the platforms that may be operating in U.S. financial markets.

C. Collaborative Market Governance

Under the CEA, a designated contract market (DCM) is a board of trade that agrees to comply with the core principles described in 7 U.S.C. § 7(d) and any requirement that the CFTC imposes by rule or regulation.⁴⁶⁰ A board of trade is an organized exchange or other trading facility.⁴⁶¹ Once designated as a contract market, the board of trade becomes a registered entity subject to oversight by the Commission.⁴⁶²

The CEA permits DCMs to list a new contract for trading a commodity or derivative upon the DCM by providing the Commission with either (1) a written certification that the new contract complies with the CEA and existing regulations (self-certification),

459. *See Financial Reports and Policies*, FINRA (July 1, 2020), <https://www.finra.org/about/annual-reports> [<https://perma.cc/KM53-EZGR>] (discussing FINRA's financial policies as a not-for-profit SRO).

460. 7 U.S.C. § 7(d)(1)(A)(i)-(ii).

461. *See id.* § 1a(6).

462. *See id.* § 1a(40).

or (2) a request that the Commission grant approval to the new contract (prior approval).⁴⁶³ If the DCM elects to self-certify the new contract, the submission to the Commission must include a copy of the product's rules, as well as a "concise explanation and analysis of the product and its compliance with ... core principles" and existing regulations found in 17 C.F.R. § 38.⁴⁶⁴ Absent a finding by the Commission "that a new product would violate the CEA or Commission regulations, the DCM may list the new product no sooner than one full business day following the self-certification."⁴⁶⁵ There is no statutory or regulatory requirement that DCMs receive public input from market participants for product self-certifications.⁴⁶⁶ DCMs must, however, "establish, monitor, and enforce compliance" with existing rules and other federal financial markets regulations.⁴⁶⁷

Recent activity in the Bitcoin futures market illustrates the use of the self-certification process and the need for collaborative governance in certain asset classes. On December 1, 2017, the Chicago Mercantile Exchange Inc. (CME) and the CBOE Futures Exchange (CFE) self-certified new contracts for Bitcoin futures products, and the Cantor Futures Exchange (Cantor Exchange) self-certified a new contract for Bitcoin binary options.⁴⁶⁸ On December 14, 2017, the North American Derivatives Exchange, Inc. (Nadex) self-certified a new contract for weekly Bitcoin spread contracts, and on February 27, 2018, Nadex self-certified a new contract for monthly mini Bitcoin spread contracts.⁴⁶⁹

463. *Id.* § 7a-2(c)(1), (4); *see also* CFTC BACKGROUNDER, *supra* note 442.

464. 17 C.F.R. § 40.2(a)(3) (2019).

465. CFTC BACKGROUNDER, *supra* note 442; *see also* 17 C.F.R. § 40.2(a)(2).

466. J. Christopher Giancarlo, Chairman, U.S. Commodity Futures Trading Comm'n, Remarks Before the Market Risk Advisory Committee Meeting (Jan. 31, 2018), <http://www.cftc.gov/PressRoom/SpeechesTestimony/giancarlostatement013118> [<https://perma.cc/BC2D-A6CW>].

467. 7 U.S.C. § 7(d)(2).

468. CFTC BACKGROUNDER, *supra* note 442.

469. JAIME WALSH, NADEX, SELF-CERTIFICATION OF RULE AMENDMENTS: NADEX ADDS BITCOIN VARIABLE PAYOUT CONTRACT—SUBMISSION PURSUANT TO COMMISSION REGULATION § 40.2(A), at 1 (2017), <https://www.cftc.gov/sites/default/files/filings/ptc/17/12/ptc121517nadexdcm001.pdf> [<https://perma.cc/DP55-4NSP>]; Nadex Adds Mini-Bitcoin Monthly Contract, MARKETSCREENER (June 5, 2018, 9:02 AM), <https://www.marketscreener.com/news/latest/Nadex-Adds-Mini-Bitcoin-Monthly-Contract--26716813/> [<https://perma.cc/DL85-25JC>].

CME, CFE, Cantor Exchange, and Nadex filed self-certifications with the Commission as DCMs.⁴⁷⁰ Before self-certifying and thus listing their Bitcoin contracts, CME, CFE, and Cantor Exchange provided SEC staff with advanced draft contract terms and conditions to facilitate review of compliance with the CEA and CFTC regulations and to assess the “potential risk of defaults in these futures contracts on the DCOs.”⁴⁷¹

As described below in Part V, self-certification poses notable challenges. However, self-certification offers a useful pathway for regulators to discover who is operating in markets. Academic commentators have previously proposed the creation of ex ante preapproval regulatory processes for financial products similar to the processes employed by the Food and Drug Administration, for example.⁴⁷²

While interesting, these proposals raise questions that are difficult to resolve and for which there is often little political will. As CFTC Commissioner J. Christopher Giancarlo recently explained, “Congress framed the self-certification process deliberately so that development of new and innovative derivatives products would not be hampered by cautious regulators conscious of the political risks of approving new products.”⁴⁷³ The self-designation process may prove equally valuable for regulators across the financial markets ecosystem.

470. CFTC BACKGROUNDER, *supra* note 442; *see* WALSH, *supra* note 469, at 7-8.

471. CFTC BACKGROUNDER, *supra* note 442.

472. *See* Eric A. Posner & E. Glen Weyl, *An FDA for Financial Innovation: Applying the Insurable Interest Doctrine to Twenty-First-Century Financial Markets*, 107 NW. U. L. REV. 1307, 1307 (2015) (“We propose that when firms invent new financial products, they be forbidden to sell them until they receive approval from a government agency designed along the lines of the FDA, which screens pharmaceutical innovations. The agency would approve financial products if they satisfy a test for social utility that focuses on whether the product will likely be used more often for insurance than for gambling.”); Saule T. Omorova, *License to Deal: Mandatory Approval of Complex Financial Products*, 90 WASH. U. L. REV. 63, 66 (2012).

473. J. Christopher Giancarlo, Chairman, U.S. Commodity Futures Trading Comm’n, Remarks to the ABA Derivatives and Futures Section Conference (Jan. 19, 2018), <http://www.cftc.gov/PressRoom/SpeechesTestimony/opagiancarlo34> [<https://perma.cc/C4N4-6GYA>].

V. BENEFITS AND LIMITATIONS OF SELF-DESIGNATION

The self-certification (know-your-regulator) proposal outlined in Part IV creates a collaborative regulatory dialogue between regulators and regulated entities. The open dialogue increases transparency and engenders a number of benefits. Consequently, markets are better poised to protect investors from the risk of losses arising from threats such as cybersecurity attacks and predatory trading practices.

Admittedly, self-certification processes rely heavily on market participants' willingness to align themselves with regulatory norms and goals.⁴⁷⁴ This approach is, in essence, a self-regulatory approach, and self-regulation is not a panacea.⁴⁷⁵ Market participants' incentives may not align with regulatory goals, and even if many market participants refrain from misconduct, intermediary risk may still lead to several of the enterprise and systemic risks described above.

A. Benefits

Adopting a self-certification process has a number of notable benefits. First, in the absence of a regulatory dialogue with regulated market participants, regulators may lack the opportunity and incentive to investigate emerging fintech products and services. Introducing self-certification will enhance transparency in cryptocurrency primary and secondary markets. The process of declaring their preferred regulatory authority is, in part, a disclosure process. Market participants' filings will reveal the participants in the market, the size of their operations, and the specific financial services and products that they originate and distribute. The disclosure process will initiate a regulatory dialectic that will enable regulators to raise important questions regarding market participants' risk management procedures.

474. See David P. Doherty, Arthur S. Okun, Steven F. Korostoff & James A. Nofi, *The Enforcement Role of the New York Stock Exchange*, 85 NW. U. L. REV. 637, 641 (1991).

475. See generally *id.* at 637-38.

Second, initiating a dialogue provides regulators with greater access to information across the financial services industry and improves regulators' ability to identify and detect cybersecurity threats to consumers and market integrity. Similarly, greater access to information better positions regulators to identify and monitor misconduct, including market manipulation. Regulators' ability to police trading markets for disconcerting automated or HFT practices and cybersecurity risks will also improve.

Third, gathering data across markets will assist regulators in their efforts to develop and implement meaningful reforms. For example, the need for well-structured compliance programs that introduce anti-money laundering, rigorous know-your-customer, and consumer privacy protections cannot be overstated.⁴⁷⁶ Access to general information regarding the entities operating in markets and their governance structures is the first step to developing policies and practices to achieve these regulatory goals.

B. Remaining Questions

While self-certification may offer an expedient solution to the challenge of identifying market participants, assessing risks, protecting customers, ensuring fairness in trading transactions, and preserving market integrity, this approach has a number of noteworthy limitations. For example, while the Bitcoin futures exchange certification process described above initiates a robust dialogue between market participants and the CFTC, operating challenges and muddled administrative directives have plagued the fledgling market.⁴⁷⁷

After CME made its self-certification filings, market participants began to recognize that the clearing organizations "will bear the brunt of the risk associated with ... their guarantee fund contributions and assessment obligations"; consequently, the members

476. See Alon Kaufman, *How Privacy-Enhanced Technologies Can Make Financial Crime Compliance More Effective*, AM. BANKERS ASS'N (June 11, 2020), <https://bankingjournal.aba.com/2020/06/how-privacy-enhanced-technologies-can-make-financial-crime-compliance-more-effective/> [https://perma.cc/79NG-JQR8].

477. See Oscar Williams-Grut, *There's an Argument Brewing over the Launch of Bitcoin Futures*, BUS. INSIDER (Dec. 7, 2017, 5:26 AM), <http://www.businessinsider.com/fia-complains-to-cftc-about-bitcoin-futures-2017-12?r=UK&IR=T> [https://perma.cc/RK5R-LBYJ].

became increasingly concerned and critical of the self-certification process.⁴⁷⁸

In an open letter to CFTC Chairman J. Christopher Giancarlo, Walt Lukken, CEO of the Futures Industry Association (FIA), stated that “the launching of these innovative products through the 1-day self-certification process did not allow for proper public transparency and input.”⁴⁷⁹ Lukken found “that this expedited self-certification process for these novel products does not align with the potential risks that underlie their trading” and that “[a] more thorough and considered process would have allowed for a robust public discussion among clearing member firms, exchanges and clearinghouses to ascertain the correct margin levels, trading limits, stress testing and related guarantee fund protections and other procedures needed in the event of excessive price movements.”⁴⁸⁰ On a similar note, Kristen Walters of BlackRock “suggested a more formal review was appropriate given the ‘extreme volatility’ of cryptocurrencies.”⁴⁸¹

In response to the criticism, Commissioner Giancarlo acknowledged the CFTC’s need for “heightened review” of compliance by the DCMs with core principles.⁴⁸² In order to implement risk mitigation and oversight measures, the CFTC must improve oversight of margin requirements and solicit information-sharing agreements among the Bitcoin trading platforms.⁴⁸³ These measures may enable the CFTC to gain better insights into the U.S. Bitcoin futures market and enable the CFTC to better detect and pursue bad actors.⁴⁸⁴ In addition, Commissioner Giancarlo explained that DCMs must disclose “what steps they have taken in their capacity as self-

478. *See id.*

479. Walt Lukken, *Open Letter to CFTC Chairman Giancarlo Regarding the Listing of Cryptocurrency Derivatives*, FUTURES INDUS. ASS’N (Dec. 7, 2017), <https://fia.org/resources/open-letter-cftc-chairman-giancarlo-regarding-listing-cryptocurrency-derivatives> [<https://perma.cc/BV8P-F9KE>].

480. *Id.*

481. Gregory Meyer, *U.S. Derivatives Regulator Looks to Calm Cryptocurrency Fears*, FIN. TIMES (Jan. 31, 2018), <https://www.ft.com/content/db9d547e-06b4-11e8-9650-9c0ad2d7c5b5> [<https://perma.cc/S5NP-3L9G>].

482. *See* Giancarlo, *supra* note 466.

483. Jay Clayton & J. Christopher Giancarlo, *Regulators Are Looking at Cryptocurrency*, WALL ST. J. (Jan. 24, 2018, 6:26 PM), <http://www.wsj.com/articles/regulators-are-looking-at-cryptocurrency-1516836363> [<https://perma.cc/KA98-8AAY>].

484. *Id.*

regulatory organizations to gather and accommodate appropriate input from concerned parties.”⁴⁸⁵

These regulatory, administrative, and operational challenges are disturbing. They are not, however, surprising. The Bitcoin futures market is indisputably in its infancy.⁴⁸⁶ These types of limitations of the self-certification process are sharpest at the inception of the market for a financial transaction or asset class.⁴⁸⁷ Over time, experimentation will likely soften the processes.

Moreover, it appears that regulators may eliminate many of the administrative and regulatory limitations that stymied the CFTC self-certification process by introducing procedural guardrails.⁴⁸⁸ In truth, some elements of the self-certification process will remain experimental and unresolved as regulators navigate the markets for nascent financial products such as Bitcoin futures.⁴⁸⁹ As Commissioner Giancarlo explained, “[t]he CFTC’s current product self-certification framework is consistent with public policy that encourages market-driven innovation that has made America’s listed futures markets the envy of the world.”⁴⁹⁰ The product self-certification process has served the markets for decades and will likely continue to do so.⁴⁹¹

Addressing the procedural concerns described above requires making sufficient resources available to any administrative agency and, if the development of the self-designation process involves representatives of multiple agencies, it is all the more likely that the procedural elements adopted will facilitate efficient, frictionless registration. There are, however, two endemic limitations identified below that may prove difficult to address.

485. Giancarlo, *supra* note 466.

486. See Jason Williams, *Why Adoption Is Critical for the Future of Crypto—GlobalBlock Insights*, FINTECH TIMES (Mar. 2, 2019), <https://thefintechtimes.com/crypto-adoption/> [<https://perma.cc/494Y-UGUA>].

487. See *supra* notes 27-28.

488. See Henry Engler, *U.S. Derivatives Regulator Tightens Review for Virtual Currencies; Defends ‘Self-Certification’ Rules*, REUTERS (Jan. 31, 2018, 2:52 PM), <https://www.reuters.com/article/bc-finreg-cftc-virtual-currency/u-s-derivatives-regulator-tightens-review-for-virtual-currencies-defends-self-certification-rules-idUSKBN1FK2XL> [<https://perma.cc/7DLA-M2JC>].

489. Rostin Behnam, Comm’r, Commodity Futures Trading Comm’n, Opening Statement Before the Market Risk Advisory Committee (Jan. 31, 2018), <https://www.cftc.gov/PressRoom/SpeechesTestimony/behnamstatement013118> [<https://perma.cc/T4TB-UKK6>].

490. Giancarlo, *supra* note 466.

491. See *id.*

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Victor Fleischer identifies one endemic concern that will challenge regulators in cryptocurrency markets for many years to come—regulatory arbitrage.⁴⁹² According to Fleischer, “[r]egulatory arbitrage is a consequence of a legal system with generally applicable laws that purport to define, in advance, how the legal system will treat transactions that fit within defined legal forms.”⁴⁹³ When legal definitions fail to “track the underlying economic relationship between the parties, gaps arise,” creating an invitation for opportunistic behavior.⁴⁹⁴

As discussed above, Facebook and other cryptocurrency originators aspire to introduce financial services and products that displace legacy financial intermediaries.⁴⁹⁵ Many of the developers have expressly acknowledged that one central motivation for developing cryptocurrencies is to identify a gap in market regulation and profit by drawing transactions and financial resources to the unregulated area. Operating outside the ambit of federal regulations eliminates the costs of complying with federal law.⁴⁹⁶

The securities and commodities market regulatory regimes impose significant, extensive, and onerous legal obligations and costs on financial market participants. Launching a registered, initial public offering through traditional channels (elite investment banking firm, top-flight accountants, Wall Street law firm) is a costly undertaking. The average IPO costs almost \$1 million or more.⁴⁹⁷ Uber paid their underwriters—Morgan Stanley, Goldman Sachs, and Bank of America Merrill Lynch among others—over \$100 million in fees for facilitating their offering.⁴⁹⁸ This figure fails

492. See Fleischer, *supra* note 392, at 227.

493. See *id.* at 243.

494. See *id.*; see also Partnoy, *supra* note 277, at 219 n.48.

495. See *supra* notes 25-27.

496. See DEMERTZIS & WOLFF, *supra* note 431, at 8.

497. Patricia Ntiamoah, *2018-2019 IPO Accounting and Legal Fees*, AUDIT ANALYTICS (Feb. 20, 2020), <https://blog.auditanalytics.com/2018-2019-ipo-accounting-and-legal-fees/> [<https://perma.cc/8T67-NWQB>]; Caleb Christensen, *The Costs of Going Public*, IPO HUB (Mar. 27, 2018), <https://www.ipohub.org/costs-going-public/> [<https://perma.cc/RPH5-MP9K>].

498. Mamta Badkar & Nicole Bullock, *Uber Underwriters Bring in \$106.2m in Revenues*, FIN. TIMES (May 13, 2019), <https://www.ft.com/content/79df7d28-75af-11e9-bbad-7c18c0ea0201> [<https://perma.cc/KD6L-KKT7>].

to capture the costs that issuers incur beyond fees paid to professional services providers.⁴⁹⁹

An interesting literature explores the debate regarding the value of cost-benefit analysis in financial regulation.⁵⁰⁰ Without entering that thicket, this Article seeks to balance the normative goals underlying securities and commodities market regulation—consumer protection, fairness, and market stability—with calls for efficient regulation.

While creating a self-designation process will create immediate costs for market participants, these costs are far less onerous than formal registration processes or the liability that follows from failing to register. Finally, as noted above in Part III, enterprise and systemic risk management failures may create costs that market participants externalize.⁵⁰¹ Notably, cryptocurrency platforms not affiliated with regulated banking entities may lack any form of deposit insurance protection.⁵⁰² Regulators must be careful to ensure that adopted regulatory approaches do not create moral hazard concerns that lead to market participants relying on a taxpayer-funded safety net for actors operating in these nascent, mercurial, and highly volatile markets.

A second endemic concern characterizes the relationship between fintech firms and legacy financial institutions. As Rory Van Loo explains, regulatory competition creates consumer protection and systemic risk concerns.⁵⁰³ According to Professor Van Loo, “[t]he advent of fintech changes the analysis and raises the stakes for getting competition right” because “digital innovation faces additional entry barriers” and “increases systemic risk in securities trading, by creating new mechanisms for sudden and coordinated mass market movements.”⁵⁰⁴

499. Christensen, *supra* note 497.

500. See, e.g., John C. Coates, IV, *Cost-Benefit Analysis of Financial Regulation: Case Studies and Implications*, 124 YALE L.J. 882, 885-87 (2015).

501. See *supra* Part III.D.

502. *Crypto Market's Traders Get Something New: FDIC Protection*, AM. BANKER (May 14, 2019, 2:55 PM), <https://www.americanbanker.com/articles/crypto-markets-traders-get-something-new-fdic-protection> [<https://perma.cc/2WKB-DZFK>].

503. Van Loo, *supra* note 20, at 232.

504. *Id.* at 234-35.

Consequently, it is critical for regulators to operate in collaboration in their efforts to understand and regulate the fintech platforms that integrate distributed ledger technology. Acting in concert, regulators can address regulatory gaps and minimize market participants' ability to engage in regulatory arbitrage. The Office of the Comptroller of the Currency's decision to extend bank charters to fintech firms illustrates the perils of unilateral, deregulatory action.⁵⁰⁵

CONCLUSION

Global financial markets are in the midst of a transformative era. While it is not yet clear whether the integration of cryptocurrencies and related secondary market transactions marks mere evolution or a market revolution,⁵⁰⁶ it is undeniable that these innovative distributed digital ledger technologies have altered the financial markets ecosystem. As markets expand to encompass the origination and distribution of cryptocurrency assets and the secondary market platforms—broker-dealers, clearinghouses, and exchanges—regulatory uncertainty persists.

As cryptocurrencies and trading institutions transition and mature, cryptocurrency market activity and practices reveal many of the endemic enterprise and systemic risk management concerns that have plagued conventional financial markets and legacy financial institutions. Automated and accelerated trading leave individual, unsophisticated investors vulnerable to predatory trading practices.

Cybersecurity attacks threaten individual investors, cryptocurrency clearinghouses, and exchanges with significant losses. In some instances, these attacks lead to insurmountable losses. When hackers swarm or light-fingered founders shift the firm or clients' assets into their personal wallets, clearinghouse and exchange platforms find themselves anemic, insolvent, and seeking bankruptcy

505. Yuka Hayashi, *Judge Denies Federal Agency's Authority to Issue Fintech Bank Charters*, WALL ST. J. (Oct. 22, 2019, 1:53 PM), <https://www.wsj.com/articles/judge-denies-federal-agencys-authority-to-issue-fintech-bank-charters-11571766837> [<https://perma.cc/H4B6-BSEG>].

506. *See generally* TAPSCOTT & TAPSCOTT, *supra* note 166.

protection. These challenges grow in tandem with the increasing size and scope of cryptocurrency markets. Although federal regulators' preliminary market guidance and increased enforcement actions are an excellent first step in dealing with risk management concerns in cryptocurrency markets, important questions remain unresolved.

Introducing a self-certification process may properly incentivize cryptocurrency market participants to disclose material information regarding their operations such as their incorporation of centralized cryptocurrency clearing practices. This approach will minimize asymmetries of information in cryptocurrency markets, may mitigate cybersecurity risks, and will shine a spotlight on predatory automated (algorithmic) and HFT strategies. Finally, with the self-certification process, cryptocurrency exchanges may benefit from governance and risk management guidance. Each of these policy changes is necessary to protect investors, promote fairness and efficiency, and ensure market stability.