Winter 2021

Blockchain Neutrality

Samuel N. Weinstein
Benjamin N. Cardozo School of Law, samuel.weinstein@yu.edu

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Samuel N. Weinstein[*]

Blockchain technology is transforming how markets work. Blockchains eliminate the need for trusted gatekeepers like banks to execute, verify, and record transactions. In the financial markets, their disruptive potential threatens both Wall Street banks and Silicon Valley venture capitalists. How blockchain technology is regulated will determine whether it encourages or inhibits competition. Some blockchain applications present serious fraud and systemic risks, complicating regulation. This Article explores the antitrust and competition policy challenges blockchain presents and proposes a regulatory strategy, modeled on Internet regulation and net neutrality principles, to unlock blockchain's competitive potential. It contends that financial regulators should promote blockchain competition—and the resulting market decentralization—except in cases where specific applications are shown to harm consumers or threaten systemic safety. Regulators also should ensure open access and non-discrimination on dominant blockchain networks. This approach will not only serve traditional antitrust goals of lowering prices and promoting innovation, but it also might achieve broader economic and social reform by reducing the power and influence of the biggest financial institutions.

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[*] Associate Professor of Law, Benjamin N. Cardozo School of Law. The author would like to thank Daniel Awrey, Christopher Buccafusco, Eric Chaffee, Stacey Dogan, Joan Heminway, Michael Herz, Kristin Johnson, Kate Levine, Michael Pollack, Carla Reyes, Thibault Schrepel, Jeanne Schroeder, Matthew Seligman, Matthew Wansley, Ramsi Woodcock, and Aaron Wright for their insightful comments and suggestions. The Article also benefitted from helpful comments from participants at the Boston University Cyber Alliance Seminar; the 2019 University of Richmond School of Law Junior Faculty Forum; the 2019 National Business Law Scholars Conference at the University of California, Berkeley; and the 2019 Governing Innovation and Emerging Technology in Finance Writing Workshop and Roundtable at the University of California, Berkeley.

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I. INTRODUCTION

Blockchain technology has been touted as the next transformational innovation of the computer age.[1] The idea behind blockchain is simple, but it has far-reaching implications. Blockchains are distributed ledgers—decentralized databases that allow communities of users to execute, verify, and permanently record transactions using their own computers.[2] These networks are consensus-driven; community consent is required to change a ledger.[3] Once a transaction is recorded in a block of data and added

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[1] *See, e.g.*, U.S. COMMODITY FUTURES TRADING COMM'N, TECHNOLOGY ADVISORY COMMITTEE MEETING 42 (Feb. 14, 2018) [hereinafter CFTC TAC MEETING] (statement of Charley Cooper), https://www.cftc.gov/sites/default/files/2018-07/tac_021418_transcript_1.pdf ("[T]he potential impacts of [blockchain] technology in financial services . . . [are] massive. This isn't a software update on a smartphone, right? . . . This frankly goes to the very way in which capital markets operate."); DIRECTORATE FOR FIN. & ENTER. AFFAIRS COMPETITION COMM., ORG. FOR ECON. COOPERATION & DEV., BLOCKCHAIN TECHNOLOGY AND COMPETITION POLICY—ISSUES PAPER BY THE SECRETARIAT 3 (2018) [hereinafter OECD BLOCKCHAIN AND COMPETITION], https://one.oecd.org/document/DAF/COMP/WD(2018)47/en/pdf ("[Blockchain] technology can work for almost every type of transaction involving value, including money, goods and property. Its potential uses are almost limitless . . . ."); Makan Delrahim, Assistant Att'y Gen., Antirust Div., U.S. Dep't of Justice, Never Break the Chain: Pursuing Antifragility in Antitrust Enforcement (Aug. 27, 2020), https://www.justice.gov/opa/speech/assistant-attorney-general-makan-delrahim-delivers-remarks-thirteenth-annual-conference ("Blockchain is a 'general purpose technology' whose applications have the potential to transform the entire economy."); Kage Spatz, *Eight Ways Blockchain Will Impact the World Beyond Cryptocurrency*, FORBES: YEC (Mar. 9, 2018, 9:00 AM), https://www.forbes.com/sites/theyec/2018/03/09/eight-ways-blockchain-will-impact-the-world-beyond-cryptocurrency/ ("From banking and secure communications to healthcare and ride-sharing, blockchain will have a huge impact on our future."); Don Tapscott & Rik Kirkland, *How Blockchains Could Change the World*, MCKINSEY & COMPANY (May 6, 2016), https://www.mckinsey.com/industries/technology-media-and-telecommunications/our-insights/how-blockchains-could-change-the-world ("According to Tapscott Group CEO Don Tapscott, blockchains . . . could revolutionize the world economy.").

[2] *See* Jonathan Rohr & Aaron Wright, *Blockchain-Based Token Sales, Initial Coin Offerings, and the Democratization of Public Capital Markets*, 70 HASTINGS L.J. 463, 469 (2019) ("At their core, blockchains are decentralized databases maintained by a network of computers. . . . [B]lockchains store tamper-resistant, resilient, and authenticated data, enabling users to engage in pseudonymous transactions."); Kevin Werbach, *Trust, but Verify: Why the Blockchain Needs the Law*, 33 BERKELEY TECH. L.J. 487, 500 (2018) ("A blockchain is a kind of distributed ledger. It is 'distributed' in that there is no master copy." (footnote omitted)).

[3] *See* Werbach, *supra* note 2, at 500–04 (explaining the role consensus plays in blockchains).

to a chain, altering that transaction record is difficult.[4] As a result, blockchain could, in principle, reduce or eliminate the need for central "gatekeepers" to provide trusted sources of transactional verification and support.[5] To many proponents, this feature is blockchain's greatest potential benefit.[6] Rather than requiring a government to supply currency, a title company to insure and record title to real estate, or a Wall Street bank to provide trusted exchange and clearing solutions for equities or derivatives trades, these services could be furnished by a decentralized, blockchain-based network run by its users.[7]

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[4] Rohr & Wright, *supra* note 2, at 471 ("[B]lockchain-based consensus mechanisms make adding information to a blockchain purposefully difficult and even harder to remove once saved, creating data that is hard to alter once stored.").

[5] *See, e.g.*, Delrahim, *supra* note 1 ("The potential of blockchain is the ability to operate a marketplace or network without a centralized intermediary."); Steve Ranger, *Blockchain Won't Save the World, but Might Make It a Better Place*, ZDNET (June 1, 2018, 2:55 PM), https://www.zdnet.com/article/blockchain-wont-save-the-world-but-might-make-it-a-better-place (noting that blockchain "[e]nthusiasts" argue that the technology "could replace existing gatekeepers—banks, governments or any other authority—with a peer-to-peer network of trust where actions are transparent and visible to all").

[6] *See, e.g.*, Ranger, *supra* note 5 (describing blockchain's "utopian streak" and noting advocates' belief that, by replacing "existing gatekeepers," blockchain could "usher[] in a crypto-anarchist utopia"); Wilma Woo, *'Crypto's Benefit Is Fewer Gatekeepers': Rockefeller Empire Gets into Bitcoin*, BITCOINIST (Apr. 8, 2018, 10:30 AM), https://bitcoinist.com/rockefeller-empire-buy-cryptocurrency/ (quoting venture capitalist David Pakman as saying, "[g]atekeepers tend to charge rent or toll on users, . . . [t]he benefit of the advent of crypto is that we have fewer gatekeepers").

[7] For example, bitcoin and other cryptocurrencies are blockchain-based alternatives to fiat currencies. *See, e.g.*, Clem Chambers, *Crypto Is Replacing Fiat Currency in Troubled Countries*, FORBES (Aug. 5, 2019, 10:38 AM), https://www.forbes.com/sites/investor/2019/08/05/crypto-is-replacing-fiat-currency-in-troubled-countries/ (discussing the possibility that bitcoin will replace fiat currencies). Blockchain-based real estate title solutions also are in the works. A company called Propy has partnered with the city of South Burlington, Vermont to create a property-deed registration system based on blockchain. Ivan Kv, *What Is Blockchain Deed Registration in Real Estate?*, PROPY (June 13, 2019), https://propy.com/blog/what-is-blockchain-deed-registration-in-real-estate/ ("With Propy's assistance, the city will be able to scan, cryptographically secure, and store deeds on the Ethereum blockchain."). And a firm called Level01 has launched a blockchain-based derivatives exchange. *See Soft Launch in Hong Kong*, LEVEL01 (July 19, 2018), https://level01.io/2018/07/19/level01-derivatives-exchange-soft-launch-hong-kong/ (recounting a statement from the firm's CEO that he envisions "a Derivatives Exchange for traders and investors that is completely fair, transparent and trustworthy[] by using Blockchain").

Blockchain's use is already becoming widespread. Bitcoin, perhaps the best known blockchain application, is surging;[8] blockchain-based token sales, including initial coin offerings (ICOs) and initial exchange offerings (IEOs), have raised billions of dollars for companies over the past few years;[9] and the world's largest provider of derivatives processing services is moving trillions of dollars of transactions onto a new blockchain-based system.[10] A 2018 PricewaterhouseCoopers survey of 600 executives found that 84% of their firms had some form of blockchain initiative underway.[11]

Broad adoption of blockchain technology may have enormous economic, social, and political ramifications. Entrenched institutions whose power and position are based on providing trusted goods or services might see their roles undermined or fundamentally altered. Governments may discover that blockchain-based Bitcoin or JPM Coin[12] competes effectively with their currencies, and banks may find that many of their trust-based services, such as equities and derivatives dealing, are no longer

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[8] *See, e.g.*, Billy Bambrough, *Bitcoin Is Still Climbing: Is This Time Different?*, FORBES (June 26, 2019, 1:18 AM), https://www.forbes.com/sites/billybambrough/2019/06/26/bitcoin-is-this-time-different/ (noting that bitcoin prices and adoption are increasing); Jeff John Roberts, *The Blockchain Industry Faces a Moment of Truth as High-Profile Projects Go Live*, FORTUNE (Oct. 21, 2020, 10:30 AM), https://fortune.com/2020/10/21/blockchain-industry-new-businesses-polkadot-dfinity-filecoin/ (noting that Bitcoin has been "enjoy[ing] another boom" and "everyone from Square to Harvard University has been investing in it").

[9] *See* Paul P. Momtaz, *Initial Coin Offerings*, PLOS ONE (May 21, 2020), https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0233018 (stating that ICOs raised over $27 billion through the end of 2019); John Slyusarev, *Analytical Report: IEOs in 2019-2020*, COINMARKETCAP BLOG (Apr. 15, 2020), https://blog.coinmarketcap.com/2020/04/15/analytical-report-ieos-in-2019-2020/ (reporting that IEOs raised a total of $1.7 billion in 2019).

[10] *See* Michael del Castillo, *$11 Trillion Bet: DTCC to Process Derivatives with Blockchain Tech*, COINDESK, https://www.coindesk.com/11-trillion-bet-dtcc-clear-derivatives-blockchain-tech (last updated Dec. 21, 2017) (stating that the Depository Trust & Clearing Corporation (DTCC) will "mov[e] $11tn worth of credit derivatives to a custom distributed ledger").

[11] STEVE DAVIS, HENRI ARSLANIAN, DICK FONG, ANDREW WATKINS, WILLIAM GEE & CHUN YIN CHEUNG, PWC, PWC'S GLOBAL BLOCKCHAIN SURVEY 2018, at 1 (2018), https://www.pwccn.com/en/research-and-insights/publications/global-blockchain-survey-2018/global-blockchain-survey-2018-report.pdf.

[12] J.P. Morgan recently created JPM Coin, a blockchain-based payment system that allows users to "make instantaneous payments." *J.P. Morgan Creates Digital Coin for Payments*, J.P. MORGAN (Feb. 14, 2019), https://www.jpmorgan.com/global/news/digital-coin-payments.

needed. Blockchain promises to usher in changes that could be as sweeping as those the Internet has wrought over the past few decades. Just as Internet-based businesses disrupted long-established industries—travel, publishing, retail, and music and video distribution, to name a few—blockchain may render obsolete whole categories of firms and business models.

The changes promise to be particularly significant in the financial-services sector. Blockchain-based capital markets threaten Wall Street banks' and Silicon Valley venture capitalists' (VCs) market dominance. Equities and derivatives trading and clearing platforms based on blockchain may reduce the role of traditional dealers and big banks in these markets. Significant parts of Wall Street's and Silicon Valley's long-standing business models are at risk.[13]

Although blockchain has significant procompetitive potential, certain blockchain applications also pose serious fraud and systemic risks. Many ICOs have turned out to be fraudulent,[14] and decentralized financial-products trading will make regulators' task of tracking and mitigating systemic risks more difficult. Blockchain's ultimate impact in the financial markets—and in the broad range of other markets it might remake—will depend in large part on governments' competition policy responses.[15] Will regulators create the conditions for blockchain-based businesses to transform markets, as they did for the Internet in the past quarter century, or will they disfavor these new business models to protect gatekeeper institutions? To answer this question, financial regulators must weigh blockchain's potential for increasing competition against its very real risks; so far, they are erring on the side of risk prevention.[16]

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[13] *See infra* Section II.B.

[14] *See, e.g.*, SATIS GROUP, CRYPTOASSET MARKET COVERAGE INITIATION: NETWORK CREATION 24–25 (2018), https://research.bloomberg.com/pub/res/d28giW28tf6G7T_Wr77aU0gDgFQ (finding that "as a percentage of the total number of ICOs . . . approximately 78% of ICO's were Identified Scams," although "as a percentage of the US dollars raised to-date . . . only [about 11%] of ICO funding went to Identified Scams").

[15] *Cf.* Delrahim, *supra* note 1 ("[I]t is of utmost importance that we prevent competitive abuses in markets where blockchain may offer consumers and businesses lower cost or higher value options.").

[16] For example, the Securities and Exchange Commission has actively policed blockchain-related fraud and enforced securities registration requirements against initial coin offerings.

This Article argues that emerging blockchain-based financial-services networks offer a rare chance to make the financial sector less concentrated, more competitive, and more democratic. Financial regulators are uncertain stewards for this type of transformation. If the regulatory agencies maintain their narrow focus on fraud prevention and systemic-risk management, they may miss a significant opportunity to help modernize the markets they oversee. Instead, they should seek ways to promote the increased competition that blockchain technology promises to create.

To meet this challenge, this Article proposes a regulatory strategy, modeled on early Internet regulation, to unlock blockchain's competitive potential while mitigating the risk of fraud. It contends that regulators should promote vigorous blockchain competition—and the resulting market decentralization—except in cases where specific applications are shown to harm consumers or threaten systemic safety. To safeguard the full flowering of blockchain competition, regulators also should ensure open access and non-discrimination on dominant blockchain networks. This strategy will serve traditional antitrust goals of lowering prices, increasing output, and promoting innovation,[17] while also potentially achieving broader economic and social ends by reducing the power and influence of the biggest financial institutions. These institutions, especially Wall Street banks, have exercised control over financial-services markets for some time.[18]

See, e.g., Press Release, U.S. Sec. & Exch. Comm'n, SEC Charges Founder, Digital-Asset Issuer with Fraudulent ICO (Dec. 11, 2019), https://www.sec.gov/news/press-release/2019-259 (announcing charges against an entrepreneur for conducting a fraudulent initial coin offering that raised more than $42 million); Jay Clayton & J. Christopher Giancarlo, Opinion, *Regulators Are Looking at Cryptocurrency*, WALL ST. J. (Jan. 24, 2018, 6:26 PM), https://www.wsj.com/articles/regulators-are-looking-at-cryptocurrency-1516836363 (discussing a statement from the chairmen of the SEC and CFTC explaining that the SEC "is devoting a significant portion of its resources to the ICO market" and that "the SEC has made it clear that federal securities laws apply regardless of whether the offered security . . . is labeled a 'coin' or 'utility token'").

[17] *See Guide to Antitrust Laws*, FED. TRADE COMM'N, https://www.ftc.gov/tips-advice/competition-guidance/guide-antitrust-laws (last visited Feb. 6, 2021) (stating that the antitrust laws "promote vigorous competition," which "gives consumers . . . the benefits of lower prices, higher quality products and services, more choices, and greater innovation").

[18] *See, e.g.*, Martin Arnold, *How US Banks Took over the Financial World*, FIN. TIMES (Sept. 16, 2018), https://www.ft.com/content/6d9ba066-9eee-11e8-85da-eeb7a9ce36e4 ("Wall

Access to capital is dominated by leading Wall Street firms and Silicon Valley VCs; Wall Street also controls most financial products trading.[19] Blockchain-based networks offer the opportunity to release this stranglehold, giving individuals and firms more freedom about how they consume financial services. This shift might serve distributive goals, too. Availability of financial services historically has been limited by class and race.[20] By providing widely accessible competitive alternatives to traditional banks and VCs, public blockchain-based networks could broaden opportunities for individuals and firms from diverse backgrounds to raise capital and enter the financial markets.

A burgeoning body of legal scholarship has documented the spread and implications of blockchain, addressing how the technology works and its potential to upend various markets.[21]

Street's top groups . . . [have] establish[ed] a seemingly unshakeable dominance in global corporate and investment banking.").

[19] *See, e.g.*, Christine Hurt, *Initial Public Offerings and the Failed Promise of Disintermediation*, 2 ENTREPRENEURIAL BUS. L.J. 703, 705 (2008) ("A small number of investment banks and the underwriters and brokers they employ act as intermediaries that distribute and market [initial public] offerings for a substantial fee."); Ethan Mollick, Swept Away by the Crowd? Crowdfunding, Venture Capital, and the Selection of Entrepreneurs 4 (Mar. 25, 2013) (unpublished manuscript), https://ssrn.com/abstract=2239204 ("For at least a quarter century, technology entrepreneurship has . . . been defined by the Silicon Valley model . . . . In that model, venture capital firms serve as a key actor, and are often considered to be the most important actors in the system outside of the entrepreneurs themselves." (citations omitted)).

[20] *See, e.g.*, Adam Gordon, Note, *The Creation of Homeownership: How New Deal Changes in Banking Regulation Simultaneously Made Homeownership Accessible to Whites and Out of Reach for Blacks*, 115 YALE L.J. 186, 189, 209 (2005) (demonstrating that the Federal Housing Authority's mortgage insurance program "systematically discriminated against African-Americans" resulting in "much lower rates of lending to nonwhites than to whites"); Lynnise E. Phillips Pantin, *The Wealth Gap and the Racial Disparities in the Startup Ecosystem*, 62 ST. LOUIS U. L.J. 419, 442 (2018) ("[A]s a practical matter, startup funding almost exclusively goes to White men." (footnote omitted)).

[21] *See, e.g.*, PRIMAVERA DE FILIPPI & AARON WRIGHT, BLOCKCHAIN AND THE LAW: THE RULE OF CODE 2–9 (2018) (describing blockchain technology, its applications, and the legal challenges it poses); Marc Pilkington, *Blockchain Technology: Principles and Applications*, *in* RESEARCH HANDBOOK ON DIGITAL TRANSFORMATIONS 225, 225–53 (F. Xavier Olleros & Majlinda Zhegu eds., 2016) (describing blockchain technology and its applications); Lin William Cong & Zhiguo He, Blockchain Disruption and Smart Contracts 20–31 (Dec. 27, 2018) (unpublished manuscript) (on file with author), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2985764 (analyzing blockchain's impact on competition and industrial organization); Aaron Wright & Primavera De Filippi,

Much of that scholarship has focused on the financial markets, especially the development of cryptocurrencies.[22] A handful of scholars have addressed the regulatory challenges blockchain presents, including in the financial services sector,[23] but this literature is still in its infancy. This is particularly true for antitrust and competition scholarship, which is especially sparse.[24] This Article addresses that gap in the blockchain literature.

Decentralized Blockchain Technology and the Rise of *Lex Cryptographia* 4–8, 18–24 (Mar. 10, 2015) (unpublished manuscript), http://ssrn.com/abstract=2580664 (describing blockchain technology and analyzing its effect on centralized authorities).

[22] *See, e.g.*, Shaanan Cohney, David Hoffman, Jeremy Sklaroff & David Wishnick, *Coin-Operated Capitalism*, 119 COLUM. L. REV. 591, 634–58 (2019) (surveying the fifty ICOs that raised the most money in 2017 and analyzing the relationship between the promises the promoters of those ICOs made and the characteristics of the digital assets they ultimately delivered); Ryan Surujnath, Note, *Off the Chain! A Guide to Blockchain Derivatives Markets and the Implications on Systemic Risk*, 22 FORDHAM J. CORP. & FIN. L. 257, 279–84 (2017) (analyzing use of blockchain technology in derivatives markets); Lawrence J. Trautman, *Is Disruptive Blockchain Technology the Future of Financial Services?*, 69 CONSUMER FIN. L.Q. REP. 232, 240 (2016) (analyzing use of blockchain technology in financial-services markets).

[23] *See, e.g.*, Cohney et al., *supra* note 22, at 646–60 (discussing whether regulation of ICOs would be beneficial); Rohr & Wright, *supra* note 2 (advocating for increased certainty regarding regulation of utility tokens in the United States); Werbach, *supra* note 2, at 520 ("Regulators around the world need to consider how to draw lines around token offerings that protect investors without chilling innovation."); Hossein Kakavand, Nicolette Kost De Sevres & Bart Chilton, The Blockchain Revolution: An Analysis of Regulation and Technology Related to Distributed Ledger Technologies 20–24 (Jan. 1, 2017) (unpublished manuscript), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2849251 (surveying financial regulators' approach to blockchain applications in Europe and the United States).

[24] *See* Konstantinos Stylianou, *What Can the First Blockchain Antitrust Case Teach Us About the Crypto-Economy?*, JOLT: DIGEST (Apr. 26, 2019), https://jolt.law.harvard.edu/digest/what-can-the-first-blockchain-antitrust-case-teach-us-about-the-crypto-economy ("Of all the areas blockchain has made headlines in, antitrust has ranked fairly low."). For examples of blockchain-related antitrust scholarship, see Thibault Schrepel, *Is Blockchain the Death of Antitrust Law? The Blockchain Antitrust Paradox*, 3 GEO. L. TECH. REV. 281 (2019) (describing challenges blockchain poses for antitrust analysis and enforcement and proposing reforms to ameliorate those challenges); Ai Deng, Smart Contracts and Blockchains: Steroid for Collusion? 4 (Sept. 11, 2018) (unpublished manuscript), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3187010 (analyzing whether the use of smart contracts on blockchains will facilitate collusion, especially among members of blockchain consortia); Stephan U. Breu, Blockchains and Cybercurrencies Challenging Antitrust and Competition Law 6 (Dec. 1, 2017) (unpublished manuscript), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3081914 (discussing the challenges blockchain technology creates for antitrust and competition laws). There is less scholarship on blockchain's ramifications for competition policy. *See* Ioannis Lianos, *Blockchain*

In doing so, the Article draws a distinction between *antitrust* and *competition policy*. The former term is used here to refer to enforcement of federal and state antitrust statutes, particularly the Sherman and Clayton Acts.[25] This Article treats the latter term as a broader concept encompassing not only decisions about antitrust enforcement priorities, but a wider set of choices made by Congress, the executive branch, sector regulators, and state and local governments that establish the terms on which competition takes place in various markets.[26] It argues that concerns among some scholars and practitioners that blockchain threatens effective antitrust enforcement are premature.[27] Despite the technology's disruptive nature, the substantive antitrust challenges blockchain poses are not novel and can be addressed using current law and enforcement strategies. Indeed, the transparency blockchain offers may simplify discovery and prosecution of antitrust violations. Rather than locating and sifting through hundreds of thousands of documents to prove a price-fixing conspiracy, enforcers may find the relevant evidence permanently recorded on a cartel's blockchain. The ability of blockchain users to mask their identities by employing pseudonyms may raise some technical enforcement challenges, but

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Competition: Gaining Competitive Advantage in the Digital Economy—Competition Law Implications, *in* REGULATING BLOCKCHAIN: TECHNO-SOCIAL AND LEGAL CHALLENGES 329, 332 (Philipp Hacker et al. eds., 2019) (noting that blockchain's competition policy implications are underexplored).

[25] These statutes prohibit certain anticompetitive agreements between firms, conduct that unlawfully creates or maintains a monopoly, and mergers whose effect "may be substantially to lessen competition, or to tend to create a monopoly." *See* 15 U.S.C. § 1 (2018) (prohibiting agreements "in restraint of trade or commerce"); *id.* § 2 (prohibiting monopolization); *id.* § 18 (prohibiting anticompetitive mergers).

[26] The Telecommunications Act of 1996 is an example of competition policy. Pub. L. 104-104, 110 Stat. 56 (codified as amended in scattered sections of 47 U.S.C.). By requiring local telephone monopolists to share their networks with new competitors, the Act aimed to maximize certain forms of telecommunications competition. *See* AT&T Corp. v. Iowa Utils. Bd., 525 U.S. 366, 371 (1999) (stating that the Telecommunications Act subjected incumbent local exchange carriers "to a host of duties intended to facilitate market entry").

[27] *See, e.g.*, Schrepel, *supra* note 24, at 335 ("In the face of blockchain, current antitrust law may well be eliminated.").

pseudonymity does not guarantee anonymity.[28] Violators typically can be identified, and remedies can attach.[29]

In contrast, this Article contends that blockchain presents new and difficult competition policy issues that will require innovative regulatory solutions. Because blockchain-related technologies have applications across industries, multiple regulators may be positioned to make blockchain competition policy. Even if the details differ between regulatory regimes, the question these regulators will face should be similar: how to manage markets where incumbents are under attack by new competitors using blockchain-based systems to decentralize and deconcentrate industries. Agencies charged with developing blockchain-related competition policy must grapple with at least three fundamental challenges: (1) balancing the benefits of the increased competition that blockchain networks will make possible against concerns for marketplace and consumer safety; (2) determining how much market decentralization to promote or tolerate; and (3) deciding whether and how to promote standardization, open-access, and non-discrimination requirements on blockchain networks.

This Article focuses on the financial-services industry, where blockchain-based technologies might fundamentally alter the way business is conducted. Cryptocurrencies like Bitcoin are the leading edge of this transformation, but they likely are just the first step in remaking the financial sector. Bigger changes may be coming in capital markets and equities and derivatives trading. Blockchain technologies are enabling firms to raise significant amounts of capital directly from the public. Several companies already have

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[28] *See* Joseph Bonneau & Steven Goldfeder, *Five Myths About Bitcoin*, WASH. POST (Dec. 15, 2017), https://www.washingtonpost.com/outlook/five-myths/five-myths-about-bitcoin/2017/12/15/7a506742-e044-11e7-8679-a9728984779c_story.html ("[T]he vast majority of bitcoin users don't get significantly more privacy than they would with traditional bank transfers . . . because it's possible to link a user's pseudonyms together by studying patterns in the blockchain.").

[29] *See, e.g.*, Tom Robinson, *Bitcoin Is Not Anonymous*, RESPUBLICA: THE DISRAELI ROOM (Mar. 24, 2015), https://www.respublica.org.uk/disraeli-room-post/2015/03/24/bitcoin-is-not-anonymous/ (describing how prosecutors successfully linked pseudonymous bitcoin transactions to Ross Ulbricht, who had been accused of owning and operating Silk Road, an online marketplace engaged in various illegal activities). Robinson explained that Bitcoin is "pseudonymous rather than anonymous" and that "in many cases identities can be linked to bitcoin addresses." *Id.*

used ICOs to raise over $100 million each,[30] more than an average initial public offering (IPO) raises, and, in 2019, companies used blockchain-based IEOs to raise $1.7 billion.[31] These new funding models might endanger traditional sources of capital formation: if businesses can use token sales to raise public money directly, fewer reasons exist to pay VCs and Wall Street for these services. Blockchains are also being used to build equities and derivatives trading and clearing platforms that can reduce or eliminate the need for traditional dealers and big banks in these markets.[32] These platforms allow individual users to trade directly with one another from their personal terminals.[33]

Together, these blockchain-based services potentially could compete for large chunks of incumbent financial institutions' most profitable businesses. This development could have significant economic and social consequences. The financial services sector represents seven percent of U.S. GDP,[34] and Wall Street banks—for many decades—have been among the most important private

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[30] Olga Kharif, *How's that ICO Working Out?*, BLOOMBERG BUSINESSWEEK (Dec. 14, 2018, 5:00 AM), https://www.bloomberg.com/news/articles/2018-12-14/crypto-s-15-biggest-icos-by-the-numbers (listing the biggest ICOs from recent years, including eleven that raised between $153 million and $4.2 billion).

[31] Slyusarev, *supra* note 9 (describing IEO fundraising).

[32] *See, e.g.*, Alexander Osipovich, *Blockchain Makes Inroads into the Stock Market's $1 Trillion Plumbing System*, WALL ST. J. (Nov. 7, 2019, 8:00 AM), https://www.wsj.com/articles/blockchain-makes-inroads-into-the-stock-markets-1-trillion-plumbing-system-11573131600 (describing Paxos, a blockchain-based equities trade-settlement and clearing platform); *Soft Launch in Hong Kong*, *supra* note 7 (describing launch of Level01, a blockchain-based derivatives exchange).

[33] *See, e.g.*, LEVEL01, WHITE PAPER 4 (2018), https://level01.io/wp-content/uploads/2018/06/level01_whitepaper_final1-2.pdf ("Level01 allows users to trade options contracts directly with one another peer-to-peer (P2P) without the need for an intermediary broker . . .").

[34] *See Financial Services Spotlight: The Financial Services Industry in the United States*, SELECTUSA, https://www.selectusa.gov/financial-services-industry-united-states (last visited Feb. 8, 2020) ("In 2018, finance and insurance represented 7.4 percent (or $1.5 trillion) of U.S. gross domestic product."). A broader standard definition of the financial sector—which includes finance, insurance, and real estate (dubbed "FIRE")—represents closer to twenty percent of U.S. GDP. *See* Christopher Witko, *How Wall Street Became a Big Chunk of the U.S. Economy – and When the Democrats Signed on*, WASH. POST: MONKEY CAGE (Mar. 29, 2016, 12:00 PM), https://www.washingtonpost.com/news/monkey-cage/wp/2016/03/29/how-wall-street-became-a-big-chunk-of-the-u-s-economy-and-when-the-democrats-signed-on/ ("(FIRE) sector now accounts for 20 percent of GDP . . . .").

institutions in the country.[35] The outsized profits these institutions garner have played a role in the nation's growing income inequality,[36] and their gatekeeper function has limited which firms can raise money and who can trade in financial products. Blockchain-based networks offer the opportunity to reshape this financial-services landscape.

Because they oversee financial markets—including capital markets and equities and derivatives trading—sector regulators, especially the Securities and Exchange Commission (SEC) and the Commodity Futures Trading Commission (CFTC), likely will play a significant role in determining whether blockchain realizes its transformative potential. In doing so, they must determine how to balance enhanced blockchain competition against marketplace and consumer safety, how to manage market decentralization, and whether to promote standardization, open-access, and non-discrimination on blockchain networks.

Of these issues, perhaps the most pressing is how to weigh the prospects for increased blockchain-related competition and its many benefits against threats to consumer safety and systemic soundness arising from blockchain networks. In antitrust cases, agencies and courts typically reject safety-related justifications for competition restrictions.[37] Sector regulators view this balance differently.

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[35] *See, e.g.*, John Cassidy, *What Good Is Wall Street?*, THE NEW YORKER (Nov. 22, 2010), https://www.newyorker.com/magazine/2010/11/29/what-good-is-wall-street ("Even after [the 2008 financial crisis], there is a tendency in Congress and the White House to defer to Wall Street because what happens there . . . is essential to the country's prosperity.").

[36] *See* Ken-Hou Lin & Donald Tomaskovic-Devey, *Financialization and U.S. Income Inequality, 1970–2008*, 118 AM. J. SOC. 1284, 1285 (2013) (asserting that financialization is "a critical institutional mechanism encouraging the post-1970s surge in U.S. income inequality").

[37] *See, e.g.*, FTC v. Ind. Fed'n of Dentists, 476 U.S. 447, 462–64 (1986) (holding that the Federation's policy requiring members to deny insurers' requests for dental x-rays violated section 1 of the Sherman Act and section 5 of the Federal Trade Commission Act and rejecting the Federation's argument that the restraint was lawful under the rule of reason because it was designed to protect patients from being deprived of adequate dental care); Nat'l Soc'y of Prof'l Eng'rs v. United States, 435 U.S. 679, 693–95 (1978) (rejecting defendant's proffered safety justification for its ban on competitive bidding and stating that defendant's attempt to justify the ban "on the basis of the potential threat that competition poses to the public safety and the ethics of its profession is nothing less than a frontal assault on the basic policy of the Sherman Act").

Despite statutory mandates to promote competition,[38] the SEC and CFTC strongly favor consumer safety and systemic risk prevention over competition concerns.[39] These agencies have been active in the blockchain space, especially with regard to ICOs and cryptocurrencies.[40] Considering their regulatory priorities, it is unsurprising that the agencies' focus to date has been on fraud prevention and classification and registration of financial products and entities.[41] Less attention is being paid to broader competition

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[38] *See, e.g.*, 7 U.S.C. § 19(a)(1)–(2) (2018) ("Before promulgating a regulation . . . or issuing an order," the CFTC "shall consider the costs and benefits" of its action, including "considerations of the efficiency, competitiveness, and financial integrity of futures markets."); 15 U.S.C. § 77b(b) (2018) ("Whenever pursuant to [the Securities Act of 1933] the [SEC] is engaged in rulemaking and is required to consider or determine whether an action is necessary or appropriate in the public interest, the Commission shall also consider, in addition to the protection of investors, whether the action will promote efficiency, competition, and capital formation."); *id.* § 78w(a)(2) ("[The SEC] and the Secretary of the Treasury, in making rules and regulations . . . shall consider among other matters the impact [they] would have on competition. The [SEC] and the Secretary of the Treasury shall not adopt any such rule or regulation which would impose a burden on competition not necessary or appropriate in furtherance of the purposes of this chapter.").

[39] *See, e.g.*, Robert J. Jackson, Jr., Comm'r, U.S. Sec. & Exch. Comm'n, Competition: The Forgotten Fourth Pillar of the SEC's Mission (Oct. 11, 2018), http://www.sec.gov/news/speech/speech-jackson-101118 (observing that that the SEC has "forgotten a crucial part of [its] mission: to pursue the kind of vigorous competition that American investors deserve").

[40] *See, e.g.*, Press Release, U.S. Sec. & Exch. Comm'n, SEC Charges Orchestrator of Cryptocurrency Scheme Ensnaring Physicians (Feb. 11, 2020), https://www.sec.gov/news/press-release/2020-32 (announcing the SEC's charges against an individual who allegedly perpetrated a "digital asset scheme that defrauded approximately 150 investors"); Press Release, U.S. Sec. & Exch. Comm'n, SEC Obtains Emergency Order Halting Fraudulent Coin Offering Scheme (May 29, 2018), https://www.sec.gov/news/press-release/2018-94 (announcing a court order halting ICO fraud involving Titanium Blockchain Infrastructure Services); Press Release, U.S. Sec. & Exch. Comm'n, SEC Halts Fraudulent Scheme Involving Unregistered ICO (Apr. 2, 2018), https://www.sec.gov/news/press-release/2018-53 (announcing charges against the co-founders of Centra Tech., Inc. for perpetrating a fraudulent ICO that raised over $32 million).

[41] *See, e.g.*, sources cited *supra* note 40; Clayton & Giancarlo, *supra* note 16 (statement by the chairmen of the SEC and CFTC advising that those agencies "along with other federal and state regulators and criminal authorities, will continue to work together to bring transparency and integrity to these markets and, importantly, to deter and prosecute fraud and abuse"). Clayton and Giancarlo also warned "market participants, including lawyers, trading venues and financial services firms" not to "elevate form over substance" in deciding whether to register coins or utility tokens as regulated securities. *Id.*

issues. This approach is not balanced; it tilts heavily toward harm prevention.

This Article argues that sector regulators should promote the increased competition that blockchain-based networks make possible, rather than focusing solely on the need to ameliorate the potential systemic risk and fraud-related harms those networks may engender. FCC regulation of the telephony system and, later, the Internet provides a useful model for the financial regulatory agencies in this regard. Net neutrality rules and earlier FCC regulations struck a balance between promoting innovation and competition and protecting the public from unsafe practices.[42] These rules prohibited networks from discriminating against downstream competitors except when their applications were harmful or fraudulent.[43] A similar approach makes sense for the SEC and CFTC as they grapple with emerging blockchain-related competition-policy issues. In general, the agencies should think systematically about how to encourage blockchain-based competition. A narrow focus on fraud and registration requirements misses the forest for the trees.

Market decentralization poses related but distinct challenges for regulators. Among blockchain's most lauded attributes is its potential to democratize and decentralize markets.[44] In theory, blockchain technology offers the possibility for markets to become more competitive by reducing the power of gatekeeper firms—

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[42] *See infra* notes 222–226 and accompanying text.

[43] *See, e.g.*, Protecting and Promoting the Open Internet, 30 FCC Rcd. 5601, 5622 (2015) (explaining that the Open Internet Order's restrictions on Internet service providers blocking or discriminating against certain content and applications were "subject to an exception for 'reasonable network management,' allowing service providers the freedom to address legitimate needs such as avoiding network congestion and combating harmful or illegal content"); Tim Wu, *Network Neutrality, Broadband Discrimination*, 2 J. ON TELECOMM. & HIGH TECH. L. 141, 169 (2003) (advocating for "the practice of requiring public harm to justify" "discrimination against certain content and applications" in the "broadband context").

[44] *See, e.g.*, Yan Chen, *Blockchain Tokens and the Potential Democratization of Entrepreneurship and Innovation*, 61 BUS. HORIZONS 567, 573–74 (2018) (arguing that blockchain tokens might democratize access to capital and investment opportunities, potentially reshaping the entrepreneurship and innovation landscape); Dave Roos, *Here's How Blockchain Will Eliminate Banks and Democratize Money*, SEEKER (Jan. 25, 2017, 2:44 PM), https://www.seeker.com/how-blockchain-will-eliminate-banks-and-democratize-money-2214709749.html (describing blockchain's potential to "permanently disrupt the way we think about money").

including platform companies—and by creating the potential for new competitors to emerge. This decentralization may have non-economic benefits too, including spreading opportunity beyond elite institutions and offering market access to underserved populations. But decentralization also raises challenges for regulators. The more decentralized a market becomes, the more problematic it is for regulators to monitor market participants.[45] In financial markets, decentralization can create significant difficulties. One only has to recall the role derivatives products played in the 2008 financial crisis to be reminded of the risks posed by widespread, unregulated financial contracts. Presently, the CFTC and SEC can monitor much of the world's riskiest financial activity by keeping tabs on the largest regulated banks.[46] Decentralization through blockchain will likely complicate that task and may compromise consumer safety and systemic stability.

Nonetheless, because the benefits of decentralization in the financial markets may be significant, this Article argues that regulators should resist the temptation to implement policies that favor incumbent big banks simply because they are already heavily regulated. Instead, the agencies should promote decentralization while developing ways to address the safety and fraud threats it poses. The use of regulatory nodes on private (permissioned) blockchain networks, which grant the agencies direct access to all the information on a blockchain, may be one way to achieve this goal.[47]

The third key competition policy challenge blockchain technologies raise for regulators is how to handle standardization, open-access, and non-discrimination issues on blockchain networks.

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[45] William Magnuson, *Regulating Fintech*, 71 VAND. L. REV. 1167, 1205 ("[D]ecentralization serves as a barrier to effective monitoring.").

[46] *See id.* ("[R]egardless of what we may think about the success of financial regulators in reining in the behavior of large financial institutions since the financial crisis, regulators at least benefit from the fact that the relevant players are readily identifiable and their behaviors are subject to extensive disclosure requirements.").

[47] Regulatory or supervisory nodes are access points from which regulators can observe all transactions recorded on a blockchain. The Federal Reserve Bank of Boston has stated its intention to study the use of supervisory nodes on financial-services blockchain networks. FED. RESERVE BANK OF BOS., BEYOND THEORY: GETTING PRACTICAL WITH BLOCKCHAIN 19–20 (2019), https://www.bostonfed.org/publications/fintech/beyond-theory-getting-practical-with-blockchain.aspx.

These issues might arise in a variety of ways. To the extent that permissioned blockchains become necessary to compete in certain markets, firms controlling those networks might discriminate against rivals and otherwise harm competition. Or public (permissionless) blockchain networks might institute rules favoring execution of certain transactions over other transactions. Intellectual property rights and standard setting also could play a key role in how blockchain-based competition develops. Blockchain-related patent holders could use their rights strategically to limit competition and establish (or retain) market power. Anticompetitive abuses of the standard-setting process for blockchain technologies is also a risk.

To maximize blockchain-based competition, this Article contends that regulators (or, if necessary, Congress) should require or encourage open blockchain standards and mandate that dominant blockchain networks offer open and non-discriminatory access to users who meet reasonable and fair membership criteria. Like net-neutrality rules for the Internet (before they were overturned),[48] this approach will increase competition and innovation on blockchain networks and make it more difficult for the big banks that currently dominate financial services to continue to do so.[49]

Having analyzed the foundational competition-policy issues blockchain presents, this Article applies those general principles to four specific blockchain competition problems that have arisen or likely will arise in financial markets: "paid prioritization" (accepting compensation to provide faster service to certain customers on the blockchain, thereby disfavoring competitors); the spread of blockchain-based derivatives trading and clearing; the use of token sales to raise capital; and the anticompetitive abuse of blockchain-related intellectual property rights and standards.

The remainder of the Article is organized in four Parts. Part II describes blockchain technology generally and explains its uses in financial-services markets. Part III analyzes the antitrust risks blockchain technology raises and argues that, despite the new

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[48] *See* Restoring Internet Freedom, 33 FCC Rcd. 311, 312 (2018) (overturning the FCC's 2015 Open Internet Order, which had codified net neutrality rules).

[49] *See, e.g.*, Wu, *supra* note 43, at 142 (asserting that net neutrality's goal is to "preserv[e] a Darwinian competition among every conceivable use of the Internet so that . . . only the best survive").

technological setting, concerns that such risks exceed the bounds of current antitrust doctrine or the capabilities of the antitrust enforcement agencies are premature. Part IV describes the competition policy challenges blockchain networks pose and proposes an analytical theory for addressing these challenges. Part V applies this theory of blockchain competition policy to four key issues that have arisen or are likely to emerge in the financial-services sector.

II. BLOCKCHAIN TECHNOLOGY AND ITS APPLICATIONS IN FINANCIAL MARKETS

While most commonly associated with Bitcoin and other cryptocurrencies, blockchain technology has potentially broad applications across industries. This Part explains blockchain's general functions and features and describes its uses in financial markets. In particular, it details blockchain's potential impact on capital markets and financial-products trading and clearing. It also explores the effects blockchain competition might have on incumbent financial institutions.

A. WHAT IS BLOCKCHAIN TECHNOLOGY?

Blockchains (or distributed ledgers) are decentralized databases that allow communities of users to make permanent records of transactions using their own devices.[50] No central gatekeeper determines whether alterations can be made to a blockchain; changes are made by user consensus.[51] As a result, once a transaction is recorded in a block of data added to the chain, altering that transaction record is difficult.[52] In the case of Bitcoin, a user would have to control over fifty percent of the Bitcoin network's

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[50] *See* Rohr & Wright, *supra* note 2, at 469–70 (describing fundamental characteristics of blockchains); Werbach, *supra* note 2, at 499–500 (describing blockchains as distributed ledgers).

[51] *See* Werbach, *supra* note 2, at 500–04 (explaining the role consensus plays in blockchains).

[52] *See* Rohr & Wright, *supra* note 2, at 471 ("[B]lockchain-based consensus mechanisms make adding information to a blockchain purposefully difficult and even harder to remove once saved, creating data that is hard to alter once stored.").

computing power to change a transaction record.[53] Blocks become increasingly secure as time passes and as additional blocks are added to the chain, because changing an earlier block would require changing all subsequent blocks.[54] Blockchains can be public (permissionless) or private (permissioned). The former are open to anyone (Bitcoin is an example), while members may limit access to the latter.

Blockchains often rely on "smart contracts" to facilitate transactions. Smart contracts are pieces of computer code that execute agreements automatically when pre-set conditions are fulfilled.[55] For example, a smart contract could be created to transfer title to an asset when a set amount of money is deposited in an account. Smart contracts can be stored on blockchains, ensuring that their terms are securely recorded and remain difficult to change.

The scope of applications for blockchain technology is broad.[56] It can be used to record title to real estate more efficiently,[57] create

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[53] A "51 percent attack" could occur if a user or group of users controlling a majority of network computing power leveraged that control to change a transaction history and stop new transactions from being confirmed. *See Glossary*, BITCOINDEVELOPER, https://developer.bitcoin.org/glossary.html (last visited Feb. 8, 2021) (defining a 51 percent attack).

[54] *See Frequently Asked Questions*, BITCOIN, https://bitcoin.org/en/faq (last visited Feb. 8, 2021) ("For new transactions to be confirmed, they need to be included in a block along with a mathematical proof of work. . . . The proof of work is also designed to depend on the previous block to force a chronological order in the block chain. This makes it exponentially difficult to reverse previous transactions because this requires the recalculation of the proofs of work of all the subsequent blocks.").

[55] Computer scientist Nick Szabo is credited with introducing the idea of smart contracts. He described them as "computerized transaction protocol[s] that execute[] the terms of a contract." Nick Szabo, *Smart Contracts*, UNIVERSITEIT VAN AMSTERDAM (1994), http://www.fon.hum.uva.nl/rob/Courses/InformationInSpeech/CDROM/Literature/LOTwinterschool2006/szabo.best.vwh.net/smart.contracts.html. "The general objectives of smart contract design," Szabo asserted, "are to satisfy common contractual conditions (such as payment terms, liens, confidentiality, and even enforcement), minimize exceptions both malicious and accidental, and minimize the need for trusted intermediaries. Related economic goals include lowering fraud loss, arbitration and enforcement costs, and other transaction costs." *Id.*

[56] *See supra* note 1.

[57] *See, e.g.*, J. MICHAEL GRAGLIA & CHRISTOPHER MELLON, BLOCKCHAIN AND PROPERTY IN 2018: AT THE END OF THE BEGINNING 2 (2018), https://www.newamerica.org/documents/2121/Graglia_Mellon_blockchain.pdf (making a

more secure voting systems,[58] more reliably authenticate people's identities,[59] better maintain healthcare records,[60] and reduce fraud.[61] At present, however, many of the most developed uses for blockchain are in the financial markets.

B. BLOCKCHAIN'S USE IN FINANCIAL MARKETS

Blockchain adoption promises to have a significant impact on how financial markets function. Currently, its best-known application is as the architecture supporting cryptocurrencies like Bitcoin and Ethereum. But cryptocurrencies likely are just the tip of the iceberg. This Section will address two other areas where blockchain will change how financial markets operate: capital formation and financial products trading. Blockchain is being used to create potent new ways to raise capital, through token sales like ICOs and IEOs.[62] These mechanisms threaten traditional funding

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"broad case as to why blockchain makes sense for real estate"); Marc Shaw, *Will the Power of Blockchain Mean the End of Title Insurance Companies in 20 Years?*, FORBES (June 22, 2018, 8:30 AM), https://www.forbes.com/sites/forbesrealestatecouncil/2018/06/22/will-the-power-of-blockchain-mean-the-end-of-title-insurance-companies-in-20-years/ ("Blockchain technology will certainly eliminate most fraud and tampering that exists with ownership records located at a county clerk's office and convert land records to a distributed ledger.").

[58] Frances Katz, *Can Blockchain Fix America's Voting System?*, THE WEEK (July 17, 2018), https://theweek.com/articles/762519/blockchain-fix-americas-voting-system (arguing that one way to "rebuild trust in the American voting system . . . is through blockchain").

[59] *See, e.g.*, ORI JACOBOVITZ, BLOCKCHAIN FOR IDENTITY MANAGEMENT 2 (2016), https://www.cs.bgu.ac.il/~frankel/TechnicalReports/2016/16-02.pdf (contending that blockchain technology offers a solution to the problem of digital identity verification, allowing consumers to "login and verify payments without having to enter any of the traditional username and password information").

[60] *See, e.g.*, Shelby Livingston, *Will Blockchain Save the Healthcare System?*, MODERN HEALTHCARE (Feb. 9, 2019, 12:00 AM), https://www.modernhealthcare.com/article/20190209/TRANSFORMATION02/190209953/will-blockchain-save-the-healthcare-system (describing prospects for achieving the "holy grail for blockchain in healthcare—creating complete and portable medical records that connect all the disparate pieces in a patient's health history").

[61] *See, e.g.*, Daniel Newman, *3 Ways Blockchain Can Help Combat Fraud*, FORBES (Apr. 17, 2018, 9:14 AM), https://www.forbes.com/sites/danielnewman/2018/04/17/3-ways-blockchain-can-help-combat-fraud/ (surveying ways that "businesses can combat fraud with blockchain").

[62] While ICOs are initiated by individual companies, IEOs "are offered directly by online trading platforms on behalf of companies." *Initial Exchange Offerings (IEOs) – Investor Alert*, U.S. SEC. & EXCH. COMM'N (Jan. 14, 2020), https://www.sec.gov/oiea/investor-alerts-and-bulletins/ia_initialexchangeofferings. One attraction of an IEO as compared to an ICO is that the trading platform can perform due diligence on the offering. *See* Gertrude Chavez-

models—seeking capital from VCs or via public offerings—though regulation has complicated this picture. And blockchain technology likely will alter the way equities, derivatives, and other financial instruments are traded and cleared, imperiling the dominance and huge profits big banks have enjoyed in these markets.

1. Impact on Capital Markets. One of the most high-profile uses of blockchain technology is as the infrastructure for token sales, such as ICOs. Blockchain allows firms to raise capital through the sale of tokens to the broader public rather than through established public markets or traditional private funding sources. In many cases, these tokens are resold on secondary markets.[63] The growth of ICO funding was initially explosive. By one estimate, ICOs raised $7.8 billion in 2018, up from $6.2 billion in 2017, and $90 million in 2016.[64] IEOs, which are also growing in popularity, raised an estimated $1.7 billion in 2019.[65]

The technology for initiating token sales is relatively simple, making this funding model broadly available.[66] Token sales reduce costs for offerors by eliminating the need for investment bankers,

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Dreyfuss, *Explainer: Initial Exchange Offerings Flourish in Crypto Market*, REUTERS (June 20, 2019, 1:55 PM), https://www.reuters.com/article/us-crypto-currencies-offerings-explainer/explainer-initial-exchange-offerings-flourish-in-crypto-market-idUSKCN1TL2E0 (stating that exchanges organizing IEOs "effectively act as middlemen, performing functions such as due diligence on a project, 'know your customer' screening, marketing and selling tokens to customers").

[63] Rohr & Wright, *supra* note 2, at 479 ("[Tokens] are actively traded on secondary cryptocurrency markets around the globe . . . .").

[64] CB INSIGHTS, THE BLOCKCHAIN REPORT 2020, at 47 (2020), https://www.tagonline.org/wp-content/uploads/2020/05/CB-Insights_Blockchain-Report-2020.pdf. Estimates of ICO funding vary due, in part, to a lack of uniform disclosure standards for ICOs. *See* Justina Lee, *How Much Have ICOs Raised in 2018? Depends on Who You Ask*, BLOOMBERG (Nov. 4, 2018, 7:00 PM), https://www.bloomberg.com/news/articles/2018-11-05/how-much-have-token-sales-raised-in-2018-depends-on-who-you-ask ("[I]t remains hard to ascertain the amount of funds a[n] issuer claims it's raised when no one has to submit any regulated filings or even reveal their identities.").

[65] Slyusarev, *supra* note 9; *see also* PWC, 6TH ICO/STO REPORT 9 (2020), https://www.pwc.ch/en/publications/2020/Strategy&_ICO_STO_Study_Version_Spring_2020.pdf ("IEOs are experiencing a strong momentum in crypto sphere.").

[66] *See* Rohr & Wright, *supra* note 2, at 464 ("With less than a hundred lines of code, anyone can generate blockchain-based tokens and sell them to the public." (footnote omitted)).

venture capitalists, and other financial intermediaries.[67] While regulation has cooled the ICO market,[68] the token-sale model, or other blockchain-based funding mechanisms, could potentially upend established capital market structures.[69]

In the past few decades, the primary early-stage funding model for technology startups that are not self-financed has been to seek venture capital, angel investment, or, more recently, crowdfunding.[70] While these sources of capital represent only a small percentage of total new business funding—with personal funds and bank loans making up the lion's share—they can be particularly significant for early growth.[71] Access to VC and angel funding is geographically and socio-economically limited.[72] A study of venture, angel, and crowdfunding investment showed that, in 2014, thirty percent of firms receiving VC funding were located in four metropolitan areas: New York, Los Angeles, San Francisco, and

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[67] *Id.* at 465 ("Tokens sellers . . . avoid traditional gatekeepers like investment bankers and national securities exchanges, which control access to the capital markets.").

[68] *See, e.g.*, Olga Kharif, *Crypto Coin Sales Stage Revival After Bursting of ICO Bubble*, BLOOMBERG (Apr. 10, 2019, 10:10 AM), https://www.bloomberg.com/news/articles/2019-04-10/crypto-coin-sales-stage-revival-after-bursting-of-ico-bubble ("ICO sales . . . have dropped steeply . . . in the wake of a U.S. regulatory crackdown and market collapse.").

[69] Rohr & Wright, *supra* note 2, at 464 ("Blockchains are transforming capital markets.").

[70] Some data shows that the major sources of initial funding for new U.S. businesses are "personal and family savings, bank business loans, and personal credit cards." DANE STANGLER, INARA S. TAREQUE & ARNOBIO MORELIX, TRENDS IN VENTURE CAPITAL, ANGEL INVESTMENTS, AND CROWDFUNDING ACROSS THE FIFTY LARGEST U.S. METROPOLITAN AREAS 1 (2016), https://www.kauffman.org/wp-content/uploads/2019/12/ASE-Briefing-1216_FINAL.pdf.

[71] *Id.* (stating that "venture capital, angel investments, and . . . crowdfunding" are less prevalent funding forms than personal money and bank loans, "but they can be disproportionately important for business growth").

[72] *See* Christine Hurt, *Pricing Disintermediation: Crowdfunding and Online Auction IPOs*, 2015 U. ILL. L. REV. 217, 224 ("[T]he angel investing industry and venture capital industry have their own inherent biases. Early round investing depends greatly on networks and geography . . . .").

Boston.[73] This was the case for angel investing as well.[74] Racial, gender, and socio-economic disparities also exist in VC funding. Minority-run businesses have disproportionately low VC funding rates.[75] The same is true for businesses run by founders with non-elite socio-economic backgrounds.[76]

Crowdfunding is similar to blockchain-based funding in that it allows companies to raise startup capital from the general public. Theoretically, crowdfunding offers the opportunity to reduce the geographic concentration of startup investment by making it easier for remote investors to learn of and fund firms in geographically diverse areas.[77] The crowdfunding model also holds promise for circumventing the racial, gender, and socio-economic biases that plague VC funding, though some empirical research shows that

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[73] STANGLER ET AL., *supra* note 70, at 3; *see also* John Armour & Luca Enriques, *The Promise and Perils of Crowdfunding: Between Corporate Finance and Consumer Contracts*, 81 MOD. L. REV. 51, 55 (2018) ("[V]enture capitalists tend to be based in areas where there are large 'clusters' of new firms, typically near a source of technological innovation such as a university. But for an entrepreneur not living in, or able to relocate to, the vicinity of a venture capitalist, this source of finance is unlikely to be available." (footnote omitted)).

[74] STANGLER ET AL., *supra* note 70, at 4 ("Among firms that received the full amount they sought from angel investors, 30 percent were in . . . New York, Los Angeles, San Francisco, and Boston.").

[75] Project Diane, which tracks statistics regarding access to VC funding by black women founders, found that since 2009, startups led by black women raised a total of $289 million in venture and angel funding, 0.068% of the total $424.7 billion in technology venture funding raised in that time. ProjectDiane2018, *The State of Black Women Founders*, DIGITALUNDIVIDED, http://projectdiane.com (last visited Feb. 7, 2021); *see also* ALGERNON AUSTIN, CTR. FOR GLOB. POLICY SOLS., THE COLOR OF ENTREPRENEURSHIP: WHY THE RACIAL GAP AMONG FIRMS COSTS THE U.S. BILLIONS 20 (2016), http://globalpolicysolutions.org/wp-content/uploads/2016/04/Color-of-Entrepreneurship-report-final.pdf ("Entrepreneurs of color often lack access to the informal networks that are critical for attracting venture capitalists to help support their business pursuits."); Hurt, *supra* note 72, at 224 ("[A]lmost all startup companies with VC funding were founded by men and led by men.").

[76] *See, e.g.*, Kelly A. Porter, You Can't Leave Your Past Behind: The Influence of Founders' Career Histories on Their Firms (2004) (unpublished dissertation, Executive Summary, Stanford University), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1371633 ("Where entrepreneurs went to school, what they studied, where they worked previously and the types of jobs they held, all influence the range of options available to their firms.").

[77] *See* Armour & Enriques, *supra* note 73, at 56 ("Where in the past geography would have placed a constraint on the success of [crowdfunding], the internet means that a great deal of information can now be conveyed to potential funders wherever they are located." (footnote omitted)).

minorities are less likely than comparable white founders to successfully raise capital through crowdfunding.[78]

Token sales share crowdfunding's advantages but typically offer more upside potential to investors.[79] Ties to Silicon Valley or Wall Street are not required for a successful ICO or IEO, potentially allowing for greater geographic diversity in early-stage capital formation. The research on racial disparities in crowdfunding offers reason to be cautious about token sales' potential to significantly improve the racial and socio-economic diversity of founders who receive early-stage funding.[80] But untethering startup capital formation from elite VC networks and casting a wider investor net at least holds out the possibility of addressing these diversity issues.

There are signs that token sales can challenge the VC funding model. A recent study showed that while VC investment in blockchain-related firms is growing quickly, ICO funding for these types of companies surpassed it in 2018.[81] Some industry observers caution that the VC funding model offers benefits beyond capital—personal relationships, industry expertise, and other forms of non-monetary support—that token sales cannot duplicate.[82] Others

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[78] *See* Peter Younkin & Venkat Kuppuswamy, *The Colorblind Crowd? Founder Race and Performance in Crowdfunding*, 64 MGMT. SCI. 3269, 3269 (2018) (surveying over 7000 crowdfunding projects and finding that "African American men are significantly less likely than similar white founders to receive funding and that prospective supporters rate identical projects as lower in quality when they believe the founder is an African American male").

[79] Crowdfunding generally is viewed less as an investment strategy and more as an opportunity to support interesting projects or products. Many ICOs are considered investment vehicles from which participants expect a return on their funds. *See, e.g.*, Marco Dell'Erba, *Initial Coin Offerings: The Response of Regulatory Authorities*, 14 N.Y.U. J.L. & BUS. 1107, 1112 (2018) ("Unlike crowdfunding campaigns, ICOs are not donation, but more generally [offer] a financial stake in the company, including the right to vote on future decisions." (footnotes omitted)).

[80] *See* Younkin & Kuppuswamy, *supra* note 78, at 3269–70 (discussing discrimination in crowdfunding markets).

[81] Jason D. Rowley, *ICOs Delivered at Least 3.5x More Capital to Blockchain Startups than VC Since 2017*, CRUNCHBASE NEWS (Feb. 28, 2018), https://news.crunchbase.com/news/icos-delivered-least-3-5x-capital-blockchain-startups-vc-since-2017/ ("[D]espite over $900 million in recorded venture funding in 2017, and over $375 million in known venture funding for the first two months of 2018 so far, traditional VC rounds—convertible notes seed, angel, Series A, Series B, etc.—now pale in comparison to ICOs in terms of dollar volume.").

[82] *See, e.g.*, Travis Scher, *Will Blockchains Disrupt Venture Capital?*, DIGITAL CURRENCY GROUP (May 8, 2017), https://insights.dcg.co/will-blockchains-disrupt-venture-capital-9436f158f2f2 ("I doubt that VC [will] be disrupted and displaced by open blockchain. I don't

counter that, despite these advantages, blockchain-based funding will significantly alter the VC ecosystem.[83]

When companies have grown sufficiently, they may decide to tap into the public capital markets via an initial public offering. IPOs often can raise much greater amounts of capital than typically is possible through VC financing, making the IPO funding model more difficult for token sales to displace.[84] But not impossible. In recent years, the median IPO raised in the neighborhood of $100 million.[85] Several 2017 and 2018 ICOs raised more than $100 million.[86] Increased SEC regulation of ICOs cooled the market in 2019,[87] but the potential for blockchain-based vehicles to raise public money remains powerful. The number of IPOs (and public companies) has fallen since the dotcom bubble burst in the early 2000s.[88] Several explanations for this trend have been proposed, including regulatory burdens associated with going public, an increase in companies acquired pre-IPO, less demand for smaller offerings, and

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believe the crowd can replace experienced early-stage investors, who play the critical roles of sorting, signaling, and, most critically, support.").

[83] *See, e.g.*, Polina Marinova, *Why This Venture Capitalist Wants Crypto to Disrupt His Business,* FORTUNE (Jan. 10, 2018, 9:27 AM), http://fortune.com/2018/01/10/crypto-disrupt-venture-capital/ (quoting venture capitalist David Pakman as stating that "[t]here's no question that crypto will disrupt the business of venture capital").

[84] *See, e.g.*, Levon Ghonyan, Advantages and Disadvantages of Going Public and Becoming a Listed Company (June 29, 2017) (unpublished manuscript), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2995271 (going public can lead to "a greater amount of funds being available through the public capital markets to help with development and business growth").

[85] In 2019, the median IPO offering size was $107 million; it was $108 million in 2018, $120 million in 2017, and $94 million in 2016. *See* WILMERHALE, IPO REPORT 2 (2020), https://www.wilmerhale.com/en/insights/publications/2020-ipo-report.

[86] The Bancor ICO raised $153 million in June 2017; EOS raised $185 million, also in June 2017; Filecoin raised $257 million in September 2017; Telegram, which conducted a private, two-stage ICO, raised a total of $1.7 billion in February 2017 and April 2018. *See The Biggest Initial Coin Offerings We've Seen So Far*, COIN INSIDER (May 16, 2018), https://www.coininsider.com/top-five-biggest-initial-coin-offerings/.

[87] *See supra* notes 40–41 & 68 and accompanying text.

[88] There was a total of 4470 IPOs during the years 1990–2000, as compared to 1847 IPOs in the period 2001–2017. *See* JAY R. RITTER, INITIAL PUBLIC OFFERINGS: UPDATED STATISTICS 3 (2020), https://site.warrington.ufl.edu/ritter/files/IPOs2019Statistics.pdf. There were about 3600 public companies listed on U.S. exchanges at the end of 2017, "down more than half from 1997." *Where Have All the Public Companies Gone?*, BLOOMBERG (Apr. 9, 2018, 7:00 AM), https://www.bloomberg.com/view/articles/2018-04-09/where-have-all-the-u-s-public-companies-gone.

greater reliance on alternative private funding sources.[89] Whatever the cause, blockchain-based funding may exacerbate the decline.

2. Impact on Derivatives Trading. Derivatives are financial contracts whose value is based on the performance or value of an underlying financial instrument or asset, such as a mortgage, commodity, interest rate, or currency.[90] Common types of derivatives include futures, options, interest-rate swaps, and credit default swaps.[91] The markets for financial derivatives are among the largest and most important in the financial services sector.[92] They are also hugely profitable for the big banks that control them.[93]

Before the 2007–08 financial crisis, derivatives markets were largely unregulated.[94] Many derivatives contracts were executed bilaterally (over-the-counter or OTC), which resulted in firms accumulating significant counterparty risk unbeknownst to

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[89] *See e.g.*, Steven Davidoff Solomon, *A Dearth of I.P.O.s, but It's Not the Fault of Red Tape*, N.Y. TIMES: DEALBOOK (Mar. 28, 2017), https://www.nytimes.com/2017/03/28/business/dealbook/fewer-ipos-regulation-stock-market.html (describing various explanations for the decline in IPOs); Robert P. Bartlett III, Paul Rose & Steven Davidoff Solomon, *The Small IPO and the Investing Preferences of Mutual Funds*, 47 J. CORP. FIN. 151, 151 (2017) (examining "how liquidity and return concerns at large mutual funds explain their diminished participation in small IPOs since the late 1990s"); Xiaohui Gao, Jay R. Ritter & Zhongyan Zhu, *Where Have All the IPOs Gone?*, 48 J. FIN. & QUANTITATIVE ANALYSIS 1663, 1663 (2018) (arguing that the advantages for smaller companies to sell to a larger firm have increased relative to the benefits of operating independently, resulting in fewer small IPOs).

[90] Frank D'Souza, Nan S. Ellis & Lisa M. Fairchild, *Illuminating the Need for Regulation in Dark Markets: Proposed Regulation of the OTC Derivatives Market*, 12 U. PA. J. BUS. L. 473, 474 (2010).

[91] *Id.* at 479.

[92] In mid-2018, the notional value of derivatives worldwide was $595 trillion, while their gross market value (the cost of replacing all existing derivatives contracts) was $10 trillion. BANK FOR INT'L SETTLEMENTS, STATISTICAL RELEASE: OTC DERIVATIVES STATISTICS AT END-JUNE 2018, at 2 (2018), https://www.bis.org/publ/otc_hy1810.pdf. Notional value is the face value of the contracts. Saul S. Cohen, *The Challenge of Derivatives*, 63 FORDHAM L. REV. 1993, 2009 (1995). Gross market value "provides a more meaningful measure of amounts at risk" than notional amounts. BANK FOR INT'L SETTLEMENTS, *supra*, at 2.

[93] *See* Robert C. Hockett & Saule T. Omarova, *The Finance Franchise*, 102 CORNELL L. REV. 1143, 1196 (2017) (describing over-the-counter derivatives trading as "an important source of profitable business for financial institutions").

[94] *See* 7 U.S.C. §§ 1a(47)(B)(i), 2(d) (2018) (exempting over-the-counter swaps from CFTC oversight); 15 U.S.C. § 78c-1(b)(2) (2018) (exempting security-based swaps from SEC oversight); D'Souza et al., *supra* note 90, at 492 ("[T]he bulk of derivatives remain unregulated.").

regulators (and sometimes to the companies themselves).[95] When the bill came due on these trades, firms like AIG could not meet their obligations, exacerbating the contagion caused by the housing downturn.[96]

Because derivatives were widely seen as having worsened the financial crisis, Congress targeted them for regulation in the 2010 Dodd–Frank Act.[97] In some financial markets, like the public equities markets, many trades are entered on public exchanges (the New York Stock Exchange, for example) and then settled at centralized clearinghouses.[98] The primary goal of Dodd–Frank's derivatives title was to ensure that the vast majority of derivatives trades would be centrally cleared and exchange traded, rather than traded OTC.[99] In this regulatory regime, well-capitalized central

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[95] *See* D'Souza et al., *supra* note 90, at 483, 490–91 (explaining that "OTC derivatives are subject to significant counterparty (default) risk" and recounting the impact of this risk when the housing market collapse in 2007 caused the huge markets for collateralized debt obligations and credit default swaps to swoon).

[96] OFFICE OF THE SPECIAL INSPECTOR GEN. FOR THE TROUBLED ASSET RELIEF PROGRAM, AIG REMAINS IN TARP AS TARP'S LARGEST INVESTMENT 2–4 (2012), http://www.sigtarp.gov/Audit%20Reports/AIG_Remains_in_TARP_Mini_Book.pdf (describing AIG's collapse and noting that "[o]fficials involved in the rescue maintained that if AIG went under, it would have taken down other financial institutions and caused havoc around the world").

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

[98] *See* Charles W. Mooney, Jr., *Beyond Negotiability: A New Model for Transfer and Pledge of Interests in Securities Controlled by Intermediaries*, 12 CARDOZO L. REV. 305, 316–17 (1990) ("Most of the trades in corporate equity and debt securities made on the major United States securities exchanges and OTC markets are cleared and settled . . . in a system involving the combined services of two registered clearing agencies . . . ."). Even in the equities markets, many trades are now being made in so-called "dark pools" rather than on the public exchanges. *See* Tom C.W. Lin, *The New Market Manipulation*, 66 EMORY L.J. 1253, 1299 (2017) ("[M]ost equities in the United States, including those listed on the NASDAQ and the New York Stock Exchange are traded in dark pools instead of the public exchanges.").

[99] *See, e.g.*, Letter from Timothy F. Geithner, Sec'y, U.S. Dep't of the Treasury, to Sen. Harry Reid, U.S. Senate 1 (May 13, 2009), http://www.maths-fi.com/Timothy-Geithner-OTC-letter-05132009.pdf ("To contain systemic risks, the [Commodity Exchange Act] and the securities laws should be amended to require clearing of all standardized OTC derivatives through regulated central counterparties (CCPs)."); Press Release, U.S. Dep't of the Treasury, Regulatory Reform Over-the-Counter (OTC) Derivatives (May 13, 2009), http://www.treasury.gov/press-center/press-releases/Pages/tg129.aspx (stating that regulatory reform objectives for the OTC derivatives markets include that "[t]he Commodity Exchange Act (CEA) and the securities laws should be amended to require clearing of all standardized OTC derivatives through regulated central counterparties (CCP)" and that

counterparty clearinghouses (CCPs) would take on the counterparty risk of default inherent in derivatives trades, thereby reducing systemic risk—at least, theoretically.[100] Exchange trading would lessen pricing opacity and lower bid-ask spreads.[101] To this end, Dodd–Frank mandated that most derivatives trades be centrally cleared[102] and that centrally cleared derivatives trades be executed on exchanges.[103]

These reforms posed a challenge for Wall Street banks. OTC trading was extremely profitable for them because it was an opaque market where they benefitted from large bid-ask spreads.[104] Exchange trading, where spreads are publicly available, would threaten these profits by allowing customers to shop around for the best deal on a trade, reducing or eliminating banks'

"standardized trades" be moved "onto regulated exchanges and regulated transparent electronic trade execution systems").

[100] *See* Sean J. Griffith, *Governing Systemic Risk: Towards a Governance Structure for Derivatives Clearinghouses*, 61 EMORY L.J. 1153, 1175–76 (2012) (explaining that under Dodd–Frank derivatives clearinghouses "use centralization to address the systemic risk inherent in bilateral derivatives transactions" and "undertake[] all counterparty credit risk").

[101] *See, e.g.*, *In re* Credit Default Swaps Antitrust Litig., No. 13md2476 (DLC), 2014 WL 4379112, at *8 (S.D.N.Y. Sept. 4, 2014) ("[T]he prevention of exchange trading directly injured [credit default swap] investors by sustaining the inflated bid/ask spreads they had to pay."). Bid-ask spreads are the difference between the price at which a dealer will buy an asset and the price at which it will sell that asset. *See id.* at *1. The spread between these two prices is the dealer's profit. *Id.*

[102] Dodd–Frank Wall Street Reform and Consumer Protection Act, Pub. L. No. 111-203, § 723(h), 124 Stat. 1376, 1675–76 (2010) (codified as amended at 7 U.S.C. § 2(h)(1)(A) (2018)) ("It shall be unlawful for any person to engage in a swap unless that person submits such swap for clearing to a derivatives clearing organization . . . ."). The Act contains parallel requirements for securities-based swaps, which the SEC regulates under the Dodd–Frank framework. *See id.* § 763, 124 Stat. at 1762 (codified as amended at 15 U.S.C. § 78c-3(a)(1) (2018)) ("It shall be unlawful for any person to engage in a security-based swap unless that person submits such security-based swap for clearing to a clearing agency. . . .").

[103] *Id.* § 723(a)(2), 124 Stat. at 1681 (codified as amended at 7 U.S.C. § 2(h)(8)(A)) ("[S]waps subject to [this] clearing requirement" must be executed "on a board of trade designated as a contract market" or "on a swap execution facility."). Again, the Act includes parallel requirements for securities-based swaps. *Id.* § 763, 124 Stat. at 1767 (codified as amended at 15 U.S.C. § 78c-3(h)(1)) ("With respect to transactions involving security-based swaps subject to the clearing requirement . . . counterparties shall . . . execute the transaction on an exchange; or . . . execute the transaction on a security-based swap execution facility . . . .").

[104] *See, e.g.*, *In re* Interest Rate Swaps Antitrust Litig., 261 F. Supp. 3d 430, 444 (S.D.N.Y. 2017) (stating that OTC selling of interest rate swaps "was advantageous to dealers" and allowed for various practices that "tended to diminish price competition").

supracompetitive profits.[105] Indeed, public exchanges threatened to remove altogether the need for parties entering derivatives trades to use the big banks' services.[106]

Evidence suggests that the big banks have taken a number of measures since Dodd–Frank's passage to preserve their supracompetitive profits on OTC derivatives trades by resisting the move to central clearing and exchange trading. Plaintiffs in two multidistrict litigation antitrust cases against the big banks alleged a variety of anticompetitive acts aimed at preventing a shift to exchange trading.[107] These alleged acts included coordinating group boycotts of emerging electronic exchanges, seizing control of clearinghouses to prevent their use in enabling exchange trading, and using that control to push certain types of derivatives trades to the OTC markets.[108] According to plaintiffs in one of these cases, this conduct stemmed from the banks' fear that "exchange trading . . . threatened to slash the [banks'] margins by 'billions of dollars' by disintermediating them."[109]

Blockchain-based derivatives trading and (potentially) clearing similarly threaten the big banks' derivatives-trading profits. Currently, most credit derivatives contracts are processed through the Depository Trust & Clearing Corporation's (DTCC) Trade Information Warehouse (TIW).[110] DTCC and its partners in the

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[105] *See, e.g.*, *In re Credit Default Swaps Antitrust Litig.*, 2014 WL 4379112, at *8 ("[T]he prevention of exchange trading directly injured [credit default swap] investors by sustaining the inflated bid/ask spreads they had to pay.").

[106] *See In re Interest Rate Swaps Antitrust Litig.*, 261 F. Supp. 3d at 475 ("All-to-all exchange trading, however, threatened to slash the Dealers' margins by 'billions of dollars' by disintermediating them.").

[107] *See id.* at 441 (stating that the plaintiffs alleged that big banks "conspired to boycott and otherwise undermine" emergent "electronic exchange-based platforms for" interest rate swaps trades); *In re Credit Default Swaps Antitrust Litig.*, 2014 WL 4379112, at *3–4 (stating that the plaintiffs alleged that big banks "conspired to shut . . . down" an emergent electronic exchange platform for credit default swaps).

[108] *See, e.g.*, *In re Interest Rate Swaps Antitrust Litig.*, 261 F. Supp. 3d at 442 (noting that the banks allegedly engaged in "a boycott aimed at destroying" new electronic trading platforms); *In re Credit Default Swaps Antitrust Litig.*, 2014 WL 4379112, at *5 (describing banks' seizure of a clearinghouse).

[109] *In re Interest Rate Swaps Antitrust Litig.*, 261 F. Supp. 3d at 475.

[110] "The [Trade Information] Warehouse provides lifecycle event processing services for approximately 98% of all credit derivative transactions in the global marketplace." *Trade*

banking consortium R3 have announced plans to transition eleven trillion dollars of credit derivatives to a blockchain-based system.[111] The DTCC's new distributed ledger will offer "peer nodes" to large derivatives trading firms.[112] Smaller firms can access the ledger through DTCC's node.[113] This will be a permissioned network, so traders will need approval to access the ledger.[114] DTCC and its partners believe the transition to blockchain-based derivatives processing will increase transaction speeds and reduce costs.[115] The current system can take up to a week to settle a trade; blockchain settlement theoretically will be instantaneous.[116] Cost savings likely will come in the form of reduced need for human trade reconciliation.[117] While the system's rollout has been bumpier than expected—reflecting blockchain technology's relative

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Information Warehouse Learning Center, DTCC https://dtcclearning.com/products-and-services/trade-information-warehouse.html (last visited Feb. 7, 2021).

[111] del Castillo, *supra* note 10.

[112] *Id.*

[113] *Id.*

[114] Press Release, DTCC, DTCC Selects IBM, AXONI and R3 to Develop DTCC's Distributed Ledger Solution for Derivatives Processing (Jan. 9, 2017), https://www.dtcc.com/news/2017/january/09/dtcc-selects-ibm-axoni-and-r3-to-develop-dtccs-distributed-ledger-solution (describing the project's "end-state vision to establish a permissioned distributed ledger network for derivatives").

[115] *Id.* ("The [blockchain] solution will enable DTCC and its clients to further streamline, automate and reduce the cost of derivatives processing across the industry by eliminating the need for disjointed, redundant processing capabilities and the associated reconciliation costs.").

[116] del Castillo, *supra* note 10 ("[T]he existing settlement infrastructure . . . can take as long as a week to close compared to the nearly instant settlement times expected from the blockchain solution.").

[117] *See* Press Release, DTCC, *supra* note 114 ("By recording and automatically managing shared records of financial agreements in the cloud without error, [the distributed ledger] can minimize the steps required for post-trade processing and free up middle and back office staff from the onerous task of reconciliation."). A 2015 study by Santander InnoVentures estimated that "distributed ledger technology could reduce banks' infrastructure costs attributable to cross-border payments, securities trading and regulatory compliance by between $15–20 billion per annum by 2022." SANTANDER INNOVENTURES, OLIVER WYMAN & ANTHEMIS GRP., THE FINTECH 2.0 PAPER: REBOOTING FINANCIAL SERVICES 15 (2015) (footnote omitted), https://www.finextra.com/finextra-downloads/newsdocs/the%20fintech%202%200%20paper.pdf.

immaturity[118]—DTCC expects its commercial launch in the near future.[119]

DTCC's move to blockchain technology is potentially significant, but blockchain offers the possibility of more fundamentally altering the derivatives markets by eliminating the need for big banks' participation altogether, at least for portions of the derivatives-trading lifecycle. A public, permissionless, blockchain-based derivatives trading and clearing system theoretically could allow anyone to trade and clear derivatives without needing access to DTCC's permissioned network or availing themselves of the big banks' trading and clearing services.[120]

Employing a public distributed ledger, users could offer derivatives in the form of smart contracts. Buyers and sellers would enter their bids and asks directly onto the blockchain through their own terminals. A separate ledger could be used to manage collateral,[121] and traditional derivatives dealers and exchanges no longer would be needed. Blockchain could validate Nick Szabo's prediction that "[i]n a few years teenagers in Indiana will be swapping over-the-blockchain derivatives with grandmas in India without asking New York City."[122]

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[118] *See* Michael del Castillo, *Enterprises Building Blockchain Confront Early Tech Limitations*, COINDESK (Mar. 23, 2018, 12:00 PM), https://www.coindesk.com/enterprises-building-blockchain-confront-tech-limitations (commenting on blockchain's limitations and barriers to its expansion).

[119] *See* Press Release, DTCC, DTCC Enters Test Phase on Distributed Ledger Project for Credit Derivatives with MarkitSERV & 15 Leading Global Banks (Nov. 6, 2018), http://www.dtcc.com/news/2018/november/06/dtcc-enters-test-phase-on-distributed-ledger-project-for-credit-derivatives-with-markitserv ("Testing is anticipated to be completed by Q1 2019 with go live scheduled thereafter.").

[120] *See, e.g.*, Dan Awrey, *Split Derivatives: Inside the World's Most Misunderstood Contract*, 36 YALE J. REG. 495, 565 (2019) (noting that combining distributed ledgers with smart contracts could create the conditions for undertaking financial transactions "without the involvement of conventional financial intermediaries").

[121] ISDA, ISDA WHITEPAPER: THE FUTURE OF DERIVATIVES PROCESSING AND MARKET INFRASTRUCTURE 23 (2016), https://www.isda.org/a/UEKDE/infrastructure-white-paper.pdf ("It may be that related parts of a derivatives process exist on different ledgers—for example, collateral management may exist on one ledger and trade performance on another.").

[122] Nick Szabo (@NickSzabo4), TWITTER (Dec. 21, 2016, 9:06 PM), https://twitter.com/nickszabo4/status/811754664983044096?.

Several blockchain-based derivatives exchanges are in development.[123] In mid-2018, Level01 launched a blockchain-based, peer-to-peer derivatives exchange for trading options.[124] The company partnered with Thomson Reuters, which provides the data necessary for pricing the derivative contracts.[125] Level01 asserted that its exchange will allow peer-to-peer trading in a range of instruments—including stocks, foreign exchange, and commodities—"without a need for an intermediary broker."[126]

Central counterparty clearinghouses (CCPs) may be more difficult to replace in the derivatives markets. In an equities transaction, a distributed ledger can determine at the time of the trade whether both parties own the relevant assets.[127] In many

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[123] EverMarkets has announced plans to launch the EverMarkets Exchange, a futures exchange and clearing platform supporting peer-to-peer trading for both traditional and crypto derivatives. *See* Annaliese Milano, *Startup EverMarkets Aims to Shake up Futures Trading with Blockchain*, COINDESK (Mar. 21, 2018, 3:05 PM), https://www.coindesk.com/wall-street-vets-target-crypto-futures-evermarkets-launch (describing the announcement of EverMarkets' blockchain-based trading platform and quoting the firm's CEO as stating that the platform's goal is to "disintermediate some of these centralized players and allow for a peer-to-peer trading of futures."). Similarly, eToro has developed a blockchain-based derivatives trading platform. *See* Daniel Kuhn, *eToro Aims to Put Derivatives on the Blockchain with Lira Programming Language*, COINDESK (Sept. 15, 2019, 3:09 AM), https://www.coindesk.com/etoro-aims-to-put-derivatives-on-the-blockchain-with-lira-programming-language (describing eToro's "demo" derivatives trading platform). For a comparison of several blockchain-based crypto derivatives exchanges and a discussion of the benefits of using derivatives, see Ashwath Balakrishnan, *The Best Crypto Derivative Exchanges*, CRYPTOBRIEFING (Apr. 5, 2020), https://cryptobriefing.com/best-crypto-derivative-exchanges/.

[124] *Soft Launch in Hong Kong*, *supra* note 7 (announcing the platform's launch).

[125] *See Cryptovest: Blockchain Platform Eliminates Brokers in Derivatives Trading,* LEVEL01 (Sept. 25, 2018), https://level01.io/2018/09/25/blockchain-platform-eliminates-brokers-in-derivatives-trading/ ("Under the deal, Level 01 will use data feeds from Thomson Reuters as the primary source for its artificial intelligence (AI) deep learning algorithms to enable the platform to provide real-time pricing analysis on derivative contracts.").

[126] *See* LEVEL01, *supra* note 33, at abstract.

[127] The SEC recently approved a pilot project for Paxos, a blockchain startup, to begin settling certain equities trades without having to register with the SEC as a clearing agency. *See* Letter from Jeffrey S. Mooney, Assoc. Dir., Div. of Trading & Mkts., U.S. Sec. & Exch. Comm'n, to Charles G. Cascarilla & Daniel M. Burstein, Paxos Tr. Co. 2–3 (Oct. 28, 2019), https://www.sec.gov/divisions/marketreg/mr-noaction/2019/paxos-trust-company-102819-17a.pdf. The Paxos blockchain "would let banks exchange digital representations of cash and securities to settle trades with each other." Osipovich, *supra* note 32. A similar technology

derivatives contracts, by contrast, the question is whether the parties will have sufficient assets sometime in the future.[128] Existing CCPs are designed to handle this future counterparty risk because they (theoretically) have sufficient capital to guarantee that any derivative contract they back can be satisfied.[129] Nonetheless, some blockchain proponents assert that the technology can eliminate the need for derivatives CCPs, too.[130] Whether distributed clearing can replace CCPs remains an open question, which may be answered as the technology develops.[131]

Central clearing generally is required only for standardized derivatives contracts, however.[132] Bespoke derivatives will continue to be traded OTC.[133] Some argue that blockchain can serve the clearing function for OTC derivatives via a decentralized clearing network.[134] One startup, SynSwap, claims that its blockchain-based system can offer "distributed clearing" for OTC derivatives, which

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could be used to clear trades. *Id.* (stating that proponents of the Paxos project say it "offers a blueprint for a next-generation approach to clearing and settlement").

[128] *See* Griffith, *supra* note 100, at 1158, 1161 (explaining that in derivatives contracts, counterparties "commit to one or several payments at some time in the future," creating counterparty credit risk that a party "will fail to perform its obligations under the contract" because they become insolvent).

[129] *Id.* at 1176 ("[T]he clearinghouse effectively undertakes all counterparty credit risk while the transacting parties have zero exposure to their original counterparties and, as long as the clearinghouse remains solvent, no exposure to counterparty credit risk.").

[130] *See, e.g.*, Hogan Lovells, *A Look at How Blockchain Could Redefine the Structure of the Capital Markets*, LEXOLOGY (Nov. 6, 2017), https://www.lexology.com/library/detail.aspx?g=018fe6ae-6c4d-4638-8d6a-4ffc097b9fdc ("[B]lockchain and other distributed ledger technologies (DLTs) have the potential to decentralize the system and eliminate the need . . . for CCPs . . . .").

[131] *See* Surujnath, *supra* note 22, at 281 ("There is some disagreement among industry stakeholders as to the degree to which blockchains can displace CCPs as intermediaries in derivatives trades.").

[132] *See* Griffith, *supra* note 100, at 1196–97 ("The key factors in deciding whether a particular instrument must be cleared are liquidity and the ability to reliably price the instrument—both of which come down to, essentially, the standardization of a particular instrument.").

[133] *See id.* at 1197 (noting that dealers desiring to trade derivatives OTC will try to make the derivatives seem "highly customized and therefore not eligible for clearing").

[134] *See About*, SYNSWAP, https://www.f6s.com/synswap (last visited Feb. 9, 2021) (describing Synswap, a startup using "blockchain technology to build a platform providing post-trade services for OTC derivatives," including clearing).

will "disintermediate CCPs."[135] This service is touted as providing the same netting processes, reduction in counterparty risk, and management of defaults as a CCP, without the systemic risks CCPs may pose.[136]

A shift to blockchain-based derivatives trading platforms and clearinghouses may significantly alter the competitive and regulatory landscape of the derivatives markets. Before Dodd–Frank required standardized derivatives to be exchange-traded and centrally cleared, derivatives pricing typically was opaque.[137] This pricing opacity limited competition and allowed big banks to make supracompetitive profits on derivatives trades via large bid-ask spreads.[138] The move to exchange trading that Dodd–Frank required promised to reduce some of this opacity and lower spreads.[139] Trading OTC derivatives on a public blockchain would further decrease pricing opacity and make the OTC derivatives markets more competitive. Indeed, a public, blockchain-based

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[135] *See* Joe Parsons, *Blockchain Startup Aims to Replace Clearing Houses*, TRADE (Oct. 11, 2016, 5:54 AM), https://www.thetradenews.com/blockchain-startup-aims-to-replace-clearing-houses/.

[136] *Id.*

[137] *See, e.g.*, D'Souza et al., *supra* note 90, at 505 (noting the argument that the "lack of transparency in today's derivatives markets" contributed to the global financial crisis and that, "along with the complexity of the instruments used, [it] led to a level of opaqueness that 'created huge information asymmetries and failures' and prevented the market from being able to effectively price and monitor derivatives" (footnote omitted) (quoting Aaron Unterman, *Innovative Destruction—Structured Finance and Credit Market Reform in the Bubble Era*, 5 HASTINGS BUS. L.J. 53, 87 (2009))).

[138] *See, e.g.*, *In re* Credit Default Swaps Antitrust Litig., No. 13md2476 (DLC), 2014 WL 4379112, at *8 (S.D.N.Y. Sept. 4, 2014) ("[T]he prevention of exchange trading directly injured [credit default swap] investors by sustaining the inflated bid/ask spreads they had to pay. No intermediaries stood between plaintiffs, who paid the supracompetitive prices, and Dealer–Defendants, who pocketed them as a result of their efforts to keep CMDX and other nascent [exchanges] out of the market.").

[139] *See, e.g.*, Letter from Timothy F. Geithner to Harry Reid, *supra* note 99, at 2 ("Market efficiency and price transparency should be improved in derivatives markets by requiring the clearing of standardized contracts through regulated CCPs . . . and by moving the standardized part of these markets onto regulated exchanges and regulated transparent electronic trade execution systems for OTC derivatives and by requiring development of a system for timely reporting of trades and prompt dissemination of prices and other trade information.").

derivatives exchange could remove the need for derivatives dealers altogether, making trading cheaper.[140]

Blockchain-based trading and clearing also offer the possibility of increased regulatory visibility into the derivatives markets.[141] Regulators could have their own nodes on these blockchains, giving them access to the full distributed ledger, including complete information about every transaction recorded on that ledger.[142] This technology would be more efficient for regulators than the current system where the agencies must work with bank personnel to retrieve relevant records.[143] Further, accessing selected trade information allows regulators to see only a snapshot of the market at any one time; blockchain can give them a holistic understanding of the entire market.[144] Agencies also could see margin information and better understand which firms and transactions might pose systemic risk. Dan Bucsa, Deputy Director in the CFTC's Division of Market Oversight, has observed that distributed ledger

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[140] *See* Surujnath, *supra* note 22, at 280 ("In OTC markets, dealers could play a reduced role. Rather than relying on the dealers to match bids and asks, parties could take advantage of the anonymity provided by the blockchain . . . . They could upload asks directly to the blockchain and rely on its computing to automatically choose the highest bid." (footnote omitted)); OLIVER WYMAN & EUROCLEAR, BLOCKCHAIN IN CAPITAL MARKETS: THE PRIZE AND THE JOURNEY 12 (2016), https://www.oliverwyman.com/content/dam/oliver-wyman/global/en/2016/feb/BlockChain-In-Capital-Markets.pdf ("Many clients (particularly on the buy side) will expect to accrue the most benefit, from the reduction in costs of capital markets dealing and securities servicing. Retail and wholesale investors may transact more among themselves, now with guaranteed execution on open markets.").

[141] *See* Awrey, *supra* note 120, at 565–66 (noting that blockchain-based derivatives trading can "provide regulatory authorities with a more complete and accurate picture of market structure and activity, thereby improving both microprudential and macroprudential oversight whilst simultaneously reducing the regulatory reporting burden on individual counterparties and [swap data repositories]").

[142] del Castillo, *supra* note 10 ("Since the distributed ledger's record is immutable, a regulatory node has the potential to give government observers access to real-time data about transactions, instead of having to wait for reports from market participants.").

[143] *See* CFTC TAC MEETING, *supra* note 1, at 55 (statement of Dan Bucsa) (asserting that blockchain "could allow regulators to access data automatically and seamlessly . . . every time a trade is executed or posted on a particular blockchain without the need for human intervention or the use of intermediaries").

[144] *See id.* at 57 ("Agencies would no longer be privy to only a sliver of a firms' activities, or subject to delays based on snapshots in time. Instead, every U.S. financial regulator . . . would have immediate access to all the data available on the blockchain and be allowed to make fully informed decision based upon a holistic view.").

technology offers regulators numerous advantages, including more efficient data access and "near real time" market oversight.[145]

This regulatory benefit is potentially limited, however. First, it is unclear whether participants will allow their data to be shared with regulators. The CEO of DTCC's derivatives-trading subsidiary cautioned that disclosure is not mandatory, and firms may be reluctant to divulge such data to the agencies.[146] Second, regulators may find there is simply too much data to usefully assimilate. Both the CFTC and SEC are understaffed, especially considering the size and importance of the markets they oversee.[147] Asking them to dedicate personnel to analyze the firehose of information that regulatory nodes would produce may overtax the agencies. The CFTC's Dan Bucsa noted other unknowns about relying on blockchains for regulatory reporting, including the role of standardization, which he argued will be necessary for regulators to acquire and analyze data.[148] Nonetheless, both Bucsa and SEC leadership have expressed optimism that blockchain-based advances in financial-services technology will aid regulators by

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[145] *Id.* at 55–56.

[146] del Castillo, *supra* note 10 ("Opening up the fire hose of data to government controllers [the DTCC official] said, may not be so appealing to all involved. 'Clearly the capability of [regulators] being established as a node on the network exists with blockchain . . . . But it's still very much to be determined.'"). Brian Knight, Director of Innovation and Governance and Senior Research Fellow at the Mercatus Center of George Mason University, stated at a meeting of the CFTC's Technology Advisory Committee that "we don't [want] a world where the regulator is like a vampire, and once you let them into your house, you're powerless to stop them." CFTC TAC MEETING, *supra* note 1, at 68.

[147] *See, e.g.*, Gary Gensler, Chairman, Commodity Futures Trading Comm'n, Remarks before the International Group of Treasury Associations and the U.S. Chamber of Commerce (Sept. 27, 2013), https://www.cftc.gov/PressRoom/SpeechesTestimony/opagensler-146 ("[T]he CFTC is currently an underfunded agency. . . . We are far short of the people we need to oversee our new mandate, the swaps market . . . ."); Sam Knight, *With Washington Closely Eyeing Stock Prices, SEC Chair Bemoans Staff Shortages*, THE DISTRICT SENTINEL (Feb. 6, 2018), https://www.districtsentinel.com/washington-closely-eyeing-stock-prices-sec-chair-bemoans-staff-shortages/ (reporting that SEC Chairman Clayton told members of the Senate Banking Committee that "[p]ersonnel is my biggest challenge at the moment" and "I could use more people in enforcement. I could use more people in trading and markets.").

[148] CFTC TAC MEETING, *supra* note 1, at 59–61. Bucsa argued that these unknowns should "temper[] enthusiasm that regulatory reporting via DLT is both a definitive and near term deliverable." *Id.* at 59.

offering them increased intelligence about the markets they oversee.[149]

3. What is at Risk for Financial Institutions? Determining exactly how financial institutions make their money is notoriously difficult.[150] But clearly, a significant amount of the revenue Wall Street firms generate comes from sales and trading of financial instruments, deal-making, and providing financing.[151] To various degrees, blockchain technology could threaten each of these income streams. The opportunity for individuals and firms to trade derivatives and equities directly via blockchains not controlled by the big banks could potentially reduce Wall Street firms' sales and trading revenues. The measures banks have taken to avoid losing this business—some of which have resulted in government investigations, expensive lawsuits, and pricey settlements—are a testament to their concern.[152] Similarly, companies' ability to raise money through token sales threatens the traditional IPO model of

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[149] *See* Jay Clayton, *Chairman's Testimony on Virtual Currencies: The Roles of the SEC and CFTC*, U.S. SEC. & EXCH. COMM'N (Feb. 6, 2018), https://www.sec.gov/news/testimony/testimony-virtual-currencies-oversight-role-us-securities-and-exchange-commission ("From a financial regulatory perspective, [advances in financial technology] may enable us to better monitor transactions, holdings and obligations (including credit exposures) and other activities and characteristics of our markets, thereby facilitating our regulatory mission, including, importantly, investor protection."); CFTC TAC MEETING, *supra* note 1, at 55–56 (statement of Dan Bucsa) (observing that distributed ledger technology offers regulators "near real time oversight of markets").

[150] *See, e.g.*, Peter Eavis, *Making Sense of Wall Street's Trading Revenue*, N.Y. TIMES: DEALBOOK (Jan. 25, 2013, 10:12 AM), https://dealbook.nytimes.com/2013/01/25/making-sense-of-wall-streets-trading-revenue/ (quoting hedge fund founder Paul Singer as stating, "[t]he major financial institutions in the U.S. and around the globe are utterly opaque"); *How the Four Biggest US Banks Generate Income and Revenue*, MX (July 14, 2020), https://www.mx.com/moneysummit/top-us-retail-banks-income-revenue ("[R]eporting the success of single service lines [at the biggest banks] . . . has become more difficult to dissect. . . . Annual reports and SEC disclosures provide some basic insights even though specifics are opaque.").

[151] *See* Eavis, *supra* note 150 ("At large banks, sales and trading is a major source of revenue, often dwarfing the fees that they earn from arranging deals or managing other people's money.").

[152] *See, e.g.*, *In re* Interest Rate Swaps Antitrust Litig., 261 F. Supp. 3d 430 (S.D.N.Y. 2017); *In re* Credit Default Swaps Antitrust Litig., No. 13md2476 (DLC), 2014 WL 4379112 (S.D.N.Y. Sept. 4, 2014). Both these cases involved allegations that the big banks conspired to quash competition in trading derivatives. The banks settled the *Credit Default Swaps* case for $2 billion. *In re* Credit Default Swaps Antitrust Litig., No. 13md2476 (DLC), 2016 WL 2731524, at *1 (S.D.N.Y. Apr. 26, 2016).

capital formation, which is lucrative for Wall Street firms.[153] It also puts pressure on the VC ecosystem, currently a standard forum for early-stage funding.[154] It is safe to say that billions of dollars of annual profits are at risk of loss to Wall Street and VC firms should blockchain-based financial services disintermediate these established institutions.

Such a shift in the financial-services industry could have broad societal consequences. The past few decades have been marked by financialization of the economy: both the scale and profitability of finance have increased relative to other economic activity.[155] One symptom of this development is the outsized profits financial institutions enjoy: in 2013, finance accounted for nearly thirty percent of all corporate profits (a bigger share than manufacturing), but only around five percent of all employment in the United States.[156] This financialization process seemingly has contributed to a number of societal problems, including income inequality.[157] Increased competition in financial services from emergent blockchain-based networks potentially could reverse some of these

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[153] PETER KOSLOWSKI, THE ETHICS OF BANKING: CONCLUSIONS FROM THE FINANCIAL CRISIS 162 (Deborah Shannon trans., 2009) ("[T]he IPO business, which was especially lucrative for the investment banks and accounted for the bulk of their profits, is concentrated in the hands of very few investment banks."); John L. Orcutt, *Investor Skepticism v. Investor Confidence: Why the New Research Analyst Reforms Will Harm Investors*, 81 DENV. U. L. REV. 1, 16–17 (2003) ("Winning IPO business is very important to the revenues of an investment bank because of both the size of the possible underwriting fees for the IPO, and because being part of the IPO can be critical to having an opportunity to access later follow-on offering and financial advisory fees.").

[154] *See supra* Section II.B.*1*.

[155] *See* Lin & Tomaskovic-Devey, *supra* note 36, at 1286 ("It is well established that, in the past three decades, the United States has undergone a fundamental transformation from a manufacture-driven to a finance-orientated economy, during which increased income shares accrue through financial channels . . . ."); Thomas I. Palley, *Financialization: What It Is and Why It Matters* 2 (The Levy Econ. Inst., Working Paper No. 525, 2007), http://www.levyinstitute.org/pubs/wp_525.pdf ("Financialization is a process whereby financial markets, financial institutions, and financial elites gain greater influence over economic policy and economic outcomes."). Financialization is "most developed" in the U.S. economy. *Id.* at 3.

[156] Jordan Weissmann, *How Wall Street Devoured Corporate America*, THE ATLANTIC (Mar. 5, 2013), https://www.theatlantic.com/business/archive/2013/03/how-wall-street-devoured-corporate-america/273732/.

[157] *See* Lin & Tomaskovic-Devey, *supra* note 36, at 1285 ("[F]inancialization [is] a critical institutional mechanism encouraging the post-1970s surge in U.S. income inequality.").

trends.[158] Such competition should make access to these services cheaper and more widely available.[159] This competition also could reduce the power Wall Street currently holds. In 2013, then-Attorney General Eric Holder suggested that the largest financial institutions are so big they are above the law:

> I am concerned that the size of some of these institutions becomes so large that it does become difficult for us to prosecute them when we are hit with indications that if . . . [we] do bring a criminal charge, it will have a negative impact on the national economy, perhaps even the world economy, and I think that is a function of the fact that some of these institutions have become too large.[160]

If blockchain-based competition can cut into Wall Street's profits and deconcentrate the financial sector, the big banks' aura of invincibility may be pierced, potentially subjecting them to increased criminal and civil sanctions. In any event, to the extent peer-to-peer financial services, powered by blockchain, reduce reliance on financial intermediaries, the current era of enormous profits for Wall Street and Silicon Valley VCs could be nearing an end.

III. BLOCKCHAIN & ANTITRUST

Large financial institutions will not allow these transformations to occur without a fight, however. To ensure that fight is fair, antitrust authorities and regulators must consider how best to shape antitrust enforcement and competition policy for blockchain technologies. Much of the competition-related scholarship on blockchain has focused on the technology's potential impact on

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[158] *See, e.g.*, Rory Van Loo, *Making Innovation More Competitive: The Case of Fintech*, 65 UCLA L. REV. 232, 252–53 (2018) (arguing that blockchain "presents a potential mechanism for removing inefficient intermediaries" in financial services markets).

[159] *Id.* at 255 (explaining that financial innovation, led by fintech firms, has "the potential to reduce financial inequality").

[160] *Oversight of the U.S. Department of Justice: Hearing before the S. Comm. on the Judiciary*, 113th Cong. 43 (2013) (statement of Eric Holder, Att'y Gen. of the United States).

antitrust risks and enforcement, and the bulk of that literature has sounded dire warnings about blockchain's anticompetitive potential and the possibility that it will enable cartel members to escape prosecution.[161] These concerns are premature.

Blockchain's primary effect in the antitrust arena may be to facilitate collusion.[162] As a general matter, distributed ledgers make sharing information among participants easier. When that sharing includes competitively sensitive data, such as pricing information, firms may be able to use blockchains to form and maintain price-fixing cartels. Some have suggested that blockchains, combined with the Internet of Things and artificial intelligence, could serve to monitor adherence to a cartel agreement (for example by measuring and reporting production volumes) and automatically punish defectors through smart contracts.[163] Even without explicit collusive agreements, blockchain's enhanced information-sharing capabilities might facilitate tacit collusion among participants.[164]

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[161] *See, e.g.*, Schrepel, *supra* note 24, at 335 ("In the face of blockchain, current antitrust law may well be eliminated."); Thibault Schrepel, *Collusion by Blockchain and Smart Contracts*, 33 HARV. J.L. & TECH 117, 153 (2019) ("In short, mostly for technical reasons, blockchain greatly complicates the work of antitrust and competition agencies.").

[162] *See, e.g.*, Breu, *supra* note 24, at 6 (stating that using blockchain to "exchange . . . current and future pricing of a product or other similar competitively sensitive information could rapidly be deemed price fixing"); Izabella Kaminska, *Exposing the "If We Call It a Blockchain, Perhaps It Won't be Deemed a Cartel?" Tactic,* FIN. TIMES: ALPHAVILLE (May 11, 2015, 12:59 PM), https://ftalphaville.ft.com/2015/05/11/2128849/exposing-the-if-we-call-it-a-blockchain-perhaps-it-wont-be-deemed-a-cartel-tactic/ ("Why are the great and the good of the banking and financial services world suddenly extolling the virtues of blockchain . . . ? Possibly because they've finally figured out that what the technology really facilitates is cartel management for groups that don't trust each other but which still need to work together if they're to protect the value and stability of the markets they serve."); David C. Kully & Josias N. Dewey, *Blockchain Collaborators Should Be Attuned to Potential Antitrust Issues*, THOMSON REUTERS: CORP. COUNSEL CONNECT (Mar. 2017), https://legalsolutions.thomsonreuters.com/law-products/news-views/corporate-counsel/blockchain-collaborators-attuned-to-potential-antitrust ("[Blockchain] likely does provide another vehicle that members of a price-fixing cartel could employ to establish industrywide prices and ensure that members adhere to any agreement.").

[163] Deng, *supra* note 24, at 5 ("If the AI detects any deviation from the cartel agreement, it could trigger an automatic retaliatory response codified in the smart contract.").

[164] Cong & He, *supra* note 21, at 4 (arguing that the decentralized consensus generated on blockchains leads to participants' attaining "greater knowledge of aggregate business condition on the blockchain, which . . . can foster tacit collusion among sellers").

Another antitrust harm that might arise from blockchain use is anticompetitive access denial to permissioned ledgers. In the case of DTCC's blockchain-based, derivatives-processing network, for example, participating big banks potentially could disadvantage derivatives-dealing rivals by excluding them from the ledger.[165]

Price-fixing cartels and denial of access to competitively necessary facilities fall squarely within the ambit of standard antitrust theory and enforcement practice. The Antitrust Division of the U.S. Department of Justice is equipped to root out price-fixing conspiracies in a range of technological settings. In 2015, the Division prosecuted participants in a cartel that relied on algorithms to fix prices for posters sold on the Amazon Marketplace.[166] While the technology this cartel employed was different than that used in the proverbial smoke-filled rooms of the nineteenth and twentieth centuries, the Division and the Federal Bureau of Investigation were capable of uncovering the scheme and prosecuting the participants.[167] The Division's prosecutorial tools should prove as effective in the blockchain setting as in any other context. This is especially true of the Leniency Program, under which the Division grants prosecutorial immunity to cartel members who are first-in-the-door to report cartel activity and cooperate in the subsequent investigation.[168] This program is the Division's most effective criminal enforcement tool and it should operate equally well in prosecuting blockchain cartels as it does in more traditional industries.[169]

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[165] *See* Kully & Dewey, *supra* note 162 ("Use of a shared ledger as a settlement and clearance platform by financial services companies, for instance, could yield such significant benefits that excluded firms might raise objections.").

[166] Press Release, U.S. Dep't of Justice, Former E-Commerce Exec. Charged with Price Fixing in the Antitrust Div.'s First Online Marketplace Prosecution (Apr. 6, 2015), https://www.justice.gov/opa/pr/former-e-commerce-executive-charged-price-fixing-antitrust-divisions-first-online-marketplace.

[167] *Id.*

[168] *Leniency Program*, U.S. DEP'T OF JUSTICE, https://www.justice.gov/atr/leniency-program (last updated Feb. 20, 2020).

[169] *Id.* (stating that the Leniency Program is the Division's "most important investigative tool for detecting cartel activity"). *But see* Schrepel, *supra* note 161, at 163 (arguing that the "number of leniency applications may . . . drop because blockchain will reinforce trust during the lifetime of collusive agreements").

Denial of access to nodes on a clearinghouse blockchain would also represent an old story in a new technological setting. Indeed, accusations against big banks of anticompetitive access denial to clearing services pre-date the transition to blockchain. Plaintiffs in *In re Credit Default Swaps Antitrust Litigation* settled, for $2 billion, their claims that big banks used their positions on clearinghouse risk committees to refuse access to dealer rivals in a fashion that harmed competition.[170] These types of "essential facilities" or refusal-to-deal cases can be difficult for plaintiffs to win, but the theory of harm is familiar, regardless of the technological context.[171]

The same enhanced information-sharing and immutable record-keeping that might appeal to price-fixing cartels also could make blockchain-related antitrust enforcement *more* effective. A leniency applicant may give enforcers access to a permissioned blockchain, allowing them to observe the entire history and ongoing operation of a price-fixing cartel, an advantage difficult to duplicate without the blockchain.[172] Blockchains' ability to accurately preserve and offer easy access to data could reduce the burden of data collection and analysis in both merger and civil non-merger investigations.[173]

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[170] *In re* Credit Default Swaps Antitrust Litig., No. 13md2476 (DLC), 2016 WL 2731524, at *1–2 (S.D.N.Y. Apr. 26, 2016).

[171] Schrepel, *supra* note 24, at 309–12 (describing refusal to deal claims in the blockchain setting). Professor Thibault Schrepel, however, argues that blockchain poses certain new problems for antitrust enforcement, especially regarding determining relevant markets and attributing liability, due to blockchain's decentralized nature. *Id.* at 301–02.

[172] Ajinkya M. Tulpule, *Enforcement and Compliance in a Blockchain(ed) World*, 1 CPI ANTITRUST CHRON., Jan. 2017, at 4, https://ssrn.com/abstract=2906465 ("Using blockchain technology, leniency applicants will be able to provide access to a live data stream on all relevant transactions falling within the alleged cartel arrangement."); *see also* Robinson, *supra* note 29 ("The public image of bitcoin, cultivated by the media, is of the international criminal's currency of choice—an anonymous, untraceable means of laundering proceeds of crime. . . . [B]ut the opposite is true. Bitcoin is in fact the most transparent payment method ever developed, and has the potential to become a powerful tool in the fight against financial crime.").

[173] Tulpule, *supra* note 172, at 3–5 (discussing blockchains' utility in competition enforcement, including merger control, cartel investigations, and monitoring commitments); *see also* OECD BLOCKCHAIN AND COMPETITION, *supra* note 1, at 6 (arguing that granting competition agencies access to blockchains "might enable them to monitor trading prices in real-time, spot suspicious trends, and, when investigating a merger, conduct or market have immediate access to the necessary data without needing to impose burdensome information requests on parties").

Regulatory nodes on blockchains might allow agencies to detect anticompetitive conduct in real time.

Blockchain technology does present certain non-antitrust-specific challenges to the legal system that antitrust enforcers and plaintiffs may have to contend with. Blockchain users sometimes protect their identities using pseudonyms, which may make identifying them for purposes of legal sanctions difficult. So far, this issue is more theoretical than practical, as researchers have demonstrated that most blockchain users' identities can be uncovered,[174] and prosecutors have successfully linked individual defendants to blockchain transactions. A high-profile example of law enforcement's ability to pierce blockchain pseudonymity took place in the trial of Ross Ulbricht, who was accused of controlling Silk Road, an online bazaar offering drugs and various illegal services.[175] Prosecutors produced evidence of transactions between bitcoin addresses in Silk Road's digital wallet and Ross Ulbricht's digital wallet, which the FBI found on his seized laptop.[176] Ulbricht was convicted and sentenced to life in prison for operating Silk Road.[177] Further, in what appears to be among the earliest antitrust cases filed in the blockchain space, a plaintiff was able to identify the defendants, who are individuals and business entities.[178] Undoubtedly, blockchain designers will continue to strive toward

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[174] *See, e.g.*, Steven Goldfeder, Harry Kalodner, Dillon Reisman & Arvind Narayanan, *When the Cookie Meets the Blockchain: Privacy Risks of Web Payments via Cryptocurrencies*, PROC. ON PRIVACY ENHANCING TECHS., Oct. 2018, at 179 (showing "how third-party web trackers can deanonymize users of cryptocurrencies").

[175] *See* Press Release, U.S. Dep't of Justice, Ross Ulbricht, A/K/A "Dread Pirate Roberts," Sentenced in Manhattan Federal Court to Life in Prison (May 29, 2015), https://www.justice.gov/usao-sdny/pr/ross-ulbricht-aka-dread-pirate-roberts-sentenced-manhattan-federal-court-life-prison (describing Ulbricht's prosecution and sentencing).

[176] *See* Robinson, *supra* note 29 ("[An FBI agent] simply searched the bitcoin blockchain for transactions involving the bitcoin addresses found in the Silk Road wallet and those on Ross Ulbricht's laptop – and bingo, he found direct transactions between them.").

[177] *See* Press Release, U.S. Dep't of Justice, *supra* note 175.

[178] Complaint at 2–3, United Am. Corp. v. Bitmain, Inc., No. 1:18-cv-25106-KMW (S.D. Fla. Dec. 6, 2018) (identifying the defendants). Plaintiffs in this case allege that defendants conspired to use "significant computing hashing power" to "dominat[e] [a] Bitcoin Cash . . . software chain implementation." *Id.* at 10.

true anonymity for users, but to date this threat appears overblown.[179]

Another general enforcement challenge blockchain poses stems from its decentralized nature, which could make it tricky to effectively remedy unlawful conduct undertaken on these networks. Enforcing injunctions against an organization controlled by a disparate group of pseudonymous users may be difficult. Professor Thibault Schrepel warns that some blockchain networks will continue to operate even if governments sanction their developers.[180] This is not a substantive antitrust issue, but it may vex antitrust enforcers and plaintiffs who win judgments against blockchain networks. However, remedies, including injunctions, could be enforced against users, whose identities are not anonymous. Further, these problems will not necessarily arise in all or even in most blockchain-related antitrust cases.

There are reasons to believe that the antitrust laws are being underenforced generally, but that trend is broader than and separate from the growth of technology markets. As an enforcement matter, the antitrust laws have proved adaptable to technological change in the computer and Internet eras, and that flexibility should continue in the blockchain era.[181] The straightforward nature of the antitrust claims likely to arise out of blockchain networks reinforces this intuition.

IV. BLOCKCHAIN COMPETITION POLICY

While a limited body of scholarship addresses blockchain's implications for antitrust law and enforcement,[182] even less has

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[179] *See* Schrepel, *supra* note 24, at 323 (noting that "[t]here is every reason to believe that technology will move faster than regulators or authorities" to protect anonymity of blockchain users).

[180] *Id.* at 324 (noting that Augur, a blockchain-based "'prediction market platform,' has no central party that can stop its operation").

[181] *But see, e.g.*, Josh Obear, *Move Last and Take Things: Facebook and Predatory Copying*, 2018 COLUM. BUS. L. REV. 994, 1001 ("There is a growing body of scholarship criticizing current antitrust doctrine's failure to 'capture the architecture of market power in the twenty-first century marketplace,' especially for tech companies and Internet platform intermediaries." (quoting Lina M. Khan, Note, *Amazon's Antitrust Paradox*, 126 YALE L.J. 710, 716 (2017))).

[182] *See supra* note 24 and accompanying text.

been written on the broader competition-policy challenges blockchain networks pose. Like the Internet in the 1990s, blockchain is an incipient technology with the potential to upend a variety of established markets. Sector regulators will be tasked with establishing the ground rules for managing blockchain's competitive impact. Agencies charged with developing blockchain-related competition policy will confront at least three key challenges: (1) balancing the benefits of the increased competition blockchain networks will make possible against concerns for marketplace and consumer safety; (2) determining how much market decentralization to promote or tolerate; and (3) deciding whether and how to promote standardization, open-access, and non-discrimination requirements for blockchain networks. This Part analyzes the goals of blockchain competition policy, proposes a framework for addressing these three key challenges, and evaluates the capabilities of the institutions that will be responsible for implementing these policy choices.

A. GOALS

Making effective blockchain competition policy requires identifying the desired outcomes. Antitrust policy generally seeks to remove obstacles to competition with the goal of higher output and lower prices for consumers.[183] Proponents of antitrust enforcement argue that reducing anticompetitive conduct and concentrations of market power also tends to increase innovation and consumer choice.[184] Competition policy typically aims to achieve the same goals in a more interventionist fashion, but it often has broader objectives as well. Examples from the telecommunications sector—

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[183] *See, e.g.*, Herbert Hovenkamp, *Progressive Antitrust*, 2018 U. ILL. L. REV. 71, 97 ("The antitrust policy that is easiest to justify sticks to its essentially neoclassical roots, which means pursuing maximum output by maintaining market competition.").

[184] *See, e.g.*, William J. Kolasky, Deputy Assistant Att'y Gen., U.S. Dep't of Justice, Address at the International Bar Association: Conference on Competition Law and Policy in a Global Context (Mar. 18, 2002), https://www.justice.gov/atr/speech/comparative-merger-control-analysis-six-guiding-principles-antitrust-agencies-new-and-old ("The mission of an antitrust authority should, therefore, be to protect competition in all of its forms and varieties because competition is the one surefire way of guaranteeing that society's resources will be put to their most efficient use—keeping costs and the resulting prices low, and encouraging firms to innovate.").

the Telecommunications Act of 1996 (the 1996 Act) and the FCC's net neutrality rules—illustrate the point.

To encourage competition in the market for local telephone service, the 1996 Act required incumbent local exchange carriers (ILECs) to grant access to portions of their networks to competing providers at "nondiscriminatory" rates based on "the cost . . . of providing the interconnection," plus, if they wanted, "a reasonable profit."[185] It also restricted ILECs from entering the long-distance market unless they complied with a set of requirements designed to open their local markets to competition.[186] The Act's stated goals were to "promote competition and reduce regulation in order to secure lower prices and higher quality services for . . . consumers and encourage the rapid deployment of new telecommunications technologies."[187]

Similarly, in 2015, the FCC promulgated an Open Internet Order,[188] which set the rules of the road for competition in online services. The Order barred broadband providers from blocking consumer access to any lawful Internet content,[189] from degrading ("throttling") lawful Internet content[190] ("tantamount to blocking"),[191] and from engaging in "paid prioritization"—accepting compensation to provide faster service ("fast lanes") to certain content providers.[192] According to the FCC, the idea was "to ensure

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[185] 47 U.S.C. § 252(d)(1) (2012).

[186] *See id.* § 271(c); Jonathan E. Nuechterlein, *Incentives to Speak Honestly About Incentives: The Need for Structural Reform of the Local Competition Debate*, 2 J. ON TELECOMM. & HIGH TECH. L. 399, 401 (2003) (describing section 271 of the Telecommunications Act of 1996 as "the mechanism that keeps the largest ILECs, the Bell companies, from competing in the long distance market until they open their local markets to competition").

[187] Telecommunications Act of 1996, Pub. L. No. 104-104, 110 Stat. 56, 56.

[188] Protecting and Promoting the Open Internet, 30 FCC Rcd. 5601 (2015).

[189] *Id.* at 5607 ("A person engaged in the provision of broadband Internet access service . . . shall not block lawful content, applications, services, or non-harmful devices, subject to reasonable network management.").

[190] *Id.* ("A person engaged in the provision of broadband Internet access service . . . shall not impair or degrade lawful Internet traffic on the basis of Internet content, application, or service, or use of a non-harmful device, subject to reasonable network management.")

[191] *Id.*

[192] *Id.* at 5607–08 ("A person engaged in the provision of broadband Internet access service . . . shall not engage in paid prioritization," which is the "management of a broadband provider's network to directly or indirectly favor some traffic over other traffic . . . either (a)

that American communications networks develop in ways that foster economic competition, technological innovation, and free expression."[193] The agency reversed the Open Internet Order and repealed its conduct rules with its December 2017 Restoring Internet Freedom Order.[194] The stated aims of the repeal were to protect the open Internet while promoting investment in broadband deployment.[195]

The goals of net neutrality are to optimize the conditions for innovation and competition on the Internet.[196] As Professor Tim Wu put it in his seminal article coining the term, net neutrality's aim is to "preserv[e] a Darwinian competition among every conceivable use of the Internet so that . . . only the best survive."[197] Because the FCC determined that ex post antitrust enforcement might not sufficiently ensure this competitive environment, regulation mandating non-discrimination by broadband providers was deemed necessary (until the agency reversed itself).[198]

Blockchain technology raises competition-policy issues that are similar, but not identical, to those net neutrality addressed. Wu described the application of net neutrality as "no different than the challenge of promoting fair evolutionary competition in any privately owned environment."[199] This description mirrors, at least in part, the competition-policy challenge blockchain technology presents. In some instances—privately held blockchain-based derivatives clearinghouses are an example—the owners of a blockchain network might disadvantage certain users or rivals who need access to the network to compete.[200] Because the banks that control clearinghouses also compete in derivatives trading, they

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in exchange for consideration (monetary or otherwise) from a third party, or (b) to benefit an affiliated entity.").

[193] *Id.* at 5618.

[194] Restoring Internet Freedom, 33 FCC Rcd. 311, 312–13 (2018).

[195] *Id.* at 313.

[196] Wu, *supra* note 43, at 142–44.

[197] *Id.* at 142.

[198] *Protecting and Promoting the Open Internet*, 30 FCC Rcd. at 5608 ("Although there are arguments that some forms of paid prioritization could be beneficial, the practical difficulty is this: the threat of harm is overwhelming, [and] case-by-case enforcement can be cumbersome for individual consumers or edge providers . . . ." (footnote omitted)).

[199] Wu, *supra* note 43, at 142.

[200] *See, e.g.*, *supra* notes 152 & 171.

have strong incentives to discriminate against their trading rivals.[201] Such discrimination would threaten innovation, deter lower prices in derivatives trading, and lead to a competitive problem similar to that which net neutrality addressed. The challenges dominant private blockchains pose are also reminiscent of the competitive advantages ILECs held in local telephone service.[202] The analog to the Telecommunications Act would be a requirement that firms controlling those dominant blockchains, like derivatives clearinghouses, provide open and non-discriminatory access to downstream rivals.

Blockchain's competitive impact will be different than the Internet's in that, while there is only one Internet, there will be many blockchains. In some circumstances, the relevant issue will not be ensuring fair competition on a private platform, but rather managing competition among new and incumbent platforms, both blockchain-based and legacy-technology-based. The goals of increased innovation, lower prices, and more consumer choice should be consistent, however, whether regulators are dealing with competition on a single platform or competition among platforms.

B. THREE KEY CHALLENGES

Regulators making blockchain competition policy must confront three key challenges: (1) weighing the benefits of increased competition against threats to safety and soundness; (2) determining what is an acceptable degree of market decentralization; and (3) deciding how to handle standardization, open access, and non-discrimination issues on blockchain networks. How financial regulators meet these challenges will determine in large part whether blockchain technology will disrupt financial markets.

1. Competition v. Safety & Soundness. There will be instances, especially in the financial sector, where regulators will need to consider how much competition is desirable and if "excessive" competition might compromise other important policy goals,

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[201] *See* Griffith, *supra* note 100, at 1197 (asserting that the big banks may "use their influence over clearinghouses . . . as a means of increasing their market share and excluding competitors").

[202] *Cf. supra* notes 185–187 and accompanying text.

particularly consumer safety and systemic soundness. A boom in derivatives trading facilitated by public blockchain-based exchanges might lower prices for entering these contracts but create regulatory headaches for the SEC and CFTC in their efforts to limit systemic risk.[203] A similar logic may apply to financial fraud. A spike in ICOs, for example, may appear beneficial from a competition standpoint but also might open the door to widespread fraud that could stress the regulatory agencies' enforcement capabilities.[204]

Antitrust courts and enforcement agencies typically reject safety and soundness justifications for restraints on competition. In its 1978 decision in *National Society of Professional Engineers v. United States*, the U.S. Supreme Court stated that a party's attempt to justify a competitive restraint based on "the potential threat that competition poses to the public safety" amounted to "nothing less than a frontal assault on the basic policy of the Sherman Act."[205] That case involved a challenge to the National Society of Professional Engineers' canon of ethics, which barred members from participating in competitive bidding for their services.[206] Under the canon, members agreed not to negotiate or "even to discuss the question of fees" until after being chosen for a particular job.[207] If a prospective client insisted on receiving pricing information, the canon mandated that the member withdraw from consideration for the contract.[208] This policy made it difficult, or even impossible, for potential clients to compare prices for engineering services. The Court had no trouble determining that the agreement, on its face, was a restraint of trade under section 1 of the Sherman Act.[209] The Society, however, asserted that the restraint was justified because, in its absence, engineers would be

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[203] *See* Surujnath, *supra* note 22, at 291 ("Existing regulations may not be sufficient to address the risks posed by a blockchain derivatives market. . . . While blockchains can reduce the risk of over-centralization, . . . blockchain technology may create systemic risks of a different nature.").

[204] *See, e.g.*, Cohney et al., *supra* note 22, at 594 (arguing that ICOs are "a financial form ripe for fraud, and [they have] allegedly been used to that precise end").

[205] Nat'l Soc'y of Prof'l Eng'rs v. United States, 435 U.S. 679, 695 (1978).

[206] *Id.* at 681.

[207] *Id.* at 682–83.

[208] *Id.* at 683–84.

[209] *Id.* at 693.

tempted to make low bids on jobs and "do inferior work with consequent risk to public safety and health."[210]

The Court conceded that vigorous competition sometimes may threaten consumer safety: the downward pricing pressure competition creates in some circumstances can lead suppliers to cut corners and market flawed or dangerous products.[211] But the Sherman Act, the Court reasoned, embodies the idea that competition will result not only in lower prices, but also in higher quality goods and services.[212] Even if competition occasionally leads to lower quality or risky goods, the "statutory policy" underpinning the Sherman Act "precludes inquiry into the question whether competition is good or bad."[213] The Court stressed that engineers' frequent involvement in projects "significantly affecting the public safety" did not change the analysis: "[e]xceptions to the Sherman Act for potentially dangerous goods and services would be tantamount to a repeal of the statute."[214] In other words, the antitrust laws presume that competition will protect consumers both from higher prices and from unsafe goods and services.[215]

Financial regulatory agencies take a very different approach to the relationship between competition and safety and soundness. The SEC and CFTC have statutory mandates to consider competition in their work.[216] Nonetheless, rather than assuming that unfettered competition will lead to higher quality and safer financial offerings, these agencies prioritize direct measures to fight fraud and preserve systemic soundness while often ignoring their competition mandates in regulating the markets they oversee.[217]

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[210] *Id.*

[211] *Id.* at 694 ("[C]ompetition tends to force prices down and . . . an inexpensive item may be inferior to one that is more costly. There is some risk, therefore, that competition will cause some suppliers to market a defective product.").

[212] *Id.* at 695 ("The Sherman Act reflects a legislative judgment that ultimately competition will produce not only lower prices, but also better goods and services.").

[213] *Id.*

[214] *Id.*

[215] *See also* FTC v. Ind. Fed'n of Dentists, 476 U.S. 447, 462–64 (1986) (rejecting a patient-safety justification for a policy requiring federation members to deny insurers' requests for patient x-rays, which insurers would use to review claims for benefits).

[216] *See supra* note 38.

[217] *See, e.g.*, Stacey L. Dogan & Mark A. Lemley, *Antitrust Law and Regulatory Gaming*, 87 TEX. L. REV. 685, 698 (2009) ("The SEC . . . is first and foremost an investor-protection and information-disclosure agency, not an agency that investigates and weeds out cartels or other

This disfavoring of competition considerations has not gone unnoticed. In a 2018 speech, SEC commissioner Robert J. Jackson, Jr. warned that the SEC had "forgotten a crucial part of our mission: to pursue the kind of vigorous competition that American investors deserve."[218] He asserted that the agency has "stood by while power in our financial markets has become more concentrated than ever before," and he urged that the SEC "reclaim its historical role of ensuring competition" in U.S. capital markets.[219] The CFTC in some instances has stated a commitment to promoting competition,[220] but its enforcement record shows little tangible evidence that it devotes significant resources to independently pursuing competition cases; the vast majority of its enforcement efforts focus on investor protection and reducing systemic risk.[221]

The SEC's and CFTC's institutional cultures suggest that these agencies will favor traditional investor protection and systemic safety goals over maximizing competition when managing blockchain's impact on financial markets. This approach risks forfeiting the opportunity blockchain networks offer for remaking the financial sector. Another regulatory model exists, however, that better addresses tensions between competition goals and public safety, and which provides useful precedent for blockchain competition policy: telecommunications and Internet regulation.

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anticompetitive practices."); Robert A. Jablon, Anjali G. Patel & Latif M. Nurani, Trinko *and* Credit Suisse *Revisited: The Need for Effective Administrative Agency Review and Shared Antitrust Responsibility*, 34 ENERGY L.J. 627, 649–50 (2013) ("Even where agencies have express authority to include antitrust considerations within their regulatory functions, they often neglect to enforce antitrust principles fully in deference to other priorities that they deem more important as well as to needs that they consider more immediate.").

[218] Jackson, *supra* note 39.

[219] *Id.*

[220] *See, e.g.*, Gary Gensler, Chairman, Commodity Futures Trading Comm'n, Remarks, American Bar Association, Committee on Derivatives and Futures Law (Feb. 4, 2011), https://www.cftc.gov/PressRoom/SpeechesTestimony/opagensler-67 ("Competition is essential to well-functioning markets."); Reuben Jeffery III, Chairman, Commodity Futures Trading Comm'n, Opening Remarks, Hearing on Foreign Boards of Trade (June 27, 2006), https://www.cftc.gov/PressRoom/SpeechesTestimony/opajeffery-11 ("[T]he Commission hopes to help foster a competitive level playing field, all the while avoiding interference with legitimate market forces and competition.").

[221] *See* Samuel N. Weinstein, *Financial Regulation in the (Receding) Shadow of Antitrust*, 91 TEMP. L. REV. 447, 490 n.317 (2019) (reviewing CFTC independent enforcement actions from 2017 and concluding that only one arguably involved a competition violation).

While promoting a general policy of non-discrimination—which encourages competition—net neutrality principles allow for broadband providers to discriminate against harmful or fraudulent applications.[222] Put another way, net neutrality prohibits discrimination against any third-party content or applications, unless they harm consumers or network infrastructure. The same principle animated earlier telecommunications regulations, such as the 1957 FCC order requiring AT&T to rescind tariff regulations to the extent that they barred customers from attaching to their phones "any . . . device which does not injure [AT&T's] employees, facilities, the public in its use of [AT&T's] services, or impair the operation of the telephone system."[223] Similarly, the FCC's 1968 *Carterfone* decision invalidated a tariff AT&T had filed barring any non-AT&T equipment from being attached or connected to the phone system.[224] The FCC found that the Carterfone, which allowed users to connect a telephone to a two-way radio by placing the telephone handset in a cradle on the Carterfone device, "fill[ed] a need[]" and did "not adversely affect the telephone system."[225] The *Carterfone* ruling opened the telephone equipment market to competition.[226]

Financial regulators should take a similar approach to rulemaking and enforcement for blockchain-based financial-

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[222] *See, e.g.*, Protecting and Promoting the Open Internet, 30 FCC Rcd. 5601, 5622 (2015) (explaining that the Open Internet Order's restrictions on Internet service providers blocking or discriminating against certain content and applications were "subject to an exception for 'reasonable network management,' allowing service providers the freedom to address legitimate needs such as avoiding network congestion and combatting harmful or illegal conduct"); Wu, *supra* note 43, at 169 (advocating for "the practice of requiring public harm to justify" discrimination against certain content and applications); Nicholas Economides, *"Net Neutrality," Non-Discrimination and Digital Distribution of Content Through the Internet*, 4 I/S 209, 217 (2008) ("The decentralization of the Internet based on 'net neutrality' facilitated innovation resulting in successes such as the creation of the World Wide Web, Google, MSN, Skype, Yahoo, etc.").

[223] Hush-A-Phone Corp. v. AT&T Co., 22 F.C.C. 112, 114 (1957).

[224] Use of the Carterfone Device in Message Toll Tel. Serv., 13 F.C.C. 2d 420, 421, 426 (1968).

[225] *Id.* at 423.

[226] *See* Mark A. Lemley & David McGowan, *Legal Implications of Network Economic Effects*, 86 CALIF. L. REV. 479, 549–50 (1998) ("Beginning in the late 1960s with the *Carterfone* decision, the FCC grudgingly began to allow competition into . . . the equipment . . . market." (footnote omitted)).

services networks. As a default, to encourage competition and innovation, regulation should require non-discrimination on blockchain networks while allowing networks to discriminate against applications that would harm the network or the public. Participants in a private, blockchain-based, derivatives-clearing network should have the authority to bar traders who are perpetrating a fraud or who represent unreasonable credit risks. That being said, close regulatory oversight of this authority is advisable. Considering the big banks' penchant for using bogus or exaggerated safety and soundness considerations to disadvantage derivatives-trading rivals, the SEC and CFTC must carefully monitor exercise of alleged safety-based discrimination for competitive abuses. The burden should be on discriminating firms to produce a persuasive safety-based rationale for disadvantaging specific users or applications.

Further, as a general matter, the agencies should recognize the ways in which blockchain networks provide enhanced consumer safety as compared to incumbent technologies. Transactions and other data recorded on blockchains are more difficult to alter or manipulate than data stored on centralized systems, thereby offering users better protection against fraud.[227] Regulators should weigh this enhanced security when considering rules governing blockchain competition.

As described in more detail below, the agencies currently appear to be erring on the side of public safety at the expense of promoting blockchain-related competition and innovation, but there are hopeful indications that they may strike a more beneficial balance in the future.

2. How Much Decentralization Should Regulators Promote or Tolerate? Related to the challenge of weighing competition benefits against threats to consumer and systemic safety is the level of

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[227] *See* Michael A. Holmes, *Blockchain and the Future of Banking*, 24 No. 12 WESTLAW J. BANK & LENDER LIABILITY 01 (2018) ("[B]lockchain is much more secure than any other commercially available system currently on the market."); Divya Joshi, *How Secure Is Cryptocurrency and Blockchain Technology? Security Benefits and Issues of DLT*, BUS. INSIDER (Jan. 14, 2020, 11:18 AM), https://www.businessinsider.com/cryptocurrency-blockchain-security ("As [blockchain] data cannot be overwritten, data manipulation is extremely impractical, thus securing data and eliminating centralized points that cybercriminals often target.").

decentralization regulators should promote or tolerate in financial markets. A key attribute of blockchain networks is that they are distributed and decentralized: trusted central gatekeepers and platforms are not required to verify and record transactions. As a result, end users can directly enter financial-services transactions without employing the services of incumbent financial institutions. As mentioned, this decentralization likely benefits competition because it threatens the oligopolistic control big banks exercise over a range of financial markets. But decentralization and deconcentration create regulatory challenges. As Professor William Magnuson has argued, market decentralization makes monitoring emerging risks more difficult for regulators.[228] Magnuson also contends that while Dodd–Frank and much of the academic literature on systemic risk has focused on the largest financial institutions, smaller, decentralized market participants also present systemic risks.[229] Financial-sector regulators post-Dodd–Frank have appropriately centered their attention on a short list of giant financial institutions that—while posing significant systemic risks—also are well known to regulators, heavily regulated, and subject to broad disclosure requirements.[230] Decentralization will complicate this picture and force regulators to confront a new and different set of challenges.

Nonetheless, decentralization and deconcentration of financial-services markets promise significant benefits to consumers that might have important spillover effects for the broader economy. Regulatory policies that encourage innovation and competition on and among blockchain-based financial-services networks, and between those networks and incumbent providers, should serve traditional antitrust goals of lowering prices and increasing output. But such policies also might achieve broader economic and social ends.

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[228] *See* Magnuson, *supra* note 45, at 1205, 1207 (noting that "decentralization serves as a barrier to effective monitoring" and that "by contributing to the fragmentation of finance, fintech may be obscuring risk").

[229] *Id.* at 1199–1204 (describing the systemic risks posed by smaller, decentralized, fintech firms).

[230] *Id.* at 1205 ("[R]egulators . . . benefit from the fact that the relevant players are readily identifiable and their behaviors are subject to extensive disclosure requirements.").

In recent years, a prominent critique has emerged of antitrust law's singular focus on consumer welfare.[231] Critics argue that this prevailing approach fails to account for the deleterious effects of firm size when it does not result in higher consumer prices.[232] They point to damage to the political process, economic liberty, and labor as harms insufficiently ameliorated by current antitrust policy.[233] Decentralizing and deconcentrating the financial sector would address at least some of these broader issues by reducing the power and influence of the biggest financial institutions.

The largest and most influential financial firms have controlled a variety of financial-services markets for an extended period.[234] In particular, Wall Street banks and Silicon Valley VCs dominate access to capital, and big banks control most trading of financial products.[235] Blockchain-based networks present an opportunity to

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[231] *See, e.g.*, Lina M. Khan, Note, *Amazon's Antitrust Paradox*, 126 YALE L.J. 710, 716 (2017) ("[T]he current framework in antitrust—specifically its equating competition with 'consumer welfare,' typically measured through short-term effects on price and output—fails to capture the architecture of market power in the twenty-first century marketplace." (footnote omitted)).

[232] *See id.* at 722 ("[I]t is fair to say that a concern for innovation or non-price effects rarely animates or drives investigations or enforcement actions—especially outside of the merger context.").

[233] *See, e.g.*, TIM WU, THE CURSE OF BIGNESS: ANTITRUST IN THE NEW GILDED AGE 16 (2018) ("Are extreme levels of industrial concentration actually compatible with the premise of rough equality among citizens, industrial freedom, or democracy itself? . . . The questions, I think, answer themselves.").

[234] *See, e.g.*, Felix B. Chang, *Second-Generation Monopolization: Parallel Exclusion in Derivatives Markets*, 2016 COLUM. BUS. L. REV. 657, 698 ("[T]he membership profile of the dominant . . . clearinghouses has remained unchanged from year to year."); Arnold, *supra* note 18 ("Wall Street's top groups . . . [have] establish[ed] a seemingly unshakeable dominance in global corporate and investment banking.").

[235] *See, e.g.*, OFFICE OF THE COMPTROLLER OF THE CURRENCY, QUARTERLY REPORT ON BANK TRADING AND DERIVATIVES ACTIVITIES: SECOND QUARTER 2018, at 3 (2018), https://www.occ.gov/topics/capital-markets/financial-markets/derivatives/pub-derivatives-quarterly-qtr2-2018.pdf ("A small group of large financial institutions continues to dominate trading and derivatives activity in the U.S. commercial banking system."); Hurt, *supra* note 19, at 705 (noting that in "[t]he market for initial public offerings . . . [a] small number of investment banks and the underwriters and brokers they employ act as intermediaries that distribute and market offerings for a substantial fee"); Mollick, *supra* note 19, at 4 ("For at least a quarter century, technology entrepreneurship has been largely . . . defined by the Silicon Valley model . . . . In that model, venture capital firms serve as a key actor, and are often considered to be the most important actors in the system outside of the entrepreneurs themselves." (citations omitted)).

undermine this dominance, offering individuals and firms greater freedom in how they consume financial services. This shift might achieve distributive ends as well. Historically, access to financial services has been limited by class and race.[236] Public blockchain-based financial services could broaden opportunities for firms and individuals from underrepresented populations to raise capital and enter the financial markets.[237] This may benefit the political process, too. For decades, the biggest financial institutions have had enormous political sway.[238] Increased competition in some of their core businesses—including capital formation and financial-products trading—might reduce that influence. In theory, blockchain competition policy that promotes decentralization can both satisfy traditional antitrust aims and tackle some of the broader societal harms that concern advocates for antitrust reform.

While the regulatory challenges decentralization poses are real, technological factors might mitigate these risks. Requiring all permissioned financial blockchain networks to open a regulatory node through which their assigned oversight agency can actively monitor the network is technologically feasible, and the financial regulators should mandate such access.[239] Even if the amount of information that flows through these nodes is too large for the financial regulators to monitor all of it effectively, the mere threat that regulators can see everything recorded on a blockchain may reduce fraud on these networks. The permanence of information

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[236] *See, e.g.*, Gordon, *supra* note 20, at 189, 209 (demonstrating that the Federal Housing Authority's mortgage insurance program "systematically discriminated against African-Americans," resulting in "much lower rates of lending to nonwhites than to whites"); Pantin, *supra* note 20, at 442 ("[A]s a practical matter, startup funding almost exclusively goes to White men." (footnote omitted)).

[237] *See, e.g.*, Amit Sharma, *Underbanked Households Would Benefit from a Regulated Blockchain*, AM. BANKER (Aug. 26, 2020, 11:41 AM) https://www.americanbanker.com/opinion/if-blockchain-is-regulated-underbanked-households-will-benefit ("Already there are targeted and tested applications of blockchain that can help small businesses, underserved individuals and local communities weather the coronavirus pandemic.").

[238] *See, e.g.*, Arthur E. Wilmarth, Jr., *Turning a Blind Eye: Why Washington Keeps Giving in to Wall Street*, 81 U. CIN. L. REV. 1283, 1291 (2013) ("[T]he financial industry has shown a continuing ability to influence politicians and regulators.").

[239] *See* CFTC TAC MEETING, *supra* note 1, at 55–56 (statement of Dan Bucsa) (observing that regulatory nodes in distributed ledger technology offer regulators advantages, including better access to data and "near real time" market oversight).

stored on blockchains increases the benefits of these regulatory nodes; network users will find it difficult to deceive regulators by manipulating transaction records, so they may not even try.[240] Blockchain's immutability also serves to combat fraud more generally and makes blockchain networks safer in this regard than other kinds of financial networks where data manipulation is more easily accomplished.[241]

Again, the development and regulation of the Internet should serve as a useful model for the regulation of blockchain networks. At least in its early form, the Internet offered a decentralized space for commerce and innovation.[242] That radical decentralization proved to be fertile ground for the many types of Internet-based fraud that quickly emerged.[243] Yet regulators declined to take a heavy-handed approach to Internet governance.[244] The Clinton Administration's 1997 Framework for Electronic Commerce advised that "[t]he private sector should lead" the development of electronic commerce on the Internet, and "governments should encourage

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[240] *See The Blockchain Is No Mere Hype Train*, ASS'N CERTIFIED FRAUD EXAMINERS, https://www.acfe.com/fraud-examiner.aspx?id=4294992645 (last visited Feb. 6, 2021) ("Because the ledger is permanent, public and decentralized, it is incredibly difficult to defraud."); *see also supra* notes 52–54.

[241] *See, e.g.*, Magnuson, *supra* note 45, at 1185 (asserting that "[t]he distributed and consensual nature of the [blockchain-based virtual currency] networks gives users greater confidence that fraudulent transactions will be identified and prevented").

[242] *See, e.g.*, William S. Byassee, *Jurisdiction of Cyberspace: Applying Real World Precedent to the Virtual Community*, 30 WAKE FOREST L. REV. 197, 200–01 (1995) ("[T]he Internet is . . . distributed . . . . It has no central governing authority . . . ." (footnote omitted)); Frances E. Zollers, Peter Shears & Sandra N. Hurd, *Fighting Internet Fraud: Old Scams, Old Laws, New Context*, 20 TEMP. ENVTL. L. & TECH. J. 169, 172 (2001) ("In the early days of the Net, people referred to it as borderless, 'cyberspace,' a 'magical world.'" (footnotes omitted)).

[243] Zollers et al., *supra* note 242, at 169 (stating that "[t]he Internet provides a bold new frontier" for "[c]on artists, scamsters, and opportunists" to "perpetrate old frauds").

[244] *See, e.g.*, Philip J. Weiser, *The Future of Internet Regulation*, 43 U.C. DAVIS L. REV. 529, 531 (2009) ("[The FCC] self-consciously adopted a policy of 'non-regulation' toward the Internet during its emergence as an important commercial network."); William J. Clinton & Albert Gore, Jr., *A Framework for Global Electronic Commerce*, https://clintonwhitehouse4.archives.gov/WH/New/Commerce/read.html (last visited Feb. 7, 2021) ("Governments can have a profound effect on the growth of commerce on the Internet. By their actions, they can facilitate electronic trade or inhibit it. Knowing when to act and—at least as important—when not to act, will be crucial to the development of electronic commerce.").

industry self-regulation wherever appropriate" and "avoid undue restrictions on electronic commerce."[245]

The Framework recommended limited government intervention in e-commerce markets to "ensure competition, protect intellectual property and privacy, prevent fraud, foster transparency, support commercial transactions, and facilitate dispute resolution."[246] This strategy did not favor fraud prevention over decentralized competition. Instead, it took the opposite approach: promoting competition despite the risks of Internet-based fraud. The Framework advised that "[c]ommerce on the Internet could total tens of billions of dollars by the turn of the century," but "[f]or this potential to be realized fully, governments must adopt a non-regulatory, market-oriented approach to electronic commerce."[247] It concluded that "widespread competition and increased consumer choice should be the defining features of the new digital marketplace."[248]

While the Internet in recent years has become increasingly centralized, as a handful of powerful platforms have come to dominate many online industries, this initial permissiveness toward decentralization allowed for tremendous innovation that revolutionized markets.[249] A similar approach to blockchain regulation, one that would allow for decentralization of financial markets, is preferable to policies that would prioritize centralization and concentration to ease consumer-safety and systemic-risk regulation. Decentralized blockchain-based competition might

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[245] Clinton & Gore, *supra* note 244. For a discussion of the Framework's influence, see Henry H. Perritt, Jr., *The Internet at 20: Evolution of a Constitution for Cyberspace*, 20 WM. & MARY BILL RTS. J. 1115, 1122 (2012) (describing the Framework for Global Electronic Commerce as having "seminal and continuing influence" and being "analogous to the *Federalist Papers* in articulating constitutional principles for the Internet").

[246] Clinton & Gore, *supra* note 244.

[247] *Id.*

[248] *Id.*

[249] *See, e.g.*, Llewellyn Joseph Gibbons, *No Regulation, Government Regulation, or Self-Regulation: Social Enforcement or Social Contracting for Governance in Cyberspace*, 6 CORNELL J.L. & PUB. POL'Y 475, 484 (1997) ("Under the current laissez-faire approach, cyberspace has experienced exponential growth measured by the total number of users, total volume or dollar value of commerce, and the advancement of the technology."); Mark Lemley, David S. Levine & David G. Post, *Don't Break the Internet*, 64 STAN. L. REV. ONLINE 34, 37 (2011) ("[T]he Internet's uniquely decentralized structure . . . serve[s] as a global platform for innovation, speech, collaboration, civic engagement, and economic growth.").

complicate regulation and increase opportunities for fraud, but the competitive payoff should be worth the risk.

3. Standardization, Open Access, & Non-Discrimination. A third key issue blockchain regulators will face is whether and how to promote standardization, open access, and non-discrimination on blockchain networks.[250] The development of the Internet benefitted from early government commitments to standardization and open access.[251] The Internet's basic architecture has remained nonproprietary (although portions of its infrastructure are now privately owned),[252] and scholars have argued that this openness created fertile conditions for innovation.[253] The FCC's commitment for many years to net neutrality principles ensured open and non-discriminatory access for commercial applications on the Internet, preserving its innovative and competitive environment.[254] Similar standardization and open-access issues are sure to arise in the blockchain setting.

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[250] *See* Giovanna Massarotto, From Digital to Blockchain Markets. What Role for Antitrust and Regulation 20 (Jan. 26, 2019) (unpublished manuscript), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3323420 ("[A] public universal blockchain might need rules to guarantee non-discrimination among market players.").

[251] *See* Philip J. Weiser, *The Internet, Innovation, and Intellectual Property Policy*, 103 COLUM. L. REV. 534, 537 (2003) ("During the Internet's early years, the U.S. government supported and encouraged a culture of nonproprietary development that self-consciously protected the Internet's open and layered architecture."). Weiser argued that "[t]he essence" of the Internet's "open architecture was a commitment to using a platform standard that both Internet users and providers of Internet content (and services) could access easily without either limits on the use of the network or proprietary gatekeepers who could charge for access to the standard." *Id.*

[252] *Id.* at 536 (explaining that "the Internet's basic standard—the Transmission Control Protocol and Internet Protocol (TCP/IP) . . . remains nonproprietary").

[253] *Id.* at 537 ("[The Internet's] open platform standard . . . has enabled Internet application developers to create new products and services and users to adopt those products easily, thereby creating a virtuous circle of an increasing number of applications and users for Internet [content]." (footnote omitted)).

[254] While the FCC codified net neutrality in its 2015 Open Internet Order, Protecting and Promoting the Open Internet, 30 FCC Rcd. 5601 (2015), the agency had promoted net neutrality in various ways before 2015, including by issuing a 2010 Open Internet Order implementing net neutrality. *See* Preserving the Open Internet, Broadband Industry Practices 25 FCC Rcd. 17905 (2010). The U.S. Court of Appeals for the District of Columbia struck down key portions of the 2010 rule in January 2014. *See* Verizon v. FCC, 740 F.3d 623, 628 (D.C. Cir. 2014).

As a general matter, standard setting is often procompetitive.[255] Standards promote interoperability and allow manufacturers to innovate and compete to provide products conforming to the standard.[256] The standard-gauge railroad track is an example of these interoperability benefits,[257] as is competition among smartphone manufacturers, which is made possible in part by wireless network standards.[258] By requiring some degree of product uniformity, standards typically make it easier for consumers to compare competing offerings. Standards are also thought to lower barriers to entry for new competitors and to reduce the costs of introducing and marketing conforming products.[259]

But standard-setting can be abused. Typically, standards either are developed by private standard-setting organizations (SSOs) or government agencies, or they are created through market competition in a "standards war." When competitors come together in an SSO to collaboratively develop a standard, there is a risk of

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[255] *See, e.g.*, Allied Tube & Conduit Corp. v. Indian Head, Inc., 486 U.S. 492, 501 (1988) ("[P]rivate standards can have significant procompetitive advantages."); James J. Anton & Dennis A. Yao, *Standard-Setting Consortia, Antitrust, and High-Technology Industries*, 64 ANTITRUST L.J. 247, 248 (1995) ("There is a general consensus that standards provide a wide variety of substantial procompetitive benefits.").

[256] *See* J. Gregory Sidak, *The Value of a Standard Versus the Value of Standardization*, 68 BAYLOR L. REV. 59, 61 (2016) ("Standardization enables better interoperability between devices and network elements produced or operated by different parties."); Letter from Renata B. Hesse, Acting Assistant Att'y Gen., U.S. Dep't of Justice, to Michael A. Lindsay (Feb. 2, 2015), https://www.justice.gov/atr/response-institute-electrical-and-electronics-engineers-incorporated ("Standards offer significant procompetitive benefits. For example, standards can facilitate product interoperability, ensuring that products from a variety of suppliers will work together efficiently . . . ." (footnote omitted)).

[257] *See* Peter S. Menell, *Economic Analysis of Network Effects and Intellectual Property*, 34 BERKELEY TECH. L.J. 219, 226 (2019) ("Standardized railroad gauge, for example, supported far-reaching railroad networks, promoted competition in locomotive and railcar markets, and enabled interconnected rail services.").

[258] *See, e.g.*, Kirti Gupta, *Technology Standards and Competition in the Mobile Wireless Industry*, 22 GEO. MASON L. REV. 865, 869 (2015) ("Technology standards reside at the heart of [the mobile wireless] industry. Without common standards, users would not experience the worldwide interoperability and interconnectivity across mobile devices at the core of wireless's business and consumer appeal.").

[259] *See, e.g.*, Rambus, Inc. v. Infineon Techs. AG, 330 F. Supp. 2d 679, 696 (E.D. Va. 2004) ("[N]ew producers have easier entry into a market when standards exist . . . . [A] standardized technology core also lowers a company's cost of developing a next generation product[, and] producers have lower marketing costs in bringing products to a predefined, standardized market.").

various forms of anticompetitive conduct. As the U.S. Supreme Court has warned, SSOs "can be rife with opportunities for anticompetitive activity."[260] For example, powerful incumbents could abuse the standard-setting process to choose a favored technology or set of technologies over a nascent competitor's potentially more efficient technology or set of technologies.[261] Or, once a standard is set, SSO members may try to gain a competitive advantage by falsely asserting to potential customers that competitors' products or services do not comport with the standard and are unsafe or unreliable.[262] These forms of abuse could harm competition in blockchain networks.

Many standards are developed by government agencies rather than private SSOs. The anticompetitive risks of government standard-setting stem from the potential for market participants to influence the standard-setting process to favor their proprietary technologies. Because government standards often have the force of law, they can grant significant market power to firms with intellectual property (IP) rights included in the standard.[263] Firms therefore may pressure the government to incorporate their technologies in a standard or to adopt a privately created standard.[264] These risks might arise should government agencies decide to set blockchain-related standards.

The risks of anticompetitive conduct relating to a standard are particularly acute when incorporated technologies are protected by IP rights. Before a standard is set, technologies can compete to become part of the standard. Once the standard is established,

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[260] Am. Soc'y of Mech. Eng'rs, Inc. v. Hydrolevel Corp., 456 U.S. 556, 571 (1982).

[261] *See, e.g.*, Allied Tube & Conduit Corp. v. Indian Head, Inc., 486 U.S. 492, 495–99 (1988) (finding no *Noerr* antitrust immunity for members of an SSO that had conspired to exclude a competing technology from a standard for electrical conduit).

[262] *See, e.g.*, *Am. Soc'y of Mech. Eng'rs*, 456 U.S. at 571–73 (holding that an SSO is subject to antitrust liability when its agent violates the antitrust laws by issuing an interpretation of a standard that inaccurately declares a competitor's product to be unsafe).

[263] *See, e.g.*, Union Oil Co. of Cal., 138 F.T.C. 1, 2 (2004) (addressing allegations that "[a] private business . . . induce[d] a government body to issue regulatory standards that conferred market power upon the firm").

[264] *See, e.g.*, *Allied Tube & Conduit Corp.*, 486 U.S. at 511 (White, J., dissenting) (discussing application of *Noerr* antitrust immunity to "private organizations, such as the National Fire Protection Association (NFPA), that regularly propound and publish health and safety standards for a variety of products and industries and then present these codes to state and local authorities for the purpose of having them enacted into law").

however, firms with IP rights covering technologies incorporated in the standard can charge royalties to firms building products that conform to the standard. This scenario offers IP holders the power to "hold up" implementers of the standard for higher royalties on their "standard essential patents" (SEPs) than they could have charged before their technology was incorporated in the standard.[265] With this risk of hold-up in mind, SSOs typically require members to disclose any IP rights they possess over technologies that the SSO might include in a standard and to commit to licensing their SEPs on fair, reasonable, and non-discriminatory terms.[266]

As discussed in detail below, incumbent financial firms already are moving to create blockchain-related standards and patent blockchain technologies.[267] Under the Trump Administration, the Antitrust Division of the U.S. Department of Justice signaled that it was unlikely to pursue cases involving SEP hold-up claims, and the Division generally appeared inclined to favor IP holders in disputes with implementers.[268] This stance may change in the Biden Administration, but to prevent anticompetitive standard-setting abuses and preserve open and non-discriminatory access to blockchain technology and platforms, Congress and the sector regulators may need to act. Otherwise, incumbent financial-services

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[265] *See* Joseph Scott Miller, *Standard Setting, Patents, and Access Lock-In: RAND Licensing and the Theory of the Firm*, 40 IND. L. REV. 351, 366 (2007) ("Patent license disputes from outside the SSO context suggest that if participants were to wait until after the standard were set before working out any license terms those who turned out to own essential patents could hold up patentless adopters for a disproportionate share of the standardized technology's substantial coordination value.").

[266] *See* Mark A. Lemley & Carl Shapiro, *A Simple Approach to Setting Reasonable Royalties for Standard-Essential Patents*, 28 BERKELEY TECH. L.J. 1135, 1136–37 (2013) ("The vast majority of standard-setting organizations ('SSOs') require their members to commit to license any standard-essential patents on fair, reasonable, and non-discriminatory ('FRAND') terms. These FRAND commitments . . . promote the standard by assuring companies implementing the standard that they will not be blocked from bringing their products to market or held up so long as they are willing to pay reasonable royalties for any standard-essential patents . . . ." (footnote omitted)).

[267] *See infra* Section V.D.

[268] *See, e.g.*, Makan Delrahim, Assistant Att'y Gen., Antirust Div., U.S. Dep't of Justice, Antitrust Law and Patent Licensing in the New Wild West 2 (Sept. 18, 2018), https://www.justice.gov/opa/speech/file/1095011/download ("[T]he theory and evidence of unilateral 'hold-up' by patent-holders does not provide an adequate basis to condemn such conduct under the antitrust laws generally.").

firms may manipulate standards and use control over blockchain-related IP to quash competition and preserve their dominant positions in financial markets.

C. INSTITUTIONS

Developing effective blockchain competition policy not only requires articulating and pursuing clear goals but also taking into account the capabilities of the institutions that will make and enforce that policy. Understanding the prospects for blockchain competition policy in the financial markets requires evaluating the role and capacities of the SEC and CFTC as competition policy makers and enforcers.

The financial regulatory agencies have recognized the growing significance of blockchain-based networks in the markets they oversee.[269] The SEC has appointed a senior advisor for digital assets and innovation to coordinate the agency's response to the growth of cryptocurrencies and ICOs.[270] The CFTC's Technology Advisory Committee, in February 2018, approved subcommittees dedicated to cryptocurrencies and blockchains.[271] Both agencies have brought several enforcement actions related to cryptocurrencies and ICOs.[272] In 2019 alone, the SEC initiated seventeen digital

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[269] *See, e.g.*, Brian Quintenz, Comm'r, Commodity Futures Trading Comm'n, Keynote Address Before the DC Blockchain Summit (Mar. 7, 2018), https://www.cftc.gov/PressRoom/SpeechesTestimony/opaquintenz8 (describing growth of cryptocurrencies and blockchain-based technologies as a "technological revolution, which promises to transform the building blocks not just of our financial markets, but of commerce in general").

[270] Press Release, U.S. Sec. & Exch. Comm'n, SEC Names Valerie A. Szczepanik Senior Advisor for Digital Assets and Innovation (June 4, 2018), https://www.sec.gov/news/press-release/2018-102.

[271] CFTC TAC MEETING, *supra* note 1, at 80, 149 (approving subcommittees on "distributed ledger technology" and "virtual currencies").

[272] *See, e.g.*, CFTC v. McDonnell, 287 F. Supp. 3d 213, 216 (E.D.N.Y. 2018) (granting the CFTC injunctive relief in a case alleging that defendants had "operated a deceptive and fraudulent virtual currency scheme . . . for purported virtual currency trading advice" and "for virtual currency purchases and trading . . . and simply misappropriated [investor] funds" (alterations in original) (quoting Complaint at 1, CFTC v. McDonnell, 287 F. Supp. 3d 213 (E.D.N.Y. 2018) (No. 1:18-cv-00361)); SEC v. Plexcorps, No. 17-cv-7007, 2018 WL 3038500, at *4 (E.D.N.Y. June 19, 2018) (granting the SEC a preliminary injunction in a case involving alleged fraudulent and unregistered sale of securities in an ICO).

asset/ICO enforcement actions, and the agency brought another twenty-three cases in 2020.[273]

The SEC and CFTC have statutory mandates to protect competition in financial markets.[274] As some scholars have argued, however, history, theory, and data suggest that the financial regulatory agencies are not particularly willing or effective competition enforcers.[275] Several explanations for this deficiency exist, but perhaps the most persuasive is that, despite their statutory mandates, competition is a low priority for the financial regulators as compared to what they perceive to be their primary missions: maintaining systemic soundness and preventing financial fraud.[276] Achieving the broad economic and social transformations that blockchain-based competition may make possible in the financial markets likely will require regulators to place competition on an equal or near-equal footing with systemic soundness and anti-fraud efforts. Active competition-directed policymaking and enforcement would be necessary. These agencies' organization and cultures, with their lack of competition expertise and personnel and their strong commitment to non-competition goals (sometimes at the expense of competition), suggest that they may be uncertain stewards for a competitive remaking of the financial markets.

The contrast between the SEC and CFTC on the one hand and the FCC on the other is instructive. The latter agency has a dedicated competition unit and experienced competition lawyers.[277]

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[273] *See Cyber Enforcement Actions*, U.S. SEC. & EXCH. COMM'N, https://www.sec.gov/spotlight/cybersecurity-enforcement-actions (last visited Feb. 7, 2021).

[274] *See supra* note 38.

[275] *See* Dogan & Lemley, *supra* note 217, at 698 ("[The SEC] is unlikely to devote much in the way of time or resources to [stopping anticompetitive conduct], because even if it is tasked to consider such issues, they do not reflect the agency's primary purpose."); Weinstein, *supra* note 221, at 491 ("It seems clear that the financial services agencies are either unwilling or unable to 'perform the antitrust function' as envisioned by the Supreme Court's case law balancing antitrust and regulation.").

[276] *See* Dogan & Lemley, *supra* note 217, at 697–98 ("Even those agencies [like the SEC] whose mission expressly involves the consideration of competition issues will not necessarily make it their first among potentially conflicting priorities.").

[277] *See Competition Policy Division, Wireline Competition Bureau*, FED. COMMC'NS COMM'N, https://www.fcc.gov/general/competition-policy-division-wireline-competition-bureau (last visited Feb. 7, 2021) (showing that the FCC's Competition Policy Division is housed in its Wireline Competition Bureau and its "primary mission is to foster competition in the provision of communications services").

When the FCC determines that effective competition enforcement requires further expertise, it calls on outside antitrust lawyers to assist in particular investigations.[278] Its organization and actions demonstrate that the FCC takes competition policy and enforcement seriously. The financial regulators to date have not approached competition matters in the same systematic fashion.

Nonetheless, there are some hopeful signs that, where competition is consistent with these agencies' other goals, the SEC and CFTC may actively encourage new entrants and disruptive innovation. As discussed in detail below, cryptocurrencies, token sales, and equities settlement services are examples of areas where the SEC and CFTC already appear to appreciate the competitive promise of blockchain technology, and they are evaluating regulations with that promise in mind. Individual commissioners at both agencies have emphasized the importance of protecting and promoting competition in financial markets. CFTC Commissioner Brian Quintenz, for example, has put competition on the same plane as fraud prevention and consumer safety, each of which he describes as key elements of the "strongest financial markets," including futures markets.[279] And SEC Commissioner Robert J. Jackson, Jr. argued in a 2018 speech that the agency should do more to promote competition in capital markets.[280] However, to the extent that entrenched bureaucratic cultures prevent these agencies from promoting the spread of blockchain-based competition, Congress may need to step in and fill the regulatory gap.

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[278] For example, in June 2018, the FCC hired David Lawrence, an attorney in the Antitrust Division of the U.S. Department of Justice, to coordinate the FCC's review of the proposed merger of T-Mobile US, Inc. and Sprint Corporation. *See* Press Release, Fed. Commc'ns Comm'n, David Lawrence to Lead T-Mobile/Sprint Transaction Task Force (June 27, 2018), https://www.fcc.gov/document/david-lawrence-lead-t-mobilesprint-transaction-task-force.

[279] Brian Quintenz, Comm'r, Commodities Futures Trading Comm'n, Remarks at the 14th Annual China International Derivatives Forum (Nov. 30, 2018), https://www.cftc.gov/PressRoom/SpeechesTestimony/opaquintenz18 (asserting that the "strongest financial markets are shaped" by a "mixture of competition and accountability," and the combination of "fierce competition, stringent accountability, and legal certainty attracts investors, businesses, and capital" to financial markets, including futures markets).

[280] Jackson, *supra* note 39 (arguing that the SEC has "forgotten a crucial part of [its] mission: to pursue the kind of vigorous competition that American investors deserve," and proposing the creation of an Office of Competition Economics at the agency).

V. BLOCKCHAIN COMPETITION POLICY FOR FINANCIAL SERVICES

How the key blockchain competition-policy issues the previous Part explored will play out in the financial markets remains an open question. This Part applies the principles discussed above to four specific challenges emerging in blockchain-based financial services: paid prioritization, blockchain-based derivatives trading, the sharp growth in token sales, and standardization and IP-related risks.

A. PAID PRIORITIZATION

The architecture of blockchain networks makes it possible for users verifying transactions to choose the order in which they record those transactions. In the Bitcoin blockchain network, for example, the miners who confirm transactions may choose to prioritize those that offer the biggest monetary payoff, putting them in a so-called fast lane, while other, less lucrative transactions languish in a slow lane.[281]

In the blockchain context, paid prioritization refers to the practice of users paying to have their transactions recorded on a block ahead of users who have paid less or not at all.[282] This is only one form of discrimination possible on blockchain networks. Vertically integrated firms controlling a permissioned network may provide faster service to their related entities at the expense of competitors.[283] The derivatives-processing blockchain network that DTCC is creating presents a good example of these potential

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[281] *See Improving Our Fee Recommendations*, BLOCKCHAIN.COM (June 14, 2017), https://medium.com/blockchain/improving-our-fee-recommendations-11722afccd6 ("In Bitcoin, transaction fees are used to incentivize miners to confirm transactions . . . . Rational miners will select transactions paying a higher fee per byte.").

[282] *See* Falk Schoening, *What Blockchain Can Learn from the Net Neutrality Debate: Antitrust and Regulatory Aspects of "Paid Prioritization" for a Nascent Technology*, HOGAN LOVELLS: FOCUS ON REGULATION (Nov. 7, 2017), https://www.hlregulation.com/2017/11/07/what-blockchain-can-learn-from-the-net-neutrality-debate-antitrust-and-regulatory-aspects-of-paid-prioritization-for-a-nascent-technology/ ("A paid prioritization blockchain environment can create a dual speed blockchain: one for those who can or want to pay more and one for those who can't or simply don't want to do so and whose transactions accordingly lag behind.").

[283] IOANNIS LIANOS, BLOCKCHAIN COMPETITION 74–76 (2018), https://www.ucl.ac.uk/cles/sites/cles/files/cles_8-2018.pdf (discussing how vertically integrated firms may use blockchain to anticompetitively disadvantage rivals).

risks.[284] By manipulating the speed at which transactions are processed, the big banks controlling this blockchain could disfavor trades entered directly by public users on a permissionless blockchain-based derivatives exchange as well as trades facilitated by rival dealers. Perhaps more worrisome, if the big banks established a dominant blockchain-based derivatives clearinghouse, they could use paid prioritization to slow down trades made on emergent exchanges or by competing dealers, forestalling competition.

This kind of discrimination may harm users in the "slow lane" and raise both antitrust and competition-policy issues. On one level, this problem is reminiscent of the net neutrality debate and the issues the Telecommunications Act of 1996 addressed. The FCC's 2015 Open Internet Order prohibited paid prioritization of services by broadband providers, barring them from favoring any specific "content, applications, services, or devices."[285] The FCC has developed competition policy regarding paid prioritization and other forms of discrimination broadly for the entire Internet. Indeed, the agency determined that even though "there are arguments that some forms of paid prioritization could be beneficial," a sweeping net neutrality rulemaking was required because the threat of harm to innovation from the practice is "overwhelming" and "case-by-case enforcement can be cumbersome."[286] The Open Internet Order recognized that broadband providers can act as "gatekeepers standing between" purveyors of online services and consumers.[287] These gatekeepers can determine the content consumers can access and are able to "target competitors, including competitors to their own video services."[288] The competition theory animating the Open Internet Order was that such anticompetitive conduct "actually chokes consumer demand for the very broadband product" the gatekeepers supply.[289] Under this theory, more innovation in online services will lead to greater demand for broadband infrastructure—

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[284] *See supra* notes 110–119 & 165 and accompanying text.

[285] Protecting and Promoting the Open Internet, 30 FCC Rcd. 5601, 5607 (2015).

[286] *Id.* at 5608.

[287] *Id.*

[288] *Id.*

[289] *Id.*

a "virtuous cycle," in which innovative online service providers and broadband providers both win.[290]

An assumption underlying the Open Internet Order's approach to competition policy is that competition among broadband providers is not sufficient to address the paid prioritization challenge. In theory, if consumers have access to multiple broadband providers, some of which employ paid prioritization and some of which do not, the market could sort out the optimal approach. In this scenario, some consumers might choose a provider that did not employ paid prioritization because their favored online service, say Netflix, had good streaming speeds on that provider, and they might reject a competing provider which offered slow speeds for Netflix and faster speeds for a competing service. But this theory holds only if there is robust competition among broadband providers in local markets and among wireless carriers. To the contrary, the evidence suggests that competition among wireline Internet service providers is limited in many local markets.[291] And, even though competition among wireless carriers seems more robust for now,[292] net neutrality is a sensible approach to these

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[290] *Id.* at 5608–09.

[291] *See, e.g.*, WIRELINE COMPETITION BUREAU, FED. COMMC'NS COMM'N, INTERNET ACCESS SERVICES: STATUS AS OF DECEMBER 31, 2016, at 6 (2018), https://docs.fcc.gov/public/attachments/DOC-349074A1.pdf (showing the number of broadband providers at various speeds by census blocks, demonstrating that for speeds of at least 100Mbps 85% of census blocks had either one or no providers); Sascha Segan, *Exclusive: Check Out the Terrible State of US ISP Competition*, PCMAG (Dec. 15, 2017), https://www.pcmag.com/news/357972/exclusive-data-shows-the-terrible-state-of-us-isp-competitio ("[A]t 25Mbps, the FCC's definition of broadband, most Americans have two or fewer choices . . . .").

[292] *See, e.g.*, Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, 32 FCC Rcd. 8968, 8970–71 (2017) (determining on a three to two party-line vote that there is "effective competition" in the provision of mobile wireless services); Timothy B. Lee, *Competition Just Forced Verizon to Offer an Unlimited Data Plan*, VOX (Feb. 15, 2017, 1:20 PM), https://www.vox.com/new-money/2017/2/15/14598752/verizon-unlimited-wireless-competition ("[C]ompetition is working in the wireless industry."). The 2020 merger between Sprint and T-Mobile might reduce competition in the wireless market. *See, e.g.*, Applications of T-Mobile US, Inc., and Sprint Corporation For Consent To Transfer Control of Licenses and Authorizations, Applications of American H Block Wireless L.L.C., DBSD Corporation, Gamma Acquisition L.L.C., and Manifest Wireless L.L.C. for Extension of Time, WT Docket No. 18-197, Statement of Commissioner Jessica Rosenworcel, Dissenting 1 (Oct. 16, 2019), https://docs.fcc.gov/public/attachments/FCC-19-103A5.pdf ("The proposed tie-up of T-Mobile and Sprint will reduce competition.").

markets when it appears that providers may not face competitive consequences for disfavoring innovative competitors by placing them in a slow lane.

Opponents of net neutrality and rules limiting paid prioritization for broadband providers assert that these policies dull incentives for providers to invest in broadband infrastructure.[293] This argument animated the FCC's 2017 reversal of the Open Internet Order.[294] Other critics of the FCC's net neutrality rules argue that they were unnecessary because competition sufficiently protects consumers seeking innovative online services and antitrust enforcement can address any circumstances where competition fails.[295]

The Telecommunications Act of 1996 similarly barred discrimination on proprietary networks controlled by local telephone monopolists. The Act required incumbent local exchange carriers (ILECs) to provide competitors with access to their networks "on . . . just, reasonable, and nondiscriminatory" terms.[296] The Act's aim was to create competition in previously monopolized local telecommunications markets by subjecting ILECs "to a host of duties intended to facilitate market entry."[297] The FCC struggled to promulgate rules implementing the 1996 Act that would pass judicial muster,[298] and scholars have criticized the agency's

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[293] *See, e.g.*, Ajit Pai, Chairman, Fed. Commc'ns Comm'n, Remarks of Chairman Ajit Pai on Restoring Internet Freedom (Nov. 28, 2017), https://www.fcc.gov/document/fcc-chairman-pai-remarks-restoring-internet-freedom (claiming that net neutrality rules resulted in "less infrastructure investment").

[294] *See Restoring Internet Freedom*, FED. COMMC'NS COMM'N https://www.fcc.gov/restoring-internet-freedom (last visited Feb. 7, 2020) (claiming that the FCC's Restoring Internet Freedom Order would be beneficial because the Commission's net neutrality rules had "made things worse by limiting investment in high-speed networks and slowing broadband deployment").

[295] *See* Maureen K. Ohlhausen, *Antitrust Over Net Neutrality: Why We Should Take Competition in Broadband Seriously*, 15 COLO. TECH. L.J. 119, 119 (2016) ("[M]arket forces driven by consumer demand would punish broadband service providers that throttled or excluded desired content. And . . . antitrust would forbid efforts by ISPs with significant market power to foreclose rival content.").

[296] 47 U.S.C. § 251(c)(2)(D) (2012).

[297] AT&T Corp. v. Iowa Utils. Bd., 525 U.S. 366, 371 (1999).

[298] *See, e.g.*, *id.* at 387–92, 397 (striking down an FCC rule that mandated the provision of network elements to competing carriers).

approach to forced sharing,[299] but the Act's goal, in some respects, was similar to the goal of net neutrality: to allow "anyone [to] enter any communications business"[300] by mandating access and barring discrimination on what were considered to be competitively necessary platforms.[301]

With net neutrality and the Telecommunications Act, the FCC and Congress set a unified competition policy for the entirety of the Internet and telephony markets. Financial regulators may not have that luxury. The SEC and CFTC could establish a blanket regulatory framework regarding paid prioritization and other discriminatory conduct for all blockchain networks subject to their regulatory authority. But such a framework would be a blunt instrument that would not be tailored to the various ways blockchain technology might be employed in the financial sector. A better approach would be for the agencies to decide on a case-by-case basis how to regulate paid prioritization and other types of discrimination. The agencies should consider one metric in particular—the competitiveness of the market in which a specific network operates. Does the market resemble local broadband markets, which arguably are sufficiently concentrated such that competitive pressures will not forestall broadband gatekeepers' use of paid prioritization to harm competition? Or does the market appear competitive enough to make the agencies reasonably confident that consumers will be able to determine the optimal amount of paid prioritization?

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[299] *See, e.g.*, Jonathan E. Nuechterlein & Philip J. Weiser, *First Principles for an Effective Rewrite of the Telecommunications Act of 1996* 7 (AEI-Brookings Joint Ctr. for Regulatory Studies, Working Paper No. 05-03, 2005), http://ssrn.com/abstract=707124 (criticizing the FCC's implementation of forced sharing requirements as paying "insufficient heed to antitrust law's admonition against focusing more on the success of selected *competitors* than on . . . setting the ground rules for economically efficient *competition*").

[300] *Telecommunications Act of 1996*, FED. COMMC'NS COMM'N, https://www.fcc.gov/general/telecommunications-act-1996 (last updated June 20, 2013).

[301] *See* Nicholas Economides, Katja Seim & V. Brian Viard, *Quantifying the Benefits of Entry into Local Phone Service*, 39 RAND J. ECON. 699, 725 (2008) ("A major goal of the 1996 Telecommunications Act was to encourage entry into local phone service with the objectives of achieving better alignment between prices and costs, increased service quality, increased variety of service offerings, and efficiency gains in the form of 'one-stop shopping' across different telecommunications services.").

Two examples illustrate the point. Some cryptocurrency platforms, like Bitcoin, already feature paid prioritization. Parties transacting on the Bitcoin blockchain can pay miners to have their transactions recorded on a block ahead of other transactions.[302] If the cryptocurrency market is not sufficiently competitive, Bitcoin users will have no choice but to accept these "fast lane" fees. If consumers have other choices (either competing cryptocurrencies or traditional payment systems), then they may decide not to accept Bitcoin's fast-lane payments and defect to a competitive alternative.[303] Currently, consumers have a range of choices when it comes to cryptocurrencies and payment systems more generally.[304] As long as these options remain, there is no pressing reason for the SEC or CFTC to regulate the use of paid prioritization on the Bitcoin blockchain. Indeed, such regulation might be anticompetitive and innovation-retarding.[305]

A dominant derivatives-clearing blockchain may require a different regulatory approach. If the big banks controlled a blockchain-based monopoly provider of derivatives-clearing services, then they might use paid prioritization or other forms of discrimination to restrict competition and innovation in derivatives trading without fear of losing market share to competing derivatives clearinghouses. It is not difficult to imagine a situation in which such a dominant clearinghouse sets up a fast lane for trades facilitated by the big banks and slows down or rejects altogether trades executed on public, permissionless, blockchain-based derivatives exchanges. By disfavoring trades made on emergent

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[302] *See supra* note 281.

[303] *See* Peder Østbye, The Adequacy of Competition Policy for Cryptocurrency Markets 22 (Aug. 24, 2017) (unpublished manuscript), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3025732 ("Excessive transaction fees might be a dangerous play for block validators. High transaction fees will make the currency less attractive and, hence, diminish the value of the currency with which the transaction fees are paid and new coins are awarded.").

[304] *Id.* at 24 ("Today, it must be assumed that the traditional payment system puts a restraint on the possibility for the exploitation of market power in cryptocurrencies.").

[305] *See, e.g.*, Hester M. Peirce, Comm'r, U.S. Sec. & Exch. Comm'n, Beaches and Bitcoin: Remarks before the Medici Conference (May 2, 2018), https://www.sec.gov/news/speech/speech-peirce-050218 ("[R]egulator[s] should be careful not to try to control the development of new technologies. . . . The law deserves respect, but technological progress should not be bound by the limits of the regulator's lawyerly imagination.").

public exchanges, the big banks could try to preserve the supracompetitive profits they enjoy on OTC trades they facilitate.[306]

To the extent the SEC and CFTC want to encourage competition in derivatives trading (and there are reasons they may not want to expand such competition),[307] they could prohibit paid prioritization and other forms of discrimination on a dominant blockchain-based clearinghouse. Current law may do some of this work for the agencies. Dodd–Frank, for example, prohibits a clearinghouse from discriminating against derivatives trades executed on exchanges unaffiliated with that clearinghouse.[308] If paid prioritization violates the requirement of "non-discriminatory clearing" of a swap, the agencies may not have to regulate any further on this issue.[309] If it does not, additional regulation may be required. The same type of issue might arise in equities trading, token sales, and other blockchain applications in the financial markets. In each case, the SEC and CFTC must determine whether they should set the competitive rules of the road regarding paid prioritization and other forms of discrimination for particular blockchain uses in the same way the FCC created those rules of the road (and later changed them) for the Internet.

If the agencies choose not to regulate paid prioritization, antitrust law may have a role to play in addressing the issue.[310] A plaintiff whose transactions are relegated to a blockchain's slow lane may argue that it has suffered competitive harm if it loses out on favorable deals (and ultimately market share) as a result. Such a plaintiff might assert that this type of conduct amounts to an unlawful refusal to deal or is grounds for an essential facilities

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[306] *See, e.g.*, *In re* Credit Default Swaps Antitrust Litig., No. 13md2476 (DLC), 2014 WL 4379112, at *5 (S.D.N.Y. Sept. 4, 2014) (detailing allegations that Dealer–Defendants conspired to prevent the emergence of credit default swap exchange trading to "keep[] the market opaque, prevent[] competition, and maintain[] inflated bid/ask spreads").

[307] *See infra* notes 316–320 and accompanying text.

[308] *See* 15 U.S.C. § 78c-3(a)(2) (2018) (mandating open access to clearinghouses and that clearing must be "non-discriminatory").

[309] 7 U.S.C. § 2(h)(1)(B)(ii) (2018); 15 U.S.C. § 78c-3(a)(2)(B) (2018).

[310] *See* Ohlhausen, *supra* note 295, at 141 (arguing that "[c]onsumers would enjoy protection in a world without net neutrality" because antitrust law is "well positioned to tackle" cases involving "harmful exclusion, throttling, or paid prioritization by ISPs").

claim.[311] The success of such claims is by no means certain. Plaintiffs would have to show that the blockchain in question has market power and that no realistic competitive alternatives exist.[312] Further, if the transaction or service in question is regulated, defendants may be able to claim implied antitrust immunity for their conduct.[313]

B. BLOCKCHAIN-BASED DERIVATIVES TRADING

Emergent public blockchain-based derivatives exchanges have the potential to upend the derivatives markets.[314] By allowing all-to-all direct trading by end-users, these exchanges should reduce pricing opacity and may disintermediate derivatives dealers.[315] The financial regulatory agencies could play a central role in determining whether these new exchanges are given the opportunity to reshape derivatives trading. The big banks, which currently control derivatives clearing and trading, will likely resist these changes, and the CFTC and SEC must determine how they will respond.

To do so, the agencies will need to decide how much competition in derivatives trading is desirable. This issue is complicated by the

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[311] *See, e.g.*, Verizon Commc'ns, Inc. v. Law Offices of Curtis V. Trinko, LLP, 540 U.S. 398, 408 (2004) ("Under certain circumstances, a refusal to cooperate with rivals can constitute anticompetitive conduct and violate § 2 [of the Sherman Act]."). To prevail on an essential facilities claim, a plaintiff typically must show "(1) control of the essential facility by a monopolist; (2) a competitor's inability practically or reasonably to duplicate the essential facility; (3) the denial of the use of the facility to a competitor; and (4) the feasibility of providing the facility." MCI Commc'ns Corp. v. AT&T Co., 708 F.2d 1081, 1132–33 (7th Cir. 1983).

[312] *See MCI Commc'ns*, 708 F.2d at 1132–33 (describing the elements of an essential-facilities claim).

[313] Courts may find that regulated conduct is immunized from antitrust liability in cases where there is a "plain repugnancy" between a relevant regulatory regime and the antitrust laws. Gordon v. N.Y. Stock Exch., Inc., 422 U.S. 659, 682 (1975) (quoting United States v. Phila. Nat'l Bank, 374 U.S. 321, 350–51 (1963)).

[314] *See* Surujnath, *supra* note 22, at 257 ("The blockchain could radically reinvent the existing [derivatives] market infrastructure.").

[315] *See, e.g.*, *In re* Interest Rate Swaps Antitrust Litig., 261 F. Supp. 3d 430, 475 (S.D.N.Y. 2017) ("All-to-all exchange trading, however, threatened to slash the Dealers' margins by 'billions of dollars' by disintermediating them.").

systemic risks derivatives can pose.[316] If emergent exchanges make derivatives trading cheaper and more accessible, the size of these markets likely will increase.[317] Fragmentation of trading onto a number of smaller exchanges may also make keeping tabs on derivatives markets and identifying risky trading conduct more challenging.[318] The regulatory agencies might prefer to deal only with the small number of big banks that currently control derivatives trading.[319] Indeed, their general commitment to systemic stability over increased competition suggests that the agencies may opt for a less competitive and less risky derivatives sector rather than one where emergent exchanges democratize and expand derivatives trading.[320]

There are early indications that the agencies will take a cautious tack toward new competitors in these markets. The CFTC, for instance, has issued guidance on its approach to cryptocurrency futures markets.[321] In December 2017, the Chicago Mercantile Exchange and the CBOE Futures Exchange created new Bitcoin futures products.[322] Around the same time, the Cantor Exchange

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[316] *See* Griffith, *supra* note 100, at 1153 ("Derivatives transactions create systemic risk by threatening to spread the consequences of default throughout the financial system.").

[317] *See, e.g.*, *Crypto Derivatives Are on the Rise*, INT'L BANKER (Sept. 10, 2020), https://internationalbanker.com/brokerage/crypto-derivatives-are-on-the-rise/ (noting that the trading volume of the crypto-derivatives market had increased 165.56% since 2019).

[318] *See, e.g.*, Magnuson, *supra* note 45, at 1205, 1207 (noting that "decentralization serves as a barrier to effective monitoring" and that "by contributing to the fragmentation of finance, fintech may be obscuring risk").

[319] *Id.* at 1205 ("[R]egardless of what we may think about the success of financial regulators in reining in the behavior of large financial institutions since the financial crisis, regulators at least benefit from the fact that the relevant players are readily identifiable and their behaviors are subject to extensive disclosure requirements.").

[320] *See supra* notes 217–221 and accompanying text.

[321] OFFICE OF PUB. AFFAIRS, U.S. COMMODITY FUTURES TRADING COMM'N, CFTC BACKGROUNDER ON OVERSIGHT OF AND APPROACH TO VIRTUAL CURRENCY FUTURES MARKETS 1–4 (2018) [hereinafter CFTC BACKGROUNDER], https://www.cftc.gov/sites/default/files/idc/groups/public/%40customerprotection/documents/file/backgrounder_virtualcurrency01.pdf.

[322] *See CME Group Announces Launch of Bitcoin Futures*, CME GROUP (Oct. 31, 2017), https://www.cmegroup.com/media-room/press-releases/2017/10/31/cme_group_announces launchofbitcoinfutures.html (announcing CME's launch of bitcoin futures in the fourth quarter of 2017); Brady Dale, *CBOE Releases New Details on Bitcoin Futures Contracts*, COINDESK (Nov. 20, 2017, 9:10 PM), https://www.coindesk.com/cboe-releases-new-details-on-bitcoin-futures-contracts (describing CBOE's planned bitcoin futures contract).

developed a new Bitcoin binary option product.[323] The CFTC applied what it described as "heightened review" to these "[v]irtual currency self-certification[s]."[324] This review included derivatives clearing organizations (DCOs) agreeing to set "substantially high initial and maintenance margin for cash-settled Bitcoin futures;"[325] designated contract markets (DCMs) consenting to coordination with CFTC surveillance staff on trading activities and giving them access to trade settlement data on request; and DCMs coordinating product launches to allow the CFTC's market surveillance branch to "monitor minute-by-minute developments."[326]

The CFTC recognized that the big banks that run clearinghouses may protect their interests with regard to cryptocurrency futures through participation in DCO risk committees or by determining that they either will not trade cryptocurrency futures or will require "substantially higher initial margins" to do so.[327] This CFTC guidance suggests that the agency will give clearinghouses latitude to discriminate against virtual currency futures.

While caution often is advisable when regulating new financial products, compelling reasons exist for the agencies to protect emerging competition in derivatives trading. First, this competition might reduce systemic risk in some instances. One goal of the big banks' anticompetitive attempts to forestall the emergence of derivatives exchange trading is to keep lucrative derivatives trades in the opaque OTC markets, where the banks' profits (in the form of bid-ask spreads) are higher.[328] There is evidence that the big banks have used their control over derivatives clearinghouses

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[323] *See* CANTOR FUTURES EXCHANGE, L.P., NEW CONTRACT SUBMISSION 2017-6: CANTOR FUTURES EXCHANGE BITCOIN SWAP CONTRACT 1, 9 (2017), https://www.cftc.gov/sites/default/files/filings/ptc/17/12/ptc120117cantordcm001.pdf (describing Cantor's proposed bitcoin binary option contract and analyzing its compliance with CFTC regulations).

[324] *See* CFTC BACKGROUNDER, *supra* note 321, at 2–3.

[325] *Id* at 3 (footnote omitted).

[326] *Id.*

[327] *Id.* at 4.

[328] *See In re* Credit Default Swaps Antitrust Litig., No. 13md2476 (DLC), 2014 WL 4379112, at *5 (S.D.N.Y. Sept. 4, 2014) (detailing allegations that Dealer–Defendants conspired to block credit default swap exchange trading and that this "conduct harmed plaintiffs by keeping the market opaque, preventing competition, and maintaining inflated bid/ask spreads").

toward this end.[329] This conduct threatens to defeat the central systemic-risk prevention goal of Dodd–Frank's derivatives title: to ensure that most derivatives trades are centrally cleared.[330] If the emergent exchanges succeed, they will reduce profits on OTC trades and undercut the big banks' incentives to evade central clearing. Increased competition and systemic soundness may be complementary in this instance.

Second, heightened competition likely will make derivatives transactions cheaper and will lower prices for end users. Big banks' power in these markets will be reduced, and they may no longer garner supracompetitive prices on derivatives trades. To the extent blockchain-based competitors can emerge in other financial-services sectors, those services may become cheaper and more accessible, too, potentially evening the playing field for smaller investors.

If the agencies determine that increased competition in derivatives trading is desirable, the big banks already have provided a roadmap for the types of conduct regulators should police. In the first instance, the agencies should be on the lookout for big banks using control of a clearinghouse, and especially a clearinghouse risk committee, to disfavor trades made on emergent blockchain-based exchanges. This type of conduct was alleged in the market for interest rates swaps, where clearinghouses refused to clear trades entered on new public exchanges.[331] The financial regulatory agencies have the tools to prohibit such conduct. Dodd–Frank requires that clearinghouses' rules must provide for "[o]pen access" and "non-discriminatory clearing" of swaps entered OTC or through an exchange unaffiliated with a clearinghouse.[332]

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[329] *See id.* ("As a condition of their joining [CME's clearinghouse], . . . Dealer–Defendants demanded to control CME's risk committee . . . . Operating through that committee, Dealer–Defendants froze CME's ability to clear trades.").

[330] *See, e.g.*, *Assessing the Regulatory, Economic, and Market Implications of the Dodd–Frank Derivatives Title: Hearing Before the H. Comm. on Fin. Servs.*, 112th Cong. 55 (2011) (statement of Terrence A. Duffy, Executive Chairman, CME Group, Inc.) ("Congress responded to the financial crisis by adopting the Dodd–Frank Act to reduce systemic risk through central clearing and exchange trading of derivatives . . . .").

[331] *See In re* Interest Rate Swaps Antitrust Litig., 261 F. Supp. 3d 430, 452–53 (S.D.N.Y. 2017) (detailing allegations that Dealer–Defendants conspired to boycott emergent interest rate swaps exchanges "and cause[d] their affiliated clearing entities to refuse to clear trades on them").

[332] 7 U.S.C. § 2(h)(1)(B) (2018); 15 U.S.C. § 78c-3(a)(2) (2018).

To register with the regulatory agencies and to maintain their registration, clearinghouses also must comply with Dodd–Frank's "Core Principles" for derivatives clearing organizations.[333] Among those Core Principles are mandates that clearinghouses' participation and membership requirements "permit fair and open access" and that clearinghouses maintain systems to monitor adherence to their rules, presumably including the non-discriminatory clearing rules.[334] The Core Principles also include "[a]ntitrust considerations," which bar clearinghouses from adopting rules or taking actions that result in "any unreasonable restraint of trade" or that "impose any material anticompetitive burden."[335] Clearinghouses that are not registered with the agencies cannot operate, giving regulators leverage to enforce these open-access and non-discrimination regulations.[336]

Another strategy the big banks have used to forestall the emergence of derivatives exchange trading is to pressure two important industry players—Markit Group Ltd. (Markit) and the International Swaps and Derivatives Association (ISDA)—not to provide required licenses to new exchanges.[337] Markit controls two forms of IP necessary for offering derivatives-trading services: credit default swap (CDS) indices and reference-entity database (RED) codes.[338] The *In re Credit Default Swaps Antitrust Litigation* court found that Markit would have garnered "significant revenue" from licensing its CDS indices and RED codes to an emergent derivatives exchange, the Credit Market Derivatives Exchange (CMDX), and that Markit's directors "expressed interest" in doing so.[339] CMDX also would have needed access to ISDA's "Master

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[333] Derivatives Clearing Organization General Provisions and Core Principles, 76 Fed. Reg. 69,334 (Nov. 8, 2011) (to be codified at 17 C.F.R. pts. 1, 21, 39, and 140).

[334] *Id.* at 69,352, 69,436; 17 C.F.R. § 39.12(a)(1) (2019) ("The participation requirements [of a derivatives clearing organization] shall permit fair and open access . . . .").

[335] Derivatives Clearing Organization General Provisions, 76 Fed. Reg. at 69,446; 17 C.F.R. § 39.23 (2019).

[336] 7 U.S.C. § 7a-1(a) (2018) (outlining the registration requirements for derivatives clearing organizations).

[337] *See, e.g.*, *In re* Credit Default Swaps Antitrust Litig., No. 13md2476 (DLC), 2014 WL 4379112, at *5 (S.D.N.Y. Sept. 4, 2014) ("Dealer–Defendants convinced Markit and ISDA not to grant any licenses . . . .").

[338] *Id.* at *4.

[339] *Id.*

Agreement," under which CDS transactions are standardized.[340] The court found that it was "in ISDA's interest" to license the Master Agreement to CMDX and that ISDA representatives showed initial enthusiasm for entering such an agreement.[341]

Despite Markit's and ISDA's incentives to license CMDX and their initial interest in doing so, the *In re Credit Default Swaps* court determined that the big banks persuaded these organizations not to license CMDX for exchange trading.[342] It found that the banks achieved this end by taking advantage of their position as Markit's and ISDA's largest customers and using their influence as members of Markit's and ISDA's boards.[343] As a result, Markit and ISDA acted against their own incentives and told CMDX's sponsors, in "synchronized fashion," that the big banks would have to formally approve their licensing CMDX.[344] They sent CMDX draft agreements that lacked licenses for exchange trading.[345] Subsequently, "in conspicuously similar fashion," ISDA and Markit granted CMDX licenses for clearing that expressly barred their use for exchange trading.[346] These licenses went so far as to require that a big bank be a part of every CDS transaction.[347]

It appears that Markit and ISDA will continue playing an important role in the derivatives markets as they shift toward blockchain-based trading. ISDA recently announced publication of its Common Domain Model, a standardized digital representation of all the steps in a derivatives trade.[348] ISDA's goal is to create an industry-wide technological standard to facilitate interoperability among industry players.[349] This standard is intended to serve as the

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[340] *Id.*

[341] *Id.*

[342] *Id.* at *5.

[343] *Id.*

[344] *Id.*

[345] *Id.*

[346] *Id.*

[347] *Id.* ("The licenses . . . required that some Dealer–Defendant be on at least one side of every CDS transaction.").

[348] Press Release, ISDA, ISDA Publishes Digital Iteration of the Common Domain Model (June 5, 2018), https://www.isda.org/2018/06/05/isda-publishes-digital-iteration-of-the-common-domain-model/.

[349] *Id.*; *see also* IAN SLOYAN, ISDA, ISDA'S COMMON DOMAIN MODEL (CDM) 7 (2020), https://www.cftc.gov/media/3536/TAC022620_ISDACommonDomainModel/download ("ISDA

foundation for blockchain and smart-contract applications in derivatives trading and clearing.[350] Markit also has been active in the blockchain space, creating a product called Stax, a blockchain-based system initially tasked with handling payments for syndicated loan trading.[351] The company has stated that the system can be used for payments in derivatives trades and other financial markets.[352] DTCC has explained that it has been "work[ing] closely" with Markit and ISDA in implementing the blockchain-based upgrade to its Trade Information Warehouse.[353]

The CFTC and SEC can reach the banks' conduct regarding Markit and ISDA, or similar conduct, under Dodd–Frank's "[a]ntitrust considerations" for swap dealers and security-based swap dealers.[354] Public and private antitrust enforcement also may play a role in preventing conspiracies among the big banks intended to forestall the emergence of new blockchain-based derivatives exchanges and clearinghouses.[355] However, while there is some

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CDM enables interoperability between systems/services, removing burden of setting up connections to different systems/entities . . . .").

[350] Press Release, ISDA, *supra* note 348.

[351] *Blockchain – Beyond Cryptocurrencies*, IHS MARKIT (June 28, 2018), https://ihsmarkit.com/research-analysis/blockchain-beyond-cryptocurrencies.html.

[352] Ian Allison, *IHS Markit Has a Plan to Tokenize a $1 Trillion Loan Market*, COINDESK (May 28, 2018, 4:00 AM), https://www.coindesk.com/ihs-markit-plan-tokenize-1-trillion-syndicated-loan-market (quoting a Markit executive as saying, "[w]e have built [Stax] in a generic way and we have already met with exchanges and talked about derivatives and other asset classes").

[353] CFTC TAC MEETING, *supra* note 1, at 31–32 (statement of Jennifer Peve).

[354] These provisions state that "[u]nless necessary or appropriate to achieve" Dodd–Frank's purposes "a swap dealer or major swap participant" as well as a "security-based swap dealer or major security-based swap participant shall not" engage in conduct that "results in any unreasonable restraint of trade" or "impose any material anticompetitive burden on trading or clearing." 7 U.S.C. § 6s(j)(6) (2018); 15 U.S.C. § 78o-10(j)(6) (2018). "Swap dealer[s]" are defined in Dodd–Frank as "any person who – (i) holds itself out as a dealer in swaps; (ii) makes a market in swaps; (iii) regularly enters into swaps with counterparties as an ordinary course of business for its own account; or (iv) engages in any activity causing the person to be commonly known in the trade as a dealer or market maker in swaps." 7 U.S.C. § 1a(49)(A) (2018). Excluded from this definition is a "person that enters into swaps" for their own account, "but not as a part of a regular business." *Id.* § 1a(49)(C). The definition of a "security-based swap dealer" is the same. *See* 15 U.S.C. § 78c(71)(A) (2018).

[355] *See, e.g.*, *In re* Interest Rate Swaps Antitrust Litig., 261 F. Supp. 3d 430 (S.D.N.Y. 2017); *In re* Credit Default Swaps Antitrust Litig., No. 13md2476 (DLC), 2014 WL 4379112 (S.D.N.Y. Sept. 4, 2014).

limited history of private plaintiffs maintaining antitrust cases in the derivatives markets, such plaintiffs face significant obstacles, including the threat of implied antitrust immunity.[356] In light of these challenges, the financial regulatory agencies likely will play the key role in determining whether emergent blockchain-based derivatives trading and clearing competitors are able to survive long enough to transform these markets.

The SEC's 2019 no-action letter to Paxos Trust Company is a hopeful indication that the agency will consider competition when evaluating the role of blockchain technology in the markets it oversees.[357] Paxos offers a blockchain-based equities-settlement service that competes with DTCC's equities-settlement business.[358] The SEC decided not to challenge Paxos's pilot offering. Paxos contends that its blockchain-based system will settle equities trades faster than DTCC can do so currently using its legacy technology.[359] The SEC's openness to a blockchain-based solution that will increase competition in equities settlement is a good sign that the agency may be willing to make similar procompetitive decisions in the derivatives space.

C. CAPITAL MARKETS & TOKEN SALES

While blockchain-based derivatives trading is in its nascent stages, token sales are already a competitive factor in the capital markets.[360] The amount of money raised in ICOs and IEOs has soared over the past several years, and this funding model has shown genuine potential to challenge the traditional forums for

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[356] *See supra* note 313. Derivatives are regulated under Dodd–Frank, raising the possibility of a court finding implied antitrust immunity for conduct in these markets. *But see In re* Credit Default Swaps Antitrust Litig., No. 13md2476 (DLC), 2014 WL 4379112 at *16–17 (S.D.N.Y. Sept. 4, 2014) (rejecting defendant derivatives dealers' argument that Dodd–Frank "precludes application of the antitrust laws" to alleged anticompetitive conduct).

[357] Letter from Jeffrey S. Mooney, *supra* note 127, at 3–4.

[358] *Id.* at 1; Osipovich, *supra* note 32 (noting that as a result of the SEC permitting Paxos to continue its securities-settling pilot project, "DTCC is about to face something new: competition").

[359] Osipovich, *supra* note 32 ("Today, the standard time it takes to settle a stock trade is two business days . . . . Paxos's initiative is aimed at settling trades at the end of the day in which they are agreed upon, or even sooner.").

[360] *See supra* Section II.B.*1*.

capital formation: VCs and IPOs.[361] Because token sales are further along the developmental curve, financial regulators are already grappling with whether and how to regulate them.[362] Indeed, SEC regulation appears to have cooled the ICO market in 2019.[363] Two related questions dominate this regulatory discussion: when do token sales qualify as sales of a security under the U.S. securities laws and how can the agencies combat fraud in ICOs and IEOs?

The securities laws are designed to protect investors by requiring offerors to register with the SEC and to make a number of disclosures to potential investors.[364] These laws also prohibit fraud "in connection with" a securities transaction.[365] Because these regulations apply only if an instrument is defined as a security, the threshold question for the SEC regarding token sales is whether they amount to a sale of securities.[366] The Securities Act of 1933 defines a security as encompassing a broad range of financial instruments, including notes, stocks, futures, swaps, bonds, and "investment contract[s]."[367] This latter term, "investment contract," may capture new types of investment vehicles, such as token sales. More than seventy years ago, in *SEC v. W.J. Howey Co.*, the U.S. Supreme Court established a test for determining whether an instrument is an "investment contract."[368] The *Howey* test defines an investment contract as "a contract, transaction or scheme whereby a person invests his money in a common enterprise and is led to expect profits solely from the efforts of the promoter or a third

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[361] *See supra* notes 9, 30, & 81–89 and accompanying text.

[362] *See, e.g.*, Clayton & Giancarlo, *supra* note 16 (describing the SEC's and CFTC's regulatory activities in blockchain-based financial markets).

[363] *See* Kharif, *supra* note 68 ("ICO sales . . . have dropped steeply . . . in the wake of a U.S. regulatory crackdown . . . .").

[364] *See, e.g.*, J. William Hicks, *Securities Regulation: Challenges in the Decades Ahead*, 68 IND. L.J. 791, 798 (1993) ("One of the essential missions of the SEC is to ensure that investors are provided with material information and are protected from fraud and misrepresentation in the public offering, trading, voting, and tendering of securities.").

[365] 15 U.S.C. § 78j(a)(1) (2018); 17 C.F.R. § 240.10b-5 (2019).

[366] *See* Jay Clayton, *Statement on Cryptocurrencies and Initial Coin Offerings*, U.S. SEC. & EXCH. COMM'N (Dec. 11, 2017), https://www.sec.gov/news/public-statement/statement-clayton-2017-12-11 ("[A]ny [ICO] that involves an offering of securities must be accompanied by the important disclosures, processes and other investor protections that our securities laws require.").

[367] 15 U.S.C. § 77b(a)(1) (2018).

[368] 328 U.S. 293 (1946).

party."[369] Conforming to the securities laws' requirements is expensive and raises a barrier to entry for nascent forms of capital formation, so the SEC's (and courts') determination of how to treat token sales will affect their growth and competitive potential.[370]

As professors Jonathan Rohr and Aaron Wright have argued, determining whether a token qualifies as a security depends on the type of token involved. They identified two main types of tokens: investment tokens and utility tokens.[371] Investment tokens offer an opportunity for profits.[372] Utility tokens give users rights to access a particular technology or organization.[373] Rohr and Wright contended that while the *Howey* analysis is straightforward as to investment tokens, which typically will qualify as securities, its application is unclear as to utility tokens.[374] Utility tokens often are hybrid instruments; they permit users to access a service or technology, but some also have the potential to increase in value, allowing holders to make a profit by selling them. Rohr and Wright urged the SEC to create a "more predictable regulatory framework" for utility tokens, giving offerors objective guidelines to determine if a proposed token must be registered as a security.[375] Absent such a framework, the authors worried that offerors will avoid U.S. markets altogether, depriving them of access to some portion of this innovative technology.[376]

SEC Chairman Jay Clayton has weighed in on whether and when tokens might qualify as securities.[377] In his view, most ICOs "involve the offer and sale of securities and directly implicate the

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[369] *Id.* at 298–99.

[370] *See, e.g.*, Lindeen v. SEC, 825 F.3d 646, 649 (D.C. Cir. 2016) ("[The Securities Act] registration process is often prohibitively expensive for small companies . . . .").

[371] Rohr & Wright, *supra* note 2, at 475–77.

[372] *Id.* at 476 ("*[I]nvestment tokens* . . . provide holders with economic rights, such as a share of profits generated by a project or organization.").

[373] *Id.* at 475 ("*[U]tility tokens* . . . grant holders the right to access, use, and enjoy a given technology or participate in an online organization.").

[374] *Id.* at 486 (asserting that investment tokens "are often securities dressed in different clothing and thus would be subject to U.S. securities laws" whereas "the analysis [for utility tokens] is more muddled").

[375] *Id.* at 515.

[376] *Id.* at 513 ("This uncertainty will create strong incentives to engage in regulatory arbitrage and . . . large scale migration to non-U.S. jurisdictions is a real possibility.").

[377] Clayton, *supra* note 366 ("A key question for all ICO market participants: 'Is the coin or token a security?'").

securities registration requirements."[378] The Chairman cast doubt on claims that utility token offerings are not subject to the securities laws.[379] He warned that offerings whose marketing efforts emphasize profit potential based on others' entrepreneurial or management efforts likely are securities offerings, especially when promoters stress the ability to trade tokens on a secondary market.[380] In a joint opinion piece, SEC Chairman Clayton and CFTC Chairman J. Christopher Giancarlo observed that "[c]aution is merited" as to cryptocurrencies and ICOs, and they warned "[m]arket participants, including lawyers, trading venues and financial services firms," that the agencies are "disturbed" by efforts to avoid registration requirements for ICOs.[381]

By contrast, in a speech on Bitcoin, cryptocurrencies, and ICOs, SEC Commissioner Hester Peirce argued for a cautious regulatory approach to these technologies and for giving the market space to innovate without undue regulation.[382] She noted the "risk, when something truly innovative comes along, that regulators will focus only on the harms the innovation may bring and miss entirely the opportunity it presents to improve people's lives."[383] And she cautioned that "undue focus on potential harm can result in an agency's leading with its enforcement powers, and ultimately setting itself up as the industry's adversary."[384] Commissioner Peirce also observed that a regulator may insert itself inappropriately into competitive and innovative processes, potentially disrupting or diverting them from outcomes consumers and investors might prefer.[385] Indeed, SEC Chairman Clayton also

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[378] *Id.*

[379] *Id.* ("Merely calling a token a 'utility' token or structuring it to provide some utility does not prevent the token from being a security.").

[380] *Id.* ("Tokens and offerings that incorporate features and marketing efforts that emphasize the potential for profits based on the entrepreneurial or managerial efforts of others continue to contain the hallmarks of a security under U.S. law.").

[381] Clayton & Giancarlo, *supra* note 16.

[382] Peirce, *supra* note 305.

[383] *Id.*

[384] *Id.*

[385] *Id.* ("The regulator may insert itself inappropriately into the creative process. The regulator should be careful not to try to control the development of new technologies. . . . [T]echnological progress should not be bound by the limits of the regulator's lawyerly imagination.").

has recognized the beneficial competitive potential of blockchain-based financial networks, although he has struck a more cautionary tone about what he sees as the many risks ICOs and cryptocurrencies present to investors.[386]

The agencies have good reason to be concerned about ICO fraud and registration requirements. Empirical research has shown that promises made in white papers regarding key terms of ICOs often are not reflected in offerings' blockchain or smart-contract code.[387] Other researchers have asserted that a significant percentage of ICOs to date have been fraudulent.[388] The SEC has actively policed ICO fraud and has brought several enforcement actions against allegedly fraudulent coin offerings.[389] To underscore the dangers of ICO frauds, the SEC created a mock ICO website, Howeycoins.com, inviting investors to take advantage of an "all too good to be true investment opportunity."[390] The site includes a mock whitepaper and other enticements ICO fraudsters commonly use.[391] Browsers who click on the "Buy Coins Now" button are directed to an investor education page warning about the dangers of fraudulent ICOs and how to spot a fraud.[392]

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[386] Clayton, *supra* note 149 ("[T]echnological innovations have improved our markets, including through increased competition, lower barriers to entry and decreased costs for market participants. Distributed ledger and other emerging technologies have the potential to further influence and improve the capital markets and the financial services industry."). Chairman Clayton asserted that his "key consideration" in dealing with cryptocurrencies and ICOs "is to serve the long term interests of our Main Street investors," and that the SEC's efforts "have been driven . . . most significantly by the concern that too many Main Street investors do not understand all the material facts and risks involved." *Id.*

[387] *See, e.g.*, Cohney et al., *supra* note 22, at 640 ("Our results show that the majority of the top-grossing ICOs of 2017 had major problems with how code bore out their antiexploitation disclosures.").

[388] SATIS GROUP, *supra* note 14, at 1 (noting that "over 80% of [cryptoasset] projects (by # share) were identified as scams" although "[o]ver 70% of ICO funding (by $ volume) to-date went to higher quality projects").

[389] *See supra* notes 16 & 40.

[390] Press Release, U.S. Sec. & Exch. Comm'n, The SEC Has an Opportunity You Won't Want to Miss: Act Now! (May 16, 2018), https://www.sec.gov/news/press-release/2018-88.

[391] *Id.* ("The website features several of the enticements that are common to fraudulent offerings, including a white paper with a complex yet vague explanation of the investment opportunity, promises of guaranteed returns, and a countdown clock that shows time is quickly running out on the deal of a lifetime.").

[392] *ICO-Howeycoins: If You Responded to an Investment Offer Like This, You Could Have Been Scammed – Howeycoins are Completely Fake!*, U.S. SEC. & EXCH. COMM'N,

Still, there is reason to hope that financial regulators might be more receptive to the competitive potential of token sales than to other forms of blockchain-based financial-services competition, particularly in trading and clearing. Encouraging capital formation is a primary policy goal for these agencies, on par with consumer protection and maintaining fair, orderly, and efficient markets.[393] Promoting competition in capital formation forwards the agencies' mission in a way that has prompted agency leaders to trumpet the advantages of innovation in this space. SEC Chairman Clayton has stated his belief that ICOs "can be effective ways for entrepreneurs and others to raise funding, including for innovative projects."[394] He explained that "the SEC [is] committed to promoting capital formation" and asserted that "[t]he technology on which cryptocurrencies and ICOs are based may prove to be disruptive, transformative and efficiency enhancing."[395] Indeed, Chairman Clayton has recognized some of the broader economic and social goals blockchain-based capital formation may help achieve, including opening capital markets to smaller businesses and new investors.[396]

Rohr and Wright explored the tension between the SEC's fraud prevention and capital-formation missions, noting that the increased regulatory clarity necessary to encourage growth of this new funding model also might be viewed by the agency as a "roadmap to fraud."[397] But harmonization of the agency's capital-formation mission and its competition mandate is also important and should push the SEC to issue guidance and pursue enforcement

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https://www.investor.gov/howeycoins (last visited Feb. 7, 2021) ("[The SEC] created the bogus HoweyCoins.com site as an educational tool to alert investors to possible fraud involving digital assets like . . . coin offerings.").

[393] *See* Clayton, *supra* note 149 (describing the SEC's "tripartite mission to protect investors, maintain fair, orderly and efficient markets and facilitate capital formation").

[394] Clayton, *supra* note 366.

[395] *Id.*

[396] Clayton, *supra* note 149 ("Businesses, especially smaller businesses without efficient access to traditional capital markets, can be aided by financial technology in raising capital to establish and finance their operations, thereby allowing them to be more competitive both domestically and globally. And these technological innovations can provide investors with new opportunities to offer support and capital to novel concepts and ideas.").

[397] Rohr & Wright, *supra* note 2, at 512, 515 (quoting A.C. Pritchard, *The SEC at 70: Time for Retirement?*, 80 NOTRE DAME L. REV. 1073, 1086 (2005)).

actions that promote the development of blockchain-based capital formation.

The SEC has made some important efforts in this regard. In a 2018 speech, William Hinman, Director of the Division of Corporate Finance at the SEC, described circumstances under which a digital asset transaction initially characterized as a sale of a security eventually may cease to be a security offering.[398] He suggested that this could occur if the network on which the token functions is "sufficiently decentralized," so that "purchasers would no longer reasonably expect a person or group to carry out essential managerial or entrepreneurial efforts."[399] Hinman contended that "[a]s a network becomes truly decentralized, the ability to identify an issuer or promoter to make the requisite disclosures becomes difficult, and less meaningful."[400]

Regulatory agency efforts to encourage the growth of token sales will not go unopposed by incumbent financial firms whose business models are threatened by this new funding alternative. The Competition Committee of the Organisation for Economic Cooperation and Development's Directorate for Financial and Enterprise Affairs has cautioned that entrenched financial institutions may resist the growth of independent blockchain-based financial networks by appealing to regulators to raise barriers to entry and "exaggerating the safety risks of the technology."[401] This prediction is being borne out. NASDAQ, for example, stands to lose a critical stream of business if token sales replace NASDAQ IPOs. NASDAQ's CEO, Adena Friedman, has warned retail investors not to participate in unregulated ICOs, which she described as a way to "take[] advantage of people," especially unsophisticated investors like "Auntie Mae in Iowa."[402]

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[398] *See* William Hinman, Dir., Div. of Corp. Fin., U.S. Sec. & Exch. Comm'n, Digital Asset Transactions: When Howey Met Gary (Plastic) (June 14, 2018), https://www.sec.gov/news/speech/speech-hinman-061418 (discussing the instances where a digital asset transaction will be taken "out of the purview of the U.S. securities laws").

[399] *Id.*

[400] *Id.*

[401] OECD BLOCKCHAIN AND COMPETITION, *supra* note 1, at 6.

[402] Kate Rooney, *Nasdaq CEO says ICOs are 'Taking Advantage' of Retail Investors*, CNBC (June 20, 2018, 11:34 AM), https://www.cnbc.com/2018/06/20/nasdaq-ceo-says-icos-are-taking-advantage-of-retail-investors.html ("To make it no rules at all, when companies can

D. STANDARD SETTING & INTELLECTUAL PROPERTY-RELATED RISKS

Other tools incumbent financial institutions might use to turn back challenges from independent blockchain-based financial networks include standard-setting and strategic patent acquisitions. In some sectors with emerging blockchain-based competitors, interoperability among networks may be necessary for markets to function efficiently. Derivatives markets are an example. Competitive derivatives markets might feature multiple exchanges and clearinghouses, which would need to work collaboratively for efficient trading to take place. Standardization of blockchain-based derivatives trading and clearing would facilitate interoperability. ISDA—with the backing of Barclays, Goldman Sachs, and other incumbent financial firms—has been developing its common domain model (CDM) to standardize blockchain-based derivatives trading.[403] The CDM, according to ISDA, "provides a standard digital representation of events and actions that occur during the life of a derivatives trade."[404]

How will standardization affect the development of blockchain technology in the financial sector? Much depends on which entities control any standard-setting processes. ISDA's efforts to create a standard for blockchain-based derivatives trading, while potentially benign or even procompetitive, require scrutiny. As discussed above, there is already a history of ISDA—responding to pressure brought by the big banks—denying an emergent derivatives exchange the IP necessary to compete.[405] Regulators and antitrust authorities

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just willy-nilly take people's money and offer no information at all, with no governance, that sounds to me like you're taking advantage of people.").

[403] *See* Press Release, ISDA, *supra* note 348; Ian Allison, *Barclays, Goldman Champion ISDA Standard for Blockchain Derivatives*, COINDESK (Apr. 26, 2018, 8:00 AM), https://www.coindesk.com/barclays-goldman-champion-isda-standard-blockchain-derivatives ("[T]he financial world's blockchain evangelists are pinning their hopes on [the CDM] to harmonize the way [derivatives] data is presented and reported, regardless of the platform used.").

[404] Press Release, ISDA, *supra* note 348.

[405] *See In re* Credit Default Swaps Antitrust Litig., No. 13md2476 (DLC), 2014 WL 4379112 at *5 (S.D.N.Y. Sept. 4, 2014) ("As for CMDX, Dealer–Defendants convinced . . . ISDA not to grant any licenses . . . ."). For further discussion of this history, see *supra* notes 337–347 and accompanying text.

should be concerned that any standard ISDA and the big banks set might be similarly abused to disfavor new competitors by denying them licenses necessary to use the CDM.

Other organizations have been racing to create blockchain-based platforms for financial-services applications.[406] The R3 consortium, initially backed by several Wall Street banks (some of which have since dropped out), has launched two versions of its Corda platform: an "open source blockchain platform" and a presumably proprietary "commercial version . . . for enterprise usage."[407] R3 claims both platforms will "enabl[e] businesses to transact directly and in strict privacy" using smart contracts, "reducing transaction and record-keeping costs."[408] Subsequently, a number of large financial institutions joined the competing Ethereum Enterprise Alliance, which strives to "drive the use of Ethereum blockchain technology as an open-standard to empower ALL enterprises."[409] Hyperledger is a similar consortium vying to create open-source blockchain networks.[410] It is hosted by the Linux Foundation and supported by a range of companies, including big financial and technology firms.[411]

To the extent that any blockchain standards that result from this process are open and can be practiced by emergent firms, competition concerns should recede. But if the standards are proprietary, controlled by big financial and tech firms, and

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[406] *See supra* note 111–126, 134–136 and accompanying text.

[407] R3, CORDA ENTERPRISE: DELIVERING A BLOCKCHAIN PLATFORM FOR ALL BUSINESSES 1, 4, https://www.r3.com/wp-content/uploads/2018/07/US_07_CordaEnterprise_FS_JUN26_final.pdf (last visited Feb. 9, 2021). One-time members Goldman Sachs, Banco Santander, and J.P. Morgan dropped out of the consortium. *See* Jeff John Roberts, *Blockchain Firm R3 is Running out of Money, Sources Say*, FORTUNE (June 7, 2018, 11:10 AM), http://fortune.com/2018/06/07/blockchain-firm-r3-is-running-out-of-money-sources-say/.

[408] R3, *supra* note 407, at 1.

[409] *About*, ENTERPRISE ETHEREUM ALLIANCE, https://entethalliance.org/about/ (last visited Feb. 9, 2021). Members include J.P. Morgan Chase Bank, Banco Santander, and the Bank of New York Mellon. *EEA Members*, ENTERPRISE ETHEREUM ALLIANCE, https://entethalliance.org/eea-members/ (last visited Feb. 9, 2021).

[410] *About Hyperledger*, HYPERLEDGER, https://www.hyperledger.org/about (last visited Feb. 9, 2021) ("Hyperledger is an open source community focused on developing a suite of stable frameworks, tools and libraries for enterprise-grade blockchain deployments.").

[411] *Members*, HYPERLEDGER, https://www.hyperledger.org/about/members (last visited Feb. 9, 2021) (showing that Hyperledger's "premier members" include Accenture, DTCC, Hitachi, IBM, and J.P. Morgan).

inaccessible to nascent competitors, the potential for blockchain-based competition to transform the financial markets may be frustrated. This threat is especially concerning for standards that incorporate patents owned by incumbent financial firms and their technology partners.

Unsurprisingly, a race to patent blockchain-related technologies is well underway.[412] Already, Bank of America has filed for or received at least eighty blockchain-related patents.[413] Other financial firms are attempting to create similar patent portfolios, including Mastercard, Visa, and Accenture.[414] Technology companies, including IBM and Intel, are also among the leading owners of blockchain-related patents.[415] Moving quickly to claim IP rights over blockchain-related inventions makes sense, considering the growing number of possible uses for these technologies, and stockpiling these IP assets is not inherently anticompetitive. Firms like Bank of America might be planning to license their blockchain-related patents to all comers as a way to monetize their research and development in this area. Or they might intend to use these patents defensively, ensuring they have IP rights available to cross-license to gain access to competitors' blockchain technologies. Without a portfolio of blockchain-related patents, firms might find that they cannot develop their own competitive blockchain networks and could risk being shut out of the sector altogether.[416]

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[412] *See, e.g.*, Malathi Nayak, *Blockchain Patent Race Is on, but Hurdles Await*, BLOOMBERG LAW NEWS (May 30, 2018, 5:02 AM) ("A wide array of corporations, including Alphabet Inc.'s Google and Bank of America, are lining up to enter a potentially lucrative club: one that allows them to own patents on blockchain technology.").

[413] *See* Hugh Son, *Bank of America Tech Chief Is Skeptical on Blockchain Even Though BofA Has the Most Patents for It*, CNBC (Mar. 26, 2019, 6:58 AM), https://www.cnbc.com/2019/03/25/bank-of-america-skeptical-on-blockchain-despite-having-most-patents.html ("[Bank of America] has applied for or received 82 blockchain-related patents, more than any other financial firm . . . .").

[414] *See Largest Blockchain Patent Owners in the United States as of 2019, by Number of Active Patent Families*, STATISTA, https://www.statista.com/statistics/1022077/blockchain-patent-owners-united-states-authority/ (last visited Feb. 9, 2021).

[415] *Id.*

[416] *See* Lucinda Shen, *Here's Why Bank of America Has Filed Nearly 50 Blockchain-Related Patents*, FORTUNE (June 20, 2018, 5:51 PM), https://fortune.com/2018/06/20/bank-of-america-blockchain-patent-why/ (stating that Bank of America is filing blockchain-related patents because it "doesn't want to be left behind").

Another strategy blockchain patent holders might pursue is creating patent pools for specific blockchain standards or technologies. Patent pools are collections of patents necessary for adhering to a technical standard or making specific products.[417] The patents in the pools are contributed by their various owners, and the pools offer licenses to all the patents they contain.[418] When designed with certain competitive safeguards, patent pools offer important efficiencies.[419] They reduce transaction costs for implementers: rather than entering separate licensing negotiations with the holders of all the patents necessary to adhere to a standard or build a product, implementers can pay one price and get all the patent licenses in a bundle.[420] Pool licenses also may be less expensive than acquiring individual licenses to all the necessary patents.[421] By simplifying licensing, patent pools for blockchain-related technologies could encourage more rapid innovation.

Early indications suggest that at least some blockchain-related patent holders are interested in using their IP rights defensively and collaboratively, rather than to quash innovation. Ken Seddon, chief executive officer of LOT Networks, a non-profit created to immunize its members from lawsuits filed by patent assertion entities, has argued that "[b]anks are taking a defensive posture when it comes to blockchain" and that their patent filings are aimed at safeguarding their innovations and protecting themselves in licensing negotiations.[422]

While there are benign reasons for stockpiling blockchain-related patents, these patent portfolios also create opportunities for anticompetitive conduct. Should a Bank of America or J.P. Morgan Chase patent be incorporated into a blockchain standard and become a standard-essential patent (SEP), those firms could hold-up competitors for supracompetitive licensing fees. The Antitrust Division's recent policy statements, indicating that it is less

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[417] U.S. DEP'T. OF JUSTICE & FED. TRADE COMM'N, ANTITRUST ENFORCEMENT AND INTELLECTUAL PROPERTY RIGHTS: PROMOTING INNOVATION AND COMPETITION 64 (2007).

[418] *Id.*

[419] *Id.* at 64–65 (explaining that patent pools help to mitigate "hold up" and "hold out" problems, reduce transaction costs, and reduce risks and costs of litigation).

[420] *Id.* at 65.

[421] *Id.*

[422] Jeff John Roberts, *As Blockchain Grows, Companies Look to Avert a Patent War*, FORTUNE (June 19, 2018, 12:08 PM), https://fortune.com/2018/06/19/blockchain-patent/.

concerned with SEP hold-up than in the past, could invite this type of abuse.[423] Similar competitive risks might arise if holders of blockchain-related patents decide to form a patent pool. Although patent pools have procompetitive potential, they also can be used to harm competition.[424] For example, if a patent pool is designed to charge lower licensing fees to holders of pool patents than to outsiders, and big banks and big tech companies hold the pool patents, the pool could undermine competitive challenges from insurgent firms lacking pool patents.[425] The FTC and Antitrust Division have cautioned that they typically will not evaluate "the reasonableness" of patent pool royalty rates and will not "presume that different royalty payments faced by different licensees . . . are anticompetitive."[426] This somewhat hands-off approach to the structure of patent pool royalty rates might encourage blockchain patent pools to charge discriminatory rates to nascent competitors, potentially retarding competition and innovation.

In the absence of antitrust agency action, the potential for anticompetitive abuse of SEPs and patent pools by holders of blockchain-related patents may merit regulatory attention. If evidence emerges that blockchain-related patent holders are charging exorbitant and discriminatory licensing fees to forestall the emergence of new competitors in financial services, a regulatory or legislative response may be necessary to safeguard competition in these markets.

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[423] *See, e.g.*, Delrahim, *supra* note 268, at 2 ("[T]he theory and evidence of unilateral 'hold-up' by patent-holders does not provide an adequate basis to condemn such conduct under the antitrust laws generally.").

[424] *See* U.S. DEP'T. OF JUSTICE & FED. TRADE COMM'N, *supra* note 417, at 77 (explaining how patent pools containing substitute patents that compete with one another, rather than solely complementary patents, "may have the anticompetitive effect of increasing the total royalty rate to licensees"); *id.* at 81 (explaining that patent pools could enable competitors to exchange competitively sensitive proprietary information in an effort to facilitate downstream price-fixing).

[425] *Id.* at 82 (noting a hearing panelist's concerns "that a pool that charges smaller royalties to licensors that are also licensees (insiders) than it charges to pure licensees (outsiders) might produce anticompetitive effects in downstream markets . . . [,] 'allow[ing] inefficient [licensor] competitors to dominate downstream markets by combining the power of the patents in the pool to the exclusion of efficient independent competitors'" (third alteration in original)).

[426] *Id.* at 82–83.

Congress and financial regulators also should be watchful for, and prepared to respond to, potential abuses of the standard-setting process in blockchain networks. Efforts by incumbent financial institutions to shoehorn their proprietary technology into privately set or government standards may signal an intent to use that IP to raise rivals' costs to practice the standard.[427] As standards are set, regulators should be aware of the possibility that members of blockchain SSOs might abuse those standards by falsely warning potential customers that emergent competitors' networks do not meet the relevant requirements and either lack interoperability or are in some way dangerous for customers.

Regulators' goal in making these efforts should be to facilitate the procompetitive benefits of standardization in blockchain-related financial services while preventing anticompetitive abuses of the standardization process or blockchain-related IP. In doing so, the agencies should aim to create and preserve the type of open-access and non-discriminatory environment that the federal government was able to achieve in the early days of the Internet.

VI. CONCLUSION

Blockchain-based technologies already are transforming the way business is done across a broad spectrum of markets. Big companies like J.P. Morgan and DTCC have adopted blockchain to run key portions of their infrastructures, making clear that this is no longer a fringe technology. By eliminating the need for the trust-based services that incumbent institutions historically have provided, blockchain offers the possibility for a competitive renaissance throughout the economy—especially in the financial-services sector. This renaissance could be derailed in several ways, however, and sector regulators will play an important role in shaping how this story plays out. Unlike the FCC, which generally has employed a steady hand in guiding competition policy for the Internet, the SEC and CFTC historically have been indifferent stewards of competition. This indifference may prove problematic as blockchain restructures financial-services markets.

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[427] *See supra* note 265.

This Article has identified three key challenges regulators must grapple with in managing competition policy for blockchain technology: balancing blockchain's promise of increased competition against concerns for marketplace and consumer safety; determining the appropriate level of market decentralization to encourage or tolerate; and deciding whether and how to promote standardization, open-access, and non-discrimination requirements on blockchain networks. This Article also has suggested ways the agencies might meet these challenges. It applied this analysis to four specific blockchain competition-related issues that have arisen or are likely to arise in financial-services markets: (1) paid prioritization, (2) the expansion of blockchain-based derivatives trading, (3) the boom in token sales, and (4) the potential use of standard-setting and IP rights to limit blockchain competition.

The Article looked to the FCC's pre-2017 approach to Internet regulation as a model to suggest that financial regulators should employ a default rule promoting blockchain-based competition structured around open access and non-discrimination unless entities can prove that a particular application is unsafe for consumers or the economy. This strategy offers the best chance for blockchain networks to realize their potential to make financial-services markets more competitive and more democratic—an outcome that might reduce the grip of the big banks and big tech in this sector. This Article's approach to blockchain competition policy in the financial sector can also inform regulatory responses in other markets as blockchain expands its reach across the economy.