REGULATING DECENTRALIZED FINANCE: CRYPTOCURRENCY EXCHANGES

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ABSTRACT

Global financial markets are in the midst of a transformative era. The creation of Bitcoin and Facebook's proposed distribution of Libra 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 risk-management threats that have plagued conventional financial institutions as well as a host of

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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. This approach recognizes the dynamic nature of cryptocurrency secondary market actors seeking to achieve disintermediation yet balances these potential benefits with normative regulatory goals—protecting investors from fraud, theft, misconduct, and malfeasance; 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 $1 trillion 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

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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, Bitfnex 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,

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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].

mismanagement of 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 requisite approval from federal or state authorities to operate as an exchange.[14] Regulators have formally prosecuted only two 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 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

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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 the World's 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/pr7380-16 [https://perma.cc/DCZ9-FUAS].

16.*See* Shaanan Cohney, 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-brummerc-20190717.pdf [https://perma.cc/T7EU-5NEJ] (describing the structure of Facebook's proposed Libra 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).

2007,[18] and, in the wake of the crisis, many were disillusioned. 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] To disrupt financial services markets, 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

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18.*See, e.g.*, Saule T. Omarova, *The Quiet Metamorphosis: How Derivatives Changed the "Business of Banking*," 63 U. MIAMI 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/businessworldbusiness/03iht-bailout.4.16679355.html [https://perma.cc/K6J8-TUHM].

20.Brummer & Yadav, *supra* note , 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*, U. MIAMI 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).

technology and the popular subset of blockchain-based technologies are among the 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—Libra, a global cryptocurrency designed to displace existing government-issued

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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.'" (citations 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].

fiat and introduce a frictionless international financial payment system.[25] Facebook's description depicts Libra as sharing attributes with a variety of traditional assets and financial services; according to Facebook, Libra is a currency or cash-equivalent cryptowallet and private payment platform.[26]

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

Achieving regulatory aims may be difficult, if not impossible, if lawmakers and regulators do not understand exactly *what* 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

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25.Jeff Horwitz & Parmy Olson, *Facebook Unveils Cryptocurrency Libra 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]. Libra is, in fact, Facebook's fourth attempt at introducing an alternative financial services platform.

26.*Examining Facebook's Proposed Crypocurrency 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 Libra 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-cryptocurrence/?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 Libra 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://libra.org/en-US/white-paper/#introduction [https://perma.cc/QVX3-94DG].

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 of departure for analysis).

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 alternatives to 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 lead some cryptocurrencies and platforms enabling cryptocurrency secondary market transactions to alter their operations or governance infrastructure or undertake a metamorphosis that reduces or eliminates reliance on intermediaries. Questions regarding the efficacy of applying our existing regulatory framework to cryptocurrency secondary market transactions remain 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 primary market regulation—chiefly mandatory disclosure—as the "anointed" approach stems from a belief that erecting and enforcing initial disclosure reduces asymmetries of information, fraud, unscrupulous abuses, and exploitation of unwitting individual investors. In the context of cryptocurrency markets, emphasis on primary market

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

30.*But see infra* note 314 and accompanying text.

31.Statement of Katharina Pistor, *supra* note , 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].

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 participants 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 execution "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 response to the harms emerging in cryptocurrency secondary markets. 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, individual firm risk- management failures may engender systemic risk-management concerns. 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.

33.*See infra* notes 153-55.

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

Part I of this Article describes the history and philosophy of the regulatory framework that governs conventional secondary market transactions. It argues that the dominant narrative in regulatory discourse prioritizes the regulation of 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 outlines a developing taxonomy of cryptocurrency exchanges. Many of the exchanges that describe themselves as decentralized 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. Refusing to elevate form over substance, regulators must investigate the central operational mechanics of the platforms as well as the strategic 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, pinging, 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 in 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 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 efficiency, fairness, and the integrity of secondary market transactions.[37] The thread of mandatory disclosure

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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).

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

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

37.*See id.*

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.

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

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38.Securities Exchange Act of 1934, 15 U.S.C. § 781(b) (requiring registration in order to be part of a national exchange); *id.* § 781(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 2,000 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 , at 1071-72.

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 , at 4-15; Joseph E. Stiglitz, *Pareto Optimality and Competition*, 36 J. FIN. 235, 247 (1981).

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

the appreciation of the valuation of the firm.[44] The origination and distribution of equity or debt securities from the issuer to investors is referred to as a primary market transaction and 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]

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 information[49] punctuated spectacular evidence of fraud and stunning acts of avarice. During this period, securities listed on the New York Stock Exchange declined from a precrash 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]

44.*See* GARY STRUMEYER, THE CAPITAL MARKETS 21 (Sarah Swammy 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].

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).

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 issuer 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 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

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52.LOUIS D. BRANDEIS, OTHER PEOPLE'S MONEY 92 (1914).
53.15 U.S.C. §§ 77a-77mm.
54.*Id.* § 55f. *See generally* 15 U.S.C. §§ 77a-77aa.
55.15 U.S.C. §§ 78a-78qq.
56.*See* Schwartz, *supra* note , at 1079.
57.*See* STRUMEYER, *supra* note , at 121.
58.*About the 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.") .

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 private fundraising cannot compete without access to 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-

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59.*See* Kristin N. Johnson, *Regulation Innovation: High Frequency Trading in Dark Pools*, 42 J. CORP. L. 833, 843 (2017) (alteration in original).
60.*See id.*
61.*See* Elisabeth de Fontenay, *The Deregulation of Private Capital and the Decline of the 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).

governance, federal mandatory disclosure requirements introduce an efficient, uniform regulatory metric that enables authorities to evaluate an issuer's compliance with primary offering disclosures and creates a point of departure for investor assessment of the merits of investing in the security as well as 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 the disclosure norms. In primary markets, for example, intermediaries may face strict liability for promoting the sale of unregistered securities.[66]

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 private families, 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

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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).
67.HILL & PAINTER, *supra* note , at 5.
68.In 2006, the six largest investment banking firms accounted for 81.9% 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 , at 161.

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 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 threats 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]

72.*Id.* at 114-15.
73.*Id.*
74.*See* ANTHONY SAUNDERS & MARCIA MILLON CORNETT, FINANCIAL MARKETS AND 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 , at 161.
79.Tuch, *supra* note , at 56.

Finally, intermediation in IPO markets has an expressive function. In their service as underwriters, investment banks perform a gatekeeping function. 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]

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 buy some portion of the IPO shares that the underwriter acquires from the issuer.[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.

80.*See* Tuch, *supra* note , at 61.
81.*See id.* at 58-59.
82.*See id.*
83.*See* Tuch, *supra* note , at 161.
84.*See id.* at 161-62.
85.*See* Tuch, *supra* note , at 60.
86.*See id.* at 52.
87.*See id.* at 52-53.
88.*See id.*

In a parallel manner, financial institutions that operate as intermediaries play a significant role in secondary market transactions. While the issuers are no longer a party in these transactions, issuers of publicly traded securities do remain subject to mandatory continuous disclosure obligations.[89] Broker-dealers, often a division with the same investment bank that serves as underwriter for an issuer's IPO, execute secondary market transactions in the issuers' registered, listed securities.[90]

Yet, the central actor in secondary market transactions is, arguably, 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. Securities exchanges are a critical infrastructure resource and a focal point in the Exchange Act. The next Section examines the role of securities exchanges in secondary market transactions and contends that a seismic shift in the structure of markets challenges the underlying presumptions and effectiveness of existing financial markets regulation.

B. The Structure and Economics of Trading Markets

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, a significant thread—mandatory disclosure—weaves the two categories together. Parallel registration requirements for issuers (under the Securities Act)[93] and broker-dealers and exchanges (under the Exchange Act)[94] establish this normative thread. Thus, in certain

89.*See* 15 U.S.C. § 78o(d).
90.*See* Tuch, *supra* note , at 52-53.
91.Leslie Kramer, *Primary vs. Secondary Capital Markets: What's the Difference?* INVESTOPEDIA (Oct. 2, 2020), https://www.investopedia.com/ask/answers/012615/what-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* 15 U.S.C. § 78a-78qq.

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 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 (clearinghouses 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 intrastate transactions or exempt

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

96.*Id.* § 78o(b).

97.*See* U.S. SEC. & EXCH. COMM'N, 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.

99.15 U.S.C. § 78o(b).

100.*See* Austin, *supra* note , 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. 15 U.S.C. § 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.

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] While there are alternative trading platforms that facilitate trading unregistered securities, these securities sold pursuant to a statutory or regulatory safe harbor are likely subject to restrictions that may limit resales based on the volume, the type of investor transacting in the securities, holding periods imposed on purchasers, or other transaction-related limits.[105] Underscoring the importance of access to secondary market trading, the prohibition on broker-dealer transactions in Section 12(a) of the Exchange Act[106] prevents issuers who distribute unregistered securities from accessing the liquidity, economic or governance benefits that national securities exchanges engender for the issuers of registered, listed securities.[107]

Since the founding of the nation, broker-dealers and exchanges have had a prominent role in regulating secondary market transactions. Notwithstanding the mandate in the Exchange Act granting the oversight of broker-dealers and exchanges, the agency promptly acquiesced to the nation's 150 year tradition of permitting broker-dealers and exchanges to organize 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,

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102.15 U.S.C. § 78o(a).
103.*Id.* § 78o(b)(4).
104.*Id.* § 781(a).
105.*See id.*
106.*Id.*
107.*See infra* notes 96-104 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* 15 U.S.C. § 78s.

conduct, capitalization, and similar matters.[109] This collaborative governance approach continues to be a hallmark of U.S. securities regulation.

In contemporary markets, for example, 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]

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

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109.*See id.*
110.Tuch, *supra* note , 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 , at 104-05.
113.*See* Markham & Harty, *supra* note , at 882-83.
114.*See id.*
115.*See* Robert R. Bliss & Robert S. Steigerwald, *Derivatives Clearing and Settlement: A Comparison of Central Counterparties and Alterative Structures*, ECON. PERSPS., 4th Quarter 2006, at 22, 22-23.
116.*See id.*
117.Johnson, *supra* note , at 840.

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 enhances 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 lowesr transaction costs, thereby improving the efficient functioning of secondary trading markets.[121] Consequently, secondary trading on these exchanges improves 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

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118.*See* supra notes 78-82 and accompanying text.

119.*See* Stanislav Dolgopolov, *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 , at 254.

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 .

124.*See* Markham & Harty, *supra* note , 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).

markets as liquid; meaning one can quickly identify buyers or sellers who are willing to enter into arrangements to act as counterparties in transactions involving 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 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. Consequently, one might describe so-called blue chip stocks with large market capitalizations listed on national securities exchanges as highly liquid.[131]

Imagine that you wish to buy shares of Amazon.com, Inc., 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, Inc. (Amazon.com) on the app of her preferred broker-dealer on her mobile phone, computer, or personal tablet. The app may text or email confirmation within minutes. In fact, the broker-dealer who submits such a request to a national securities exchange offering to purchase shares of

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

129.SAUNDERS & CORNETT, *supra* note , 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 , at 882-83.

130.*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 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.*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").

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 also 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.[132]

The contributions of exchanges extend beyond their role as auction houses; exchanges also impose regulations on the broker-dealers who are members of the exchange. These regulations include capital requirements, risk-management policies, and dispute resolution policies.[133] In addition, exchanges may initiate enforcement actions for members who violate SRO regulations or federal or state laws.[134] These regulations govern member firm's risk decisions (enterprise risk-management) as well as risks across asset class markets.[135]

Risks related to trading or the operational framework for trading might be described as member firm enterprise risks.[136] Market risk or the threat that acquired assets may suddenly decline in value offers an example of a member firm enterprise risk.[137] Trading inherently exposes firms to market risk; in a

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132.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.

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

134.*See id.* at 887.

135.*See id.*

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

137.*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

bilateral trading market, counterparty risk—the risk that the counterparty to a trade may default—creates an enterprise risk for each member firm.[138] 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.[139]

Acting as a central market intermediary, an exchange may adopt policies or practices to mitigate certain trading risks. Based on member-adopted policies, exchanges may agree to act as guarantors for the transactions executed on their platforms.[140] When an exchange agrees to act as a guarantor for transactions executed by its members, the exchange interposes itself as the counterparty in the transaction with the buyer and the transaction with the seller to ensure the performance of both the buyer and the seller under the contract.[141]

For example, in the transaction described above, a trader submits a bid to purchase Amazon.com stock at the prevailing market price. The trader submits her bid to a broker-dealer using an 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.[142] In essence, the exchange becomes the counterparty to each party to the transaction and accepts the contractual commitments of the counterparty.[143] If either party defaults, the exchange accepts the

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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.'" (citation omitted)).

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

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

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

141.*See* Bliss & Steigerwald, *supra* note , at 23.

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

143.*See id.*

risk of bearing the economic responsibility of the defaulting party.[144]

Exchanges amass reserves of funds by collecting fees, assessments, fines, and penalties from members based on capital obligations or regulatory infractions; and exchanges use the funds in reserve accounts to satisfy obligations that arise in the course of their operations.[145] Because exchanges historically have been organized as private associations, trusts, and partnerships, members shared responsibility for the losses related to operational risks.[146] 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 created securities trading conglomerate.[147] And perhaps most interestingly, a number of exchanges have elected to register shares of common stock with the SEC as part of IPOs and distribute these ownership interests to investors in public offerings.[148]

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.[149] 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.[150] In the event that the exchange experiences a liquidity crisis, members commit contribute to capital to preserve the solvency and integrity of the exchange.[151]

144.*See id.*

145.Fox et al., *supra* note , 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].

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

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

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

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

150.*See* Bliss & Steigerwald, *supra* note , at 25.

151.*See id.*

Because exchanges are SROs, the SEC carefully monitors any formal or informal rule-making practices.[152] While securities exchanges enjoy broad rule-making and enforcement authority, their governance and risk-management policies remain subject to the supervision of the SEC.[153] 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.[154]

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 market place or facilities for bringing together purchasers and sellers of securities."[155] 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."[156] The test evaluates whether the entity that facilitates trading performs functions commonly performed by a stock exchange.[157]

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

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

153.*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").

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

155.15 U.S.C. § 78c(a)(1).

156.17 C.F.R. § 240.3b-16(a) (2019).

157.*Id.*; 17 C.F.R. § 240.6a-1(a) (2019).

uses established, nondiscretionary methods to facilitate trading.[158] 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.[159] 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.[160]

In recent years, the origination and trading of cryptocurrency has attracted the attention of investors, regulators, legislators, media, and commentators.[161] With increasing frequency, regulators 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.[162] 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.[163] 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

158.§ 240.3b-16(a).
159.*See id.*
160.*See* 15 U.S.C. § 78e.
161.*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-3L9G]; *Cryptocurrency Comparison*, IG, https://www.ig.com/en/cryptocurrency-trading/ cryptocurrency-comparison [https://perma.cc/P9AL-6C8X] (last visited Feb. 17, 2021).
162.*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].
163.*See supra* note 34 and accompanying text.

liability for failure to register as broker-dealers or exchanges, respectively.[164]

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 the markets for classical securities, such as shares of common stock or corporate bonds, we are only beginning to apply many of these norms, regulations, and economic theories in the markets for cryptocurrency. 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 markes. Proponents praise cryptocurrency initiatives.[165] Skeptics express deep distrust.[166] Illegal Ponzi and pyramid schemes, scams, malfeasance, and misconduct have been all too prevalent in cryptocurrency coin and token offerings.[167] In response, Congress has proposed legislation.[168] Regulators have issued

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164.*See supra* notes 82-85 and accompanying text.

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

166.*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-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].

167.*See, e.g.*, Litigation Release, SEC, Defendant Charged in Fraudulent ICO Ordered to Pay $450,000 (June 23, 2020), https://www.sec.gov/litigation/litreleases/2020/lr24842.htm [https://perma.cc/4P8Z-MT4L]; Litigation Release, SEC, SEC Charges Founder of Purported Blockchain Marketplace for Fraudulent ICO (Jan. 21, 2020), https://www.sec.gov/litigation/ litreleases/2020/lr24723.htm [https://perma.cc/PXE9-MJZ9]; Litigation Release, SEC, SEC Charges Former Bitcoin-Denominated Exchange and Operator with Fraud (Mar. 23, 2018), https://www.sec.gov/litigation/litreleases/2018/lr24078.htm [https://perma.cc/YD4R-FGXK].

168.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/

formal guidance[169] and initiated enforcement actions.[170] State attorneys general have launched investigations.[171]

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 data or transactions can replace the various firms and institutions that intermediate financial market transactions.[172] In some instances, advocates argue, the decentralization of certain financial arrangements may remove the transactions from the ambit of regulatory oversight.[173]

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 capturing the open-source projects and diverting the community-developed technology into private, permissioned blockchains. This Part

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jasonbrett/2020/09/24/two-new-bills-in-congress-offer-clarity-for-blockchain-tokens-and-crypto-exchanges/?sh=1d90ab6f2e00 [https://perma.cc/54YN-69CD].

169.*See, e.g.*, SEC, FRAMEWORK FOR "INVESTMENT CONTRACT" ANALYSIS OF DIGITAL ASSETS (2019), https://www.sec.gov/corpfin/framework-investment-contract-analysis-digital-assets [https://perma.cc/GFG8-2DB9]; Report of Investigations, SEC, Report of Investigation Pursuant to Section 21(a) of the Securities Exchange Act of 1934: The DAO (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/statement-potentially-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].

170.*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].

171.*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].

172.*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].

173.*See infra* note 142 and accompanying text.

explores recently articulated infrastructure-based classifications—centralized and 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, 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.[174] 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.[175] Similar to conventional forms of money or cash, cryptocurrencies enable market participants to purchase or sell valuables or engage in a variety of other financial transactions.[176] Unlike conventional forms of legal tender or fiat, no sovereign government issues or guarantees the value of cryptocurrency.[177] Cryptocurrencies enable parties to transact on

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

175.Public Statement by Jay Clayton, Chairman, SEC, Statement on Cryptocurrencies and Initial Coin Offerings (Dec. 11, 2017), http://www.sec.gov/news/public-statement/statement-clayton-2017-12-11 [https://perma.cc/5Q3C-PKZ7].

176.*Id.*

177.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 Sarah Jane Hughes & Stephen T. Middlebrook, Feature, *Advancing a Framework for Regulating Cryptocurrency Payments Intermediaries*, 32 YALE J. ON REGUL. 495, 504-05 (2015).

peer-to-peer platforms, creating a pathway to transfer value to anyone capable of receiving the value anywhere in the world.[178]

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.[179] The developer outlined an innovative, decentralized protocol or blockchain that facilitated the generation and distribution of the cryptocurrency known as Bitcoin.[180]

Admittedly, this description only reveals 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. A diversity of cryptocurrencies with a wide array of functions have inundated various corners of financial markets. The universe of cryptocurrencies is continually expanding.[181] Today, the classes of cryptocurrency include, among others, a great variety of coins, alt-coins, stablecoins, and tokens.[182] 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.[183]

For financial market regulators, the rapid development of a diverse spectrum of cryptocurrencies poses a notable challenge. U.S. capital 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.[184] Consequently, as described in the previous Part,

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178.Public Statement by Jay Clayton, *supra* note .
179.*See generally* NAKAMOTO, *supra* note .
180.*See id.*
181.*See supra* text accompanying notes 25-27.
182.*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].
183.*See* Bob Mason, *The Next Cryptocurrency Evolution: Countries Issue Their Own Digital Currency*, FXEMPIRE, https://www.fxempire.com/education/article/the-next-cryptocurrency-evolution-countries-issue-their-own-digital-currency-443966 [https://perma.cc/52XZ-LSUQ].
184.*See supra* Part I.A.

determining that an asset is a security subjects the issuer to the registration requirements of Section 5 of the Securities Act.[185] Any subsequent resales of unregistered securities are likely subject to resale limitations,[186] and registered securities are subject to continuous reporting obligations,[187] exchange listing requirements (for sizable offerings),[188] and secondary market transactions restrictions imposed on registered broker-dealers or securities exchanges.[189]

Structuring regulation in this manner yields the many benefits described in the previous Part.[190] Mandatory disclosure may enhance investor protection and economic efficiency;[191] and the philosophy of prioritizing issuer registration of public offerings and registration of broker-dealers and exchanges may promote fair and orderly markets.[192] 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.[193] The diversity of features of cryptocurrencies defies the taxonomy of existing financial products, transactions, and actors.[194] 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

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185.*See supra* notes 120-25 and accompanying text; *see also* 15 U.S.C. § 78l(a).
186.*See* 17 C.F.R. § 230.905 (2019).
187.*See* 15 U.S.C. § 78m.
188.*See* U.S. Securities and Exchange Commission, *Listing Standards*, INVESTOR.GOV, https://www.investor.gov/introduction-investing/investing-basics/glossary/listing-standards [https://perma.cc/846N-9Q55].
189.*See, e.g.*, 15 U.S.C. § 78o.
190.*See supra* Part I.
191.*See supra* notes 53-58 and accompanying text.
192.*See supra* notes 78-93 and accompanying text.
193.*See* M. Todd Henderson & Max Raskin, *A Regulatory Classification of Digital Assets: Toward an Operational* Howey *Test for Crytpocurrencies, 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. 2020, at 29.
194.*See Cryptocurrency Comparison*, *supra* note .

regulation is deeply fragmented.[195] 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.[196] 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.[197] According to cryptocurrency advocates, at best, intermediaries profit richly by extracting fees from the unwary.[198] 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.[199]

In response to concerns, cryptocurrency communities developed the blockchain protocol, a peer-to-peer method of transacting without relying on intermediation.[200] 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.[201] As the Bitcoin white paper and 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 more democratic access to markets for all.[202]

Like with many financial products created in the shadows of existing financial market regulation, questions regarding the

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195.U.S. GOV'T ACCOUNTABILITY OFF., HIGH-RISK SERIES: SUBSTANTIAL EFFORTS NEEDED TO ACHIEVE GREATER PROGRESS ON HIGH-RISK AREAS 91 (2019).
196.*See id.*
197.*See* TAPSCOTT & TAPSCOTT, *supra* note , at 5.
198.*See* Deniz Kahramaner, *The Future of Crypto Trading: Decentralized Exchanges*, MEDIUM (Jan. 4, 2018), https://medium.com/@denizkahramaner/the-future-of-crypto-trading-decentralized-exchanges-20b41a20dd01 [https://perma.cc/F5Q6-RT28].
199.*See* Kahramaner, *supra* note ; *see also* TAPSCOTT & TAPSCOTT, *supra* note , at 5; Dolgopolov, *supra* note , at 86-87.
200.*See* TAPSCOTT & TAPSCOTT, *supra* note , at 4-5.
201.*See id.* at 5.
202.NAKAMOTO, *supra* note ; TAPSCOTT & TAPSCOTT, *supra* note , at 5.

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.[203] 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.[204]

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.[205] 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.[206] 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.[207] Hinman referenced Bitcoin as an example of the kind of open-source protocol that has achieved the requisite on-chain transparency to eliminate the question of whether the coins could be deemed "securities" and subject to securities regulation.[208]

Unfortunately, Hinman's explanation regarding the attributes of a "sufficiently decentralized"[209] protocol raised more questions than it resolved. Some rejoiced, interpreting Hinman's remarks as an acknowledgment that "truly" decentralized platforms would

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203.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").
204.*See, e.g.*, Press Release, N.J. Off. of the Att'y Gen., *supra* note ; Press Release, Md. Off. of the Att'y Gen., *supra* note .
205.*See* Hinman, *supra* note .
206.*Id.*
207.*See id.*
208.*See id.*
209.*Id.*

be beyond the ambit of regulation.[210] Others expressed dismay.[211] 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."[212]

As questions emerged regarding the attributes of decentralization, the SEC and Commodity Future Trading Commission (CFTC) initiated prosecutions alleging that developers violated federal statutes by creating protocols for secondary market trading in securities and commodities markets.[213] 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 the application of liability for developers whose platforms facilitated secondary market trading.[214] As the market for secondary trading platforms continues to grow, the evolution of decentralized 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

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210.*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].

211.*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].

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

213.*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].

214.*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 .

philosophical underpinnings to the recent financial crisis and developers' frustration with the avarice of legacy financial institutions that act as intermediaries.[215] Others suggest that blockchain developers were inspired by anarcho-libertarian philosophy to create an alternative financial system.[216] 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.[217]

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.[218] The ledger would be transparent, revealing verified transactions to anyone who could access the blockchain.[219] The blockchain would be governed democratically by the network or community engaged in the enterprise of creating and sustaining the protocol.[220]

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.[221] Infrastructural challenges have limited many blockchain protocols from executing transactions in a completely transparent manner.[222] While protocol developers' white papers promised transparency, executing transactions "on-chain" proved to be impractical and inefficient.[223] Consequently, developers routed certain aspects of transactions "off-chain" and created procedures for determining

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

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

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

218.Walch, *supra* note , at 844; TAPSCOTT & TAPSCOTT, *supra* note , at 5.

219.Brummer & Yadav, *supra* note , at 266-67; Magnuson, *supra* note , at 1185; TAPSCOTT & TAPSCOTT, *supra* note , at 5.

220.Walch, *supra* note , at 844-45.

221.TAPSCOTT & TAPSCOTT, *supra* note , at 3, 8.

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

223.*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].

which elements of transactions might remain on-chain and which might occur off-chain.[224]

The 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.[225] Financial services firms and entrepreneurs developing financial market transactions on blockchain promptly seized the mantle.[226] Entrepreneurs and financial services firms began adapting digital ledgers, shifting the protocols from permissionless to permissioned, and integrating governance mechanisms.[227] These market participants expressly aim to reintroduce aspects of intermediation that have generated revenues for legacy financial institutions.[228]

While critical questions remained unresolved for developers creating protocols or launching offerings associated with ICOs,[229] the growing market for secondary trading poses marked difficulties for developers seeking to comply with legal standards or create platforms that would not be subject to the registration requirements of the Exchange Act.[230]

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

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

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

226.*See id.*

227.*See id.*

228.*See supra* Part I.A.

229.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 297 and accompanying text.

230.*See, e.g.*, Press Release, SEC.gov, 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/202037 [https://perma.cc/WV3U-LSMU] (describing a run-in between Enigma and the SEC).

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.[231] These platforms are proprietary, permissioned blockchain ledgers that execute transactions using efficient operational procedures that are far from transparent.[232]

Coinbase, Gemini, Bittrex, and Binance are all examples of centralized exchanges.[233] 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.[234]

Centralized exchanges create accounts that store customer funds.[235] The exchanges maintain "hot" wallets connected to the platform's network to facilitate trading.[236] Centralized exchanges generally enable traders to execute, clear, and settle buy/sell orders.[237] As custodians of financial assets, centralized exchanges must comply with state and federal laws relevant to the custody, exchange, and transfer of assets including federal anti-money-laundering and know-your-customer user-verification obligations.[238]

Having abandoned aspects of the public, permissionless blockchain envisioned by early theorists and developers, centralized exchanges relinquished the benefits of transparent, permission-less trading. Incorporating certain aspects of intermediation, these exchanges inherited the attendant

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231.*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].

232.*See* Johnson, *supra* note , at 37-38.

233.*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].

234.Reiff, *supra* note .

235.*Id*.

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

237.*See* Reiff, *supra* note .

238.*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].

operational challenges that have long plagued legacy financial institutions.[239]

First, centralized cryptocurrency exchanges create single points of failure. Centralized exchanges are susceptible to hacks, shutdowns, insider trading, scams, and withdrawal latencies.[240] International media coverage has chronicled the cybersecurity breaches at Mt. Gox, Shapeshift, Bitfinix, Poloniex, QuadrigaCX, and Bithumb.[241] Hackers stole more than $4 billion in cryptocurrencies from centralized exchanges between 2011 and 2017.[242]

Second, similar to legacy exchanges, centralized cryptocurrency exchanges typically charge market participants transaction fees that may include deposit, trading, and withdrawal fees.[243] 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.[244] Settling trades off-chain creates a number of challenges including concerns regarding interoperability and security risks.[245]

In recent years, developers have released white papers and introduced a number of decentralized cryptocurrency exchanges (DEX), peer-to-peer blockchain-based platforms.[246] All transactions are authenticated by the network's community.[247]

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

240.*See* Kahramaner, *supra* note .

241.*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].

242.Johnson, *supra* note , at 37.

243.*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].

244.*See* Frankenfield, *supra* note .

245.*Id.*

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

247.*Id.*

DEX eliminate intermediaries; users execute transactions and store funds and assets in their own wallets, transacting in a genuinely trustless manner.[248] DEX do not maintain custody of traders' assets or wallets.[249] Traders connect hardware wallets or software wallets to the blockchain to execute trading transactions.[250] Depending on the DEX's framework, the trader either stores customer tokens at all times or releases the customer's tokens to the DEX's smart contract until a particular trade is executed and settled.[251]

Because makers and takers act independently of the DEX protocol, the DEX protocol cannot support market orders; however, an application can approximate market orders.[252] DEX traders pay many of the same fees as centralized exchange traders.[253] However, 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 blockchain.[254]

A DEX generally adopts 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 a blockchain.[255] Orders are distributed across the blockchain and the user gives up custody of her tokens to the DEX smart contract.[256] Maintaining an on-chain order book creates notable inefficiencies, imposing high friction costs on market makers and leading to latency that enables

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248.*Id.*
249.*Id.*
250.*See id.*
251.*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-exchange-2cc38054d8bb [https://perma.cc/P9B5-L5B5].
252.WILL WARREN & AMIR BANDEALI, 0X: AN OPEN PROTOCOL FOR DECENTRALIZED EXCHANGE ON THE ETHEREUM BLOCKCHAIN 7-8 (2017), https://0x.org/pdfs/0x_white_paper.pdf [https://perma.cc/ASX2-EBX2].
253.*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].
254.*See What Is Gas?*, ETH GAS STATION (July 31, 2019), https://ethgasstation.info/blog/what-is-gas/ [https://perma.cc/9L6D-DNVV].
255.*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].
256.*See id.*

market participants to engage in predatory trading behavior.[257] Modifying and cancelling trades present significant challenges.[258] Higher trading volumes consume a large amount of network bandwidth.[259]

A second approach involves DEX using off-chain order relay with on-chain settlement. Under this approach, the maker allows the DEX contract to access their token balance.[260] The maker then creates an order specifying a desired exchange rate, expiration time, and cryptographically signs their exchange order with their private key.[261] The order is not broadcast across the blockchain network. The order is sent across a communication medium; relayers, like Relay Radar, are used to find, match, and fill orders as they go across a communication medium.[262] Relayers do not execute trades; rather, relayers recommend a best available price to a taker who then decides whether to take the order.[263] A taker who intercepts the message and decides to fill the order, submits the maker's signed order to the DEX smart contract.[264] The DEX smart contract authenticates the maker's signature, makes sure the order has not expired, verifies that the order has not already been filled, and then transfers the tokens between the maker and the taker settling the exchange on-chain.[265]

DEX provide increased security. Unlike a centralized exchange, a DEX is not a single point of failure and is, therefore, far less

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257.*See id.*
258.*See* Jack Yeu, *Are Decentralized Exchanges Built Equal?*, MEDIUM (Dec. 4, 2019), https://medium.com/switcheo/are-decentralized-exchanges-built-equal-213e70a95a03 [https://perma.cc/5ULL-5UAG].
259.*See id.*
260.*See* Usman Fazil, *Diving Deep into Ox Protocol*, MEDIUM (Apr. 26, 2018), https://medium.com/coinmonks/diving-deep-into-0x-protocol-547efb83ffed [https://perma.cc/3GM7-B576].
261.*See id.*
262.*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].
263.*See* Radar Relay, *RADAR RELAY, The First Open Order Book Relayer, 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-relayer-relaunches-decentralized-exchange-with-a-modern-swap-interface-301056312.html [https://perma.cc/N33M-EDE8].
264.*See* Fazil, *supra* note .
265.*See id.*

susceptible to the various security and risk-management concerns that plague centralized exchanges.[266]

The developing definitions for each of the two classes of exchanges described in this Part may offer a path for governing crypto 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.

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[.]
>
> ... Concerns 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....

266.*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].

> 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 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.[267]

Reflecting on Director Hinman's comments, are decentralized exchanges that execute transactions "on chain" "sufficiently decentralized?"[268] Even if the operational mechanics of these publicly-accessible, permission-less blockchains 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.

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 endemic risks. Within each class of

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267.Cryptopedia Staff, *What is Uniswap? A Breakdown*, CRYPTOPEDIA (Jan. 27, 2021), https://www.gemini.com/cryptopedia/uniswap-decentralized-exchange-crypto-defi [https://perma.cc/PLK9-EN2S].

268.*See supra* note 203 and accompanying text.

risks, there are ancillary concerns that may individually, or in the aggregate, become enterprise risks. Exchanges incur market risk by acquiring securities and maintaining a proprietary portfolio of assets to satisfy orders executed on their platform;[269] 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.[270]

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 brokers-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.[271] 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 for other coins and tokens creating endemic exchange rate risks.[272]

Firms navigate a 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

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269.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].

270.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).

271.See supra notes 110-15 and accompanying text.

272.*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 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.").

at the time—declared bankruptcy.[273] 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.[274]

As financial markets expand to include a greater diversity of intermediaries, the interconnectedness between and among the 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.[275] Thus, the discussion is cursory and developing as the market for cryptocurrencies and secondary trading venues for this asset class mature.

A. Automating Risk in Cryptotrading

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.[276] In a quiet revolution, computer-based trading programs are rapidly replacing human traders.[277] These changes mark the end of the era of specialists

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273.Floyd, *supra* note .
274.*Id.*
275.*See infra* Part III.A.
276.*See* Charles R. Korsmo, *High-Frequency Trading: A Regulatory Strategy*, 48 U. RICHMOND L. REV. 523, 526-28 (2014).
277.*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].

and physical execution of trades on legacy exchanges.[278] Moreover, computer-based trading programs have had a significant impact on the volume and speed of securities market transactions.[279]

Due to the efficiencies and reduced costs, algorithmic trading has seized an increasingly dominant role in financial markets.[280] 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 entering 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.[281]

Today, investors may program trading platforms to execute automated trading strategies.[282] 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.[283] 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.[284] The introduction of artificial intelligence (AI) and algorithmic trading strategies has led to even more sophisticated automated trading programs.[285]

278.*See id.*

279.*See id.*

280.*Id.*

281.*See What Is an Automated Market Maker?*, COINMARKETCAP, https://coinmarketcap.com/alexandria/glossary/automated-market-maker-amm [https://perma.cc/5VH5-RZBD] (last visited Feb. 18, 2021); *The Stockmarket Is Now Run by Computers, Algorithms and Passive Managers*, *supra* note ; RISHI K. NARANG, INSIDE THE BLACK BOX: A SIMPLE GUIDE TO QUANTITATIVE AND HIGH FREQUENCY TRADING 42-45 (2d ed. 2013).

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

283.*See id.*

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

285.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 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/ [http://perma.cc/F7KG-424B]; Devin Soni, *Supervised vs. Unsupervised*

Similarly to legacy securities exchanges, centralized and decentralized exchanges may permit automated or algorithmic trading.[286] 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.[287]

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.[288] Introducing an AMM renders manual order books obsolete and accelerates the execution of trades, making price discovery more efficient and, arguably, more accurate.[289] AMMs also reduce the potential for human error that plague manual order entry.[290] Unfortunately, early AMM systems were also susceptible to manipulation.[291]

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.[292] Developing AMM systems, decentralized exchanges increase transparency and reduce the transaction risks that arise from intermediation.[293] In addition, AMM systems may serve as liquidity pools that may be pre-funded "on-chain."[294] Thus, for decentralized exchanges the users of the exchange may provide the liquidity pool for executing transactions.[295] Users may even earn passive income by providing

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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*.

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

287.*See, e.g.*, Radar Relay, *supra* note .

288.*What is an Automated Market Maker*, *supra* note .

289.*See id.*

290.*See id.*

291.*Id.*

292.*Id.*

293.*See id.*

294.*See id.*

295.*Id.*

the deposits that create the liquidity pool.[296] Uniswap, for example, has implemented an AMM that "allows its users to both supply liquidity to earn passive income or exchange between various assets."[297] As the next Section explains, certain classes of cryptocurrency traders may gain significant benefits as they adopt automated trading strategies in cryptocurrency markets.[298] Others discover that these practices enable sophisticated trading counterparties to target and profit from the trading of less sophisticated market participants.[299]

B. Accelerating Risk in Cryptotrading

The advent of high frequency trading strategies increases the speed for order execution in secondary markets.[300] While there is no universal definition for the specific activities that constitute high frequency trading, theorists and regulators identify several common attributes.[301] As 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 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).[302]

296.*Id.*
297.*Id.*
298.*See infra* Part III.B.
299.*See* Marr, *supra* note ; Soni, *supra* note .
300.*See* Korsmo, *supra* note , 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").
301.There is no formal, universally adopted definition of high frequency trading. *See* SHORTER & MILLER, *supra* note , 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).
302.*Id.*

One might ask what attracts investors to high frequency trading strategies. Coupling algorithmic trading practices with high frequency trading strategies generates significant profits.[303] 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.[304] After submitting the orders, HFT strategists quickly cancel the orders and benefit from the small discrepancies in the prices of the securities from the time of the submission of the orders to the moment when the HFT firm cancels the orders.[305] Estimates report that HFT transactions now account for two-thirds of trading activity in the U.S. financial market.[306] There are several different HFT strategies.[307] Traders who employ HFT strategies successfully reduce latency.[308] HFT strategies that rely on algorithms submit and route trades at exponentially faster speeds than human traders negotiating the purchase or sale of securities

303.*See* SHORTER & MILLER, *supra* note , at 5, 10-11.
304.*See id.*
305.*Id.* at 3609.
306.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.").
307.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 colocation, 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].
308.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 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 ST. L.J. 1457, 1464-69 (2012) (describing various HFT strategies).

on an exchange-trading floor.[309] HFT strategies may execute hundreds of trades in the space of milliseconds or microseconds.[310] Others adopt strategies such as algorithmic trading programs, direct market access, and colocation.[311]

Colocation 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.[312]

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."[313] Gemini, a popular cryptocurrency exchange created in 2014 by Cameron and Tyler Winklevoss, is currently offering colocation to traders operating near its data centers in the New York and Chicago areas.[314]

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

309.*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].

310.*See id.*

311.*See id.*; Korsmo, *supra* note , 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)).

312.*See* PWC, *supra* note , 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.").

313.Anna Baydakova, *High-Frequency Trading Is Newest Battleground in Crypto Exchange Race*, COINDESK (July 8, 2019, 2:00 AM), https://www.coindesk.com/high-frequency-trading-is-new-battleground-in-crypto-exchange-race [https://perma.cc/J5HR-CV2C].

314.*Id.*

> Co-location—where a high frequency trading firm places its computers in the same location that houses an exchange's matching engine, in order to access prices and transact a split second faster—is increasingly common at crypto exchanges. 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.[315]

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 spoofing[316] exacerbates the likelihood that HFT strategies may destabilize highly volatile cryptocurrency secondary markets.

315.Timothy G. Massad, It's Time to Strengthen the Regulation of Crypto-Assets", Economic Studies at Brookings, Mar. 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].

316.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, http://www.efmaefm.org/0EFMAMEETINGS/ 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. FIN., http://www.nyif.com/articles/disruptive-futures-trading-practices-spoofing [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

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.[317] At first, the trader may suffer a small loss, but will then adjust their position and earn a larger profit.[318] 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.[319]

Regulators are concerned that these tactics may also enable insider trading.[320] 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.[321] Such practices would undermine the price discovery and price accuracy processes.[322] 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."[323] 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.[324]

However, the case for better regulation will not appeal to everyone. Many may not applaud regulatory intervention that

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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)).

317.*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).

318.*Id.*

319.*Id.* at 613-14, 622-23. 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.

320.*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 , at 20-21.

321.*See* SHORTER & MILLER, *supra* note , at 41.

322.*Id.* at 8-9.

323.*Id.* at 27.

324.*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].

reduces fraud and manipulation. It is also worth acknowledging that some may reject regulation as inconsistent with the anti-establishment principles that motivate the creation and development of cryptocurrency.[325] Others may be attracted to cryptocurrency secondary markets because they desire to engage in conduct that would be impermissible, inappropriate and possibly illegal in the secondary markets for legacy asset classes.[326]

The operational mechanics of the protocols for decentralized exchanges further exacerbates concerns. Censorship resistance is a key feature of these public, permissionless blockchains.[327] Recall traders executing transactions on decentralized exchanges generally retain custody of their funds.[328] Censorship resistance reinforces the notion that only the accountholder may access any funds or assets that may be used to trade on the exchange.[329] This feature prevents third parties such as financial market intermediaries, banks, or exchanges facilitating secondary market trading from confiscating the assets of platform users.[330]

Incorporating censorship resistance creates latency in cryptocurrency secondary market trading. As noted above, for traders implementing high frequency trading strategies, latency provides opportunities for deploying front-running trading tactics.[331] 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.[332] 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

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325.*See* TAPSCOTT & TAPSCOTT, *supra* note , at 5-6; Walch, *supra* note , at 871.
326.*See supra* note 167 and accompanying text.
327.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].
328.*See supra* notes 156-69 and accompanying text.
329.Younessi, *supra* note .
330.*Id.*
331.*See supra* notes 195a-202 and accompanying text.
332.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].

> 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.[333]

Referring to the Uniswap decentralized exchange, the authors underscore that decentralized exchanges that rely on automated market makers (AMM) for liquidity offer empirical evidence of the proliferation of these practices.[334] 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"[335] however, these platforms may also facilitate unfair trading conduct that undermines the normative ethos of trading markets and undercut blockchain theorists' promises to democratize finance.

C. Cyber-Risks in Cryptotrading

The popularity of trading cryptocurrencies rises in tandem with the number of reported cyberattacks. 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.[336] These incidents have resulted in over $1.63 billion in losses.[337] 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 cyberattack.[338] Unfortunately, for cryptocurrency market

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333.*Id.*
334.*Id.*
335.*See supra* notes 141v-142b and accompanying text.
336.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].
337.*Id.*
338.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].

participants, these losses are not unprecedented.[339] Concerns regarding cybersecurity incidents are mounting, and market participants' fears are seemingly justified.[340]

Cryptocurrency exchanges lack the infrastructure of traditional financial institutions.[341] Without internal governance processes, compliance policies, and risk-management guidelines, cryptocurrency exchanges are more attractive to hackers and more likely to suffer cybersecurity attacks.[342] 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.[343] 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.[344]

Simply stated, centralized exchanges are "vulnerable to attack."[345] 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."[346]

Centralized cryptocurrency exchanges are "like sitting ducks" because cryptocurrency exchanges store currencies for their customers.[347] 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.[348]

339.As noted above, when hundreds of millions of dollars disappeared from Mt. Gox's coffers, the cryptocurrency exchange filed for bankruptcy protection. *Id.*
340.*See* Jolana Kubicek, Complications of Cyptocurrency: Financial and Cybersecurity Risk in the Age of Bitcoin 30 (Apr. 2018) (M.S. dissertation, Utica College) (Proquest).
341.*See id.*
342.*See id.*
343.*Cf. id.* at 15.
344.*Id.* at 30.
345.*Id.* at 57.
346.*Id.* at 58.
347.*See* Russolillo & Jeong, *supra* note .
348.*See id.*

The cold wallet accountholder maintains a private key required to access the cryptocurrency stored in the wallet.[349] The cold wallet is offline when cryptocurrencies are not being transferred (deposited or debited) to and from the wallet.[350] 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.[351] Consequently, cold wallet transactions operate on an inherent delay and internet outages may disrupt access to cold wallets.[352] Accessing a cold wallet may require significant planning and transactions may be delayed up to twenty-four hours.[353] Cold wallet holders also risk the loss of all value in the cold wallet.[354] If cold wallet users cannot authenticate their identification credentials, misplace passwords, or forget the responses to security imposed guardrails, their funds may be lost.[355]

In addition to these losses, there are also privacy concerns resulting from the cybersecurity risks associated with cryptocurrency trading. The transactions occurring on cryptocurrency exchanges are not as anonymous as a customer may believe.[356] For example, "[i]n Bitcoin, the public blockchain reveals all transaction data, to any user connected to the network."[357]

D. Systemic Risk in Cryptotrading

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.

349.*See* Kubicek, *supra* note , at 44-45.
350.*See id.*
351.*Id.* at 45.
352.*Id.*
353.*Id.* at 44-45.
354.*See id.*
355.*Id.*
356.*Id.* at 27.
357.*Id.*

When risks threaten the stability or solvency of an individual firm, the threat is an enterprise risk. An individual firm experiences an enterprise risk-management failure when its adopted practices, processes, or policies fail to prevent harm to customers or substantial losses.[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.[359] 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.[360] A run on the bank, or a wave of panic among investors and depositors that leads them to fear that a traditional depository bank may become insolvent, offers a classic example of a market disruption.[361] When a run on the bank occurs, depositors concerned about the bank's future solvency may demand that the bank return their cash deposits.[362] 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.[363]

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.[364] Systemic risk concerns arise because the banking industry is inextricably interconnected.[365] Traditional commercial banks hold deposit balances for other banks, lend to and borrow from each other, and

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358.*See* Stephen M. Bainbridge, Caremark *and Enterprise Risk Management*, 34 J. CORP. L. 967, 969 (2009).
359.*See* MILTON FRIEDMAN & ANNA JACOBSON SCHWARTZ, A MONETARY HISTORY OF THE UNITED STATES 1867-1960, at 308-09 (1963).
360.*See id.* at 309.
361.*See id.* at 308.
362.*See id.*
363.*Id.*
364.*See* Steven L. Schwarcz, *Systemic Risk*, 97 GEO. L.J. 193, 196 (2008).
365.*Id.* at 199.

make payments to one another through an interbank clearing system.[366]

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."[367] 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.[368]

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.[369] While regulators established these mandates, authorities delegated primary risk-management oversight to market participants.[370] 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.[371]

The failure of a systemically significant firm or the failure of several important firms in rapid succession may create disruption across financial markets.[372] In other words, localized economic shocks have the potential to crescendo into broader systemic

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366.*Id.*

367.*Id.* (quoting George G. Kaufman, *Bank Failures, Systemic Risk, and Bank Regulation*, 16 CATO J. 17, 20-21 (1996)).

368.*Id.* at 202.

369.*Id.* at 210-12.

370.*Id.* at 211.

371.*See id.* at 212 n.105.

372.*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.*

crises.[373] First, a firm's financial integrity and its exposure to the risk of low-probability adverse events may lead to economic shocks.[374] Second, the inter-institutional correlation among financial firms and markets may trigger events that disrupt a local, regional, or national economy.[375]

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;[376] 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.[377] In the years leading up to its solvency crisis, AIG's Financial Products unit had amassed a $450 billion credit derivatives portfolio—an irresponsible bet that nearly caused the firm's collapse.[378] According to Federal Reserve Chair Ben Bernanke, AIG "exploited a huge gap in the regulatory system" and operated as an unregulated hedge fund.[379]

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.[380] 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

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373.*See* Iman Anabtawi & Steven L. Schwarcz, *Regulating Systemic Risk: Towards an Analytical Framework*, 86 NOTRE DAME L. REV. 1349, 1351 (2011).
374.*Id.*
375.*Id.*
376.FED. RSRV. SYS., REGULATORY REFORM: AMERICAN INTERNATIONAL GROUP (AIG), MAIDEN LANE II AND III (2016), https://www.federalreserve.gov/regreform/reform-aig.htm [https://perma.cc/5SGM-6Z56].
377.*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-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.*
378.*See* Zuill & Cooke, *supra* note .
379.*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.).
380.*See* Zuill & Cooke, *supra* note .

protection, its counterparties would have suffered staggering losses and some may have faced their own individual solvency crisis.[381] To avoid this outcome, the Federal Reserve granted AIG access to a $152 billion credit facility.[382] 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.[383]

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 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.[384] 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.[385] For search goods and services, quality can easily be discerned prior to consumption.[386] Financial markets are 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

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381.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/ [https://perma.cc/N9HH-WQ7E].

382.*See id.*

383.*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 Enter. of the H. Comm. on Fin. Servs.*, 111th Cong. 215 (2009) (statement of Scott M. Polakoff, Acting Dir., Off. of Thrift Supervision).

384.*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.

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

386.Phillip Nelson, *Information and Consumer Behavior*, 78 J. POL. ECON. 311, 312 (1970); *see also* Butler & Johnston, *supra* note , at 59.

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.[387] During the recent financial crisis, several of the most storied broker-dealers suffered debilitating losses due to their firms' excessive risk taking or enterprise risk-management failures.[388]

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.[389]

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

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387.*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].

388.*See id.*

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

regarding a pending trade and the execution of the trade.[390] 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.[391] This strategy increases the price of the security at little risk for the high frequency trader.[392]

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: 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 Libra, a managed stablecoin, in 2019 illustrates this drive.[393] During his testimony before Congress, the head of Libra and chief executive officer of Calibra, David Marcus, stated that Libra will democratize finance and increase access to banking for the thirty-three million unbanked and underbanked households in the United States[394] and the 1.7 billion individuals globally who lack access to basic financial services.[395] According to Marcus, Libra 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.[396]

390.*See supra* Part III.B.
391.*See supra* Part III.B.
392.*See supra* Part III.B.
393.*See supra* notes 25-27 and accompanying text.
394.*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].
395.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.").
396.Alex Katsomitros, *Facebook's Foray into Financial Services Is Struggling to Gain Momentum—Here's Why*, WORLD FIN. (Jan. 6, 2020),

While lawmakers and consumer advocates' skeptical response has (temporarily) stymied domestic and international adoption of Libra,[397] 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.[398] In fact, Libra and Facebook Pay mark the fourth and 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 addresses 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. Proposed Reforms

A survey of the proposed regulatory response to fintech's growing significance in financial markets reveals three all-too-common approaches to market regulation. First, disillusioned by dystopian perspectives of the financial services industry, fintech proponents contend that efforts to regulate are a by-product of industry capture. Such proponents demand a laissez-faire approach, and they criticize regulators' irreverent, clumsy, and underinformed interventions.

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https://www.worldfinance.com/special-reports/faebooks-foray-into-financial-services-is-struggling-to-gain-momentum-heres-why [https://perma.cc/RUE7-2ZW8].

397.*See id.*

398.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/PQ7D-GNWH].

According to advocates, regulators may be subject to capture, unduly influenced by the industries that they regulate.[399] In other words, 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.[400] Consequently, capture may lead to policy choices that benefit the industry rather than the public.[401] Examples following the recent financial crisis punctuate these claims.[402] The question is not *which* example but how many examples may be required to prove the point.[403]

Second, 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 ensconces the markets for native tokens.[404] In other words, the horse is out of the gate.

While an express prohibition is unlikely, through public guidance and its enforcement actions, 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 that any cryptocurrencies for which the economic realities of the issuer-investor dynamic are analogous to those of traditional

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399.*See* Victor Fleischer, *Regulatory Arbitrage*, 89 TEX. L. REV. 227, 283-84 (2010).
400.*See id.*
401.*See id.*
402.*See id.* at 283-85.
403.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).
404.*See supra* Part II.

securities—stocks or bonds—are subject to federal securities laws.[405]

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 of 1933 (Securities Act) to ICOs issued by decentralized, autonomous organizations.[406] 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.[407] 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 statute.[408] 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."[409] Unsurprisingly, blockchain-based coin and token offerings are not expressly listed among the enumerated examples of "securities" in Section 2(a)(1).[410] However, alongside the enumerated examples of asset classes commonly referred to as securities, Congress curiously included, but did not define, a catch-all term: "investment contract."[411]

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."[412] 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 solely from the entrepreneurial or managerial efforts of others.[413]

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

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405.Henderson & Raskin, *supra* note , at 455.
406.DAO Report, *supra* note , at 1-2.
407.Securities Act of 1933 § 5, 15 U.S.C. § 77e(a).
408.Securities Act of 1933 § 2, 15 U.S.C. § 77b(a)(1).
409.*See id.*
410.*Id.*
411.*Id.*
412.328 U.S. 293, 298-99 (1946).
413.*Id.* at 301.

contracts" and therefore "securities" subject to the registration requirements established under Section 5 of the Securities Act.[414]

Second, a marked uptick in SEC enforcement actions buttresses the agency's proclamation regarding cryptocurrencies.[415] Unless an exemption applies, failure to register an offering of financial products that bear the attributes of the instruments enumerated in the definition of a "security" triggers strict liability under Sections 5(a) and (c)[416] and a host of remedies, including an investor's right to rescind her purchase under Section 12.[417] In recent enforcement actions against cryptocurrency broker-dealers and exchanges, the SEC has reiterated this perspective.[418]

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.[419] 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.[420]

Moreover, the DAO Report announces the application of federal securities laws, yet fails to address concerns regarding the application of the standard.[421] Specifically, the DAO Report does not explain which attributes of a cryptocurrency offering satisfy the final two elements of the *Howey* test.[422] I 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

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414.*See* DAO Report, *supra* note , at 10-11.
415.*See, e.g.*, Munchee Inc., Securities Act Release No. 10445, 2017 WL 10605969, at 2 (Dec. 11, 2017).
416.15 U.S.C. § 77e(a), (c).
417.*Id.* § 77l.
418.*See, e.g.*, Munchee Inc., Securities Act Release No. 10445 at 2, 10.
419.*See* 15 U.S.C. § 77e (describing liability for failure to register product as a "security").
420.*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).
421.*See* DAO Report, *supra* note , at 1-2.
422.*See id.* at 11-12.

cryptocurrencies.[423] Cryptocurrencies pool investors' money, establishing the horizontal or vertical commonality required under *Howey* and its progeny.[424] Thus, liability for ICO issuers rests on whether there is evidence of investors' reasonable expectation of profits derived predominantly from the managerial efforts of others.[425] Reasonable minds may disagree regarding the evidence that satisfies these final elements in the standard.[426]

As market participants and regulators observe, the operational mechanics of different coins and tokens create noteworthy variations among cryptocurrencies.[427] 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.[428] Moreover, market participants are indignant as continued guidance, court decisions, and subsequent enforcement actions reflect inaccuracies regarding how cryptocurrencies operate,[429] conflicting suggestions regarding the structures that satisfy the final elements of the *Howey* standard, and muddled or incomplete information

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423.*See id.* at 11.

424.*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).

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

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

427.*See generally Cryptocurrency Comparison*, *supra* note .

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

429.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 (E.D. Tex. Sept. 18, 2014) (No. 4:13-CV-416).

regarding what triggers liability in secondary market transactions.[430]

Reflecting on Facebook's Libra, Katharina Pistor poignantly observed during congressional hearings that "[e]xisting experience with attempts to regulate cryptocurrencies suggests that regulating Libra with the tools currently available would not be easy and might even be impossible."[431]

Finally, moderate commentators acknowledge the perils of an unregulated cryptocurrency market and the challenges of applying existing regulation to cryptocurrency markets.[432] In a diverse set of proposals that all encourage light touch regulation, proponents encourage various intermediate approaches to regulation, including allowing cryptocurrency market participants to qualify for offering and secondary market trading exemptions[433] or creating regulatory sandboxes to permit regulators to engage in regulatory experimentation.[434]

B. Regulating Risk in Primary and Secondary Cryptocurrency Markets

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).[435] Creators posit that transforming cryptocurrencies or digital gold[436] into these types of assets expands the ecosystem of financial products, platforms, and services, enhances price discovery and liquidity, and mitigates volatility.[437] Yet, recent

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430.*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].

431.Statement of Katharina Pistor, *supra* note , at 9.

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

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

434.Allen, *supra* note , at 580-81.

435.*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).

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

437.*See* Horch, *supra* note (describing ETFs as "typically low cost, low risk" funds).

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.[438]

Similar to the creation of cryptocurrencies, crypto-exchanges, and clearinghouses, cryptocurrency ETFs present a notable challenge for federal financial markets regulators.[439] Financial markets statutes and regulations expressly establish transaction-centered mandates for federal regulatory agencies.[440] These mandates apply to specific transactions with the understanding that regulators exercise authority over the regulation of certain classes of entities, financial products, and transactions.[441] New classes of cryptoassets, however, may be fluid and defy this transaction-based regulatory approach.[442]

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.[443] Espousing a transaction-based approach in a market where financial products are rapidly evolving fails to acknowledge the threats that lurk in these shadow markets.[444]

Additionally, contentious conflicts regarding jurisdiction create frictions in the relationships among regulators in this regulatory framework.[445] Territorial disputes among regulators and posturing may impede the development of universally adopted terminology and parallel regulation that provide certainty and clarity regarding the application of federal regulation and,

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438.*See* MARIA DEMERTZIS & GUNTRRAM 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].

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

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

441.*See id.*

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

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

444.*See* Fleischer, *supra* note , 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").

445.*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].

perhaps more importantly, liability.[446] Regulators fiercely defend the scope of their authority and aggressively dissuade incursions.[447] As described below, regulatory competition can undermine regulators' efforts to achieve the normative goals that motivate financial market regulation.[448]

To enhance regulatory oversight of cryptocurrency exchange 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 regulations imposed by the Commodity Futures Trading Commission (CFTC) under the CEA adopted by Congress in 1936.[449] 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.[450] Under such a coordinated approach, each regulator, empowered by one of the several statutes in the patchwork of laws that governs financial markets to regulate an aspect of cryptocurrency markets, would proceed according to its mandate.[451] Even operating within this coordinated regulatory scheme, the ethos and regulatory culture of each agency will

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446.*See id.*

447.*See id.*; *see also* MARCELO REZENDE, FED. RSRV. BD., THE EFFECTS OF BANK CHARTER SWITCHING ON SUPERVISORY RATINGS 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").

448.*See infra* Part V.B.

449.*See* U.S. COMMODITY FUTURES TRADING COMM'N, CFTC BACKGROUNDER 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 BACKGROUNDER].

450.*See Commission Rulemaking Explained*, *supra* note .

451.*Cf.* Shelagh Dolan, *How the Laws and Regulations Affecting Blockchain Technology and Crypocurrencies, Like Bitcoin, Can Impact Its Adoption*, BUS. INSIDER (Mar. 3, 2020, 12:20 PM), https://businessinsider.com/blockchain-cryptocurrency-regulations-us-global [https://perma.cc/36GU-X5JN] (describing state agencies empowered by law to regulate cryptocurrency).

characterize and 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.[452] By imposing a single, uniform, principles-based regulation across asset classes, self-designation fills this 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.[453] Acknowledging that fragmented regulatory oversight may invite market participants to engage in opportunistic behavior, Congress orchestrated regulatory intervention in the shadow markets that parallel traditional markets.[454] To this end, Congress created the Financial Stability Oversight Council (FSOC).[455]

452.Macroprudential policies mitigate the herding associated with prudential policies. S*ee supra* notes 252-58. 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-macroprdential-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.*

453.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.).

454.*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].

455.*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 ST. L.J. 1087,

The FSOC creates a forum for the senior regulatory officials of the most significant financial markets regulators to act as a super regulator.[456] 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 correlations among asset classes or the interconnectedness among systemically significant financial institutions.[457] Led by the U.S. Department of the Treasury, the FSOC has ten voting members and five nonvoting members.[458] The voting members include the Chairpersons of the SEC, the CFTC, and the Federal Reserve.[459]

Congress established the FSOC with supervisory authority and a mandate to mitigate systemic risk concerns.[460] Yet, the FSOC's 2019 annual report mentions Bitcoin in passing but does not reference cryptocurrency, virtual currency, initial coin offerings, or cryptocurrency exchanges.[461] 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

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1088-89 (2015) (arguing that the FSOC should be made a more effective financial regulator by making it less susceptible to politics).

456.*See* FSOC 2019 ANN. REP. i, https://home.treasury.gov/system/files/261/FSOC2019AnnualReport.pdf [https://perma.cc/H7S9-PZ4A].

457.*Id.*

458.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
- 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.*

459.*See id.*

460.*See id.*

461.*See id.* at 96.

financial system posed by new and emerging uses of digital assets and distributed ledger technologies."[462]

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.[463] Specifically, the FSOC can orchestrate a coordinated effort among regulatory agencies to initiate development of the self-designation policy. Given the unlikelihood that the senior statesmen regulators who serve as voting members of the FSOC would facilitate the drafting and implementation process, this Article proposes the creation of a Financial Services Office of Innovation (FSOI).

Each federal regulator would create an FSOI or indicate an existing authority among its offices and divisions that would act as the FSOI equivalent.[464] Among other mandates, the FSOI would develop a self-designation form that would permit a cryptocurrency primary and secondary market participant to affirmatively represent the financial market regulator the firm believes should supervise its activities. Self-designation would not limit market participants to designating one regulator; however, the process should require market participants to signal which regulator they believe ought to be the primary regulator of their activities.

Submission of a self-designation form would not be determinative. Based on procedures developed collaboratively by the FSOI offices, the market participant's self-designation process 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

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462.*Id.* at 7.

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

464.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).

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 time to course correct before distribution of the cryptocurrencies. 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 compliments the SEC's no action letter policies.[465] Regulators may adopt policies that permit applications to remain under review and not publicly released for some minimum period while the submission is under consideration or in the event that resubmission is required. In the event that the self-designation applies to a public offering and the SEC is concerned about alerting the public, there are other tools in the SEC's toolbox to address these concerns. Self-designation must also facilitate the process for platforms that seek to operate as regulated entities. For example, agencies must clearly indicate a pathway for a platform that indicates its intentions to register as a broker-dealer and become a member of an SRO, such as the Financial Industry Regulatory Authority (FINRA).[466]

How should regulators address a market participant that rejects the notion that it is subject to the regulatory oversight of any federal regulatory agency? In such an instance, assuming American investors access the platform, 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.

465.*See No Action Letters*, SEC (Mar. 23, 2017), https://www.sec.gov/fast-answers/answersnoactionhtm.html [https://perma.cc/K2U3-MY4W].

466.*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).

C. A Cautionary Tale

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.[467] A board of trade is an organized exchange or other trading facility.[468] Once designated as a contract market, the board of trade becomes a registered entity under the SEC.[469]

The CEA permits DCMs to list a new contract for trading a commodity or derivative upon the DCM by providing the SEC with either (1) a written certification that the new contract complies with the CEA and CFTC regulations (self-certification), or (2) a request that the SEC grant approval to the new contract (prior approval).[470] If the DCM elects to self-certify the new contract, the submission to the SEC 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 CFTC regulations found in 17 C.F.R. § 38.[471] Absent a finding by the SEC "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."[472] There is no statutory or regulatory requirement that DCMs receive public input from market participants for product self-certifications.[473] DCMs must, however, "establish, monitor, and enforce compliance" with CFTC rules and other federal financial markets regulation.[474]

Recent activity in the Bitcoin futures market illustrates the use of the self-certification process. On December 1, 2017, the Chicago Mercantile Exchange Inc. (CME) and the CBOE Futures

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467.7 U.S.C. § 7(d)(1)(A)(i)-(ii).
468.*See id.* § 1a(6).
469.*See id.* § 1a(40).
470.*Id.* § 7a-2(c)(1), (4); *see also* CFTC BACKGROUNDER, *supra* note .
471.17 C.F.R. § 40.2(a)(3) (2019).
472.CFTC BACKGROUNDER, *supra* note ; *see also* 17 C.F.R. § 40.2(a)(2).
473.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/7CVD-KWPJ].
474.7 U.S.C. § 7(d)(2).

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.[475] 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.[476]

CME, CFE, Cantor Exchange, and Nadex filed self-certifications with the SEC as DCMs.[477] 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."[478]

As described below in Part V, the road to self-certification for commodities market participants and regulators was not at all smooth. 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.[479]

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

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475.CFTC BACKGROUNDER, *supra* note .

476.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].

477.CFTC BACKGROUNDER, *supra* note ; *see* WALSH, *supra* note , at 7-8.

478.CFTC BACKGROUNDER, *supra* note .

479.*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).

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."[480] The self-designation process may prove equally valuable for regulators across the financial markets ecosystem.

V. BENEFITS AND LIMITATIONS OF SELF-DESIGNATION

The self-designation process outlined in Part IV creates a collaborative regulatory dialectic 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 cybersecurity threats and predatory trading practices.

Admittedly, self-certification processes rely heavily on market participants' willingness to align themselves with regulatory norms and goals.[481] This approach is, in essence, a self-regulatory approach, and self-regulation is not a panacea.[482] 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

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480.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].

481.*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).

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

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.

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. Similarly, greater access to information better positions regulators to identify and monitor misconduct, including market manipulation, through prohibited trading practices such as wash trades. Regulators' ability to police trading markets for disconcerting automated or HFT practices 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.[483] 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.[484]

483.*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].

484.*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].

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 became increasingly concerned and critical of the self-certification process.[485]

In an open letter to CFTC Chairman J. Chistopher 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."[486] 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."[487] On a similar note, Kristen Walters of BlackRock "suggested a more formal review was appropriate given the 'extreme volatility' of cryptocurrencies."[488]

In response to the criticism, Commissioner Giancarlo acknowledged the CFTC's needed a "heightened review" of compliance by the DCMs with core principles.[489] 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.[490] These measures may enable the CFTC to gain better insights into the U.S. Bitcoin futures market and enable the

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485.*See id.*

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

487.*Id.*

488.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].

489.*See* Giancarlo, *supra* note .

490.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].

CFTC to better detect and pursue bad actors.[491] In addition, Commissioner Giancarlo explained that DCMs must disclose "what steps they have taken in their capacity as self-regulatory organizations to gather and accommodate appropriate input from concerned parties."[492]

These regulatory, administrative, and operational challenges are disturbing. They are not, however, surprising. The Bitcoin futures market is indisputably in its infancy.[493] These types of limitations of the self-certification process are sharpest at the inception of the market for a financial transaction or asset class.[494] 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.[495] 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.[496] 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."[497] The product self-certification process has served the markets for decades and will likely continue to do so.[498]

Addressing the procedural concerns described above requires resources available to any administrative agency and, if the development of the self-designation process involves

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491.*Id.*

492.Giancarlo, *supra* note .

493.*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].

494.*See supra* notes 27-29.

495.*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].

496.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].

497.Giancarlo, *supra* note .

498.*See id.*

representatives of multiple agencies, it is all the more likely that the procedural elements adopted will facilitate efficient, frictionless registration. There are, however, three endemic limitations identified below that may prove difficult to address.

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Victor Fleischer identifies one endemic concern that will challenge regulators in cryptocurrency markets for many years to come—regulatory arbitrage.[499] 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."[500] When legal definitions fail to "track the underlying economic relationship between the parties, gaps arise," creating an invitation for opportunistic behavior.[501]

As discussed above, Facebook and other cryptocurrency originators aspire to introduce financial services and products that displace legacy financial intermediaries.[502] 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 regulators eliminates the costs of complying with state or federal law.[503]

The securities and commodities market regulatory regimes impose significant, extensive, and onerous legal obligations 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.[504] Uber paid their underwriters—Morgan Stanley,

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499.*See* Fleischer, *supra* note , at 227.
500.*See id.* at 243.
501.*See id.*; *see also* Partnoy, *supra* note , at 219 n.48.
502.*See supra* notes 25-27.
503.*See* DEMERTZIS & WOLFF, *supra* note , at 8.
504.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].

Goldman Sachs, and Bank of America Merrill Lynch among others—over $100 million in fees for facilitating their offering.[505] This figure fails to capture the costs that issuers incur beyond fees paid to professional services providers.[506]

An interesting literature explores the debate regarding the value of cost-benefit analysis in financial regulation.[507] 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. Finally, as noted above in Part III, enterprise and systemic risk-management failures may create costs that market participants externalize.[508] Notably, cryptocurrency platforms not affiliated with regulated banking entities may lack any form of deposit insurance protection.[509] 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.

As Rory Van Loo explains, regulatory competition creates consumer protection and systemic risk concerns.[510] 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."[511]

505.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].

506.Christensen, *supra* note .

507.*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).

508.*See supra* Part III.D.

509.*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].

510.Van Loo, *supra* note , at 232.

511.*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.[512]

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,[513] 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 protection. These challenges grow in tandem with the increasing size and scope of cryptocurrency markets. Although federal regulators' preliminary market guidance and

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512.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].

513.*See generally* TAPSCOTT & TAPSCOTT, *supra* note .

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, such as their incorporation of centralized cryptocurrency clearing practices, regarding their operations. 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 practice guidance. Each of these policy changes is necessary to protect investors, promote fairness and efficiency, and ensure market stability.