

Antitrust Law for Blockchain Technology

Seth C. Oranburg*

Applying traditional antitrust law to the modern world wide web could break the internet. Lina Khan, the FTC's current chair, is pushing for enhanced antitrust enforcement to break up Big Tech, seemingly based on the assumption that antitrust law is the right tool for ensuring a free and equitable internet. This assumption may be in error, and this Article seeks to explain why. Antitrust doctrine originally developed from a law enacted 130 years ago to deal with monopolist "robber barons" like Standard Oil. Since 1890, the structure of markets has changed. Today's information markets through the internet are much different from the railroad and oil markets of more than a century ago. This Article illuminates fundamental distinctions between commodities markets in the late 19th century and information markets in the mid-21st century so that lawyers, regulators, academics, and—most importantly—judges apply the doctrine correctly.

INTRODUCTION

The Federal Trade Commission (FTC), America's antitrust watchdog agency, is currently run by Lina M. Khan.¹ Kahn and her supporters, self-described "Neo-Brandesian" and regulatory radicals, strongly identify with the concept of "antimonopoly."² Khan is especially focused on breaking up Big Tech,³ which is common parlance for the dominant firms in the market for information.⁴ Khan is putting the full force of the FTC behind her objective to reshape antitrust law and policy for the information age.⁵

Unfortunately, America's sworn defender of the World Wide Web (WWW) is fundamentally mistaken about its structure. Ironically, Khan writes that her antitrust theories are based on economic structuralism;⁶ but, as this Article will show, she lacks a

* Seth Oranburg, Associate Professor of Law, University of New Hampshire Franklin Pierce School of Law.

1. *Commissioners*, FED. TRADE COMM'N., <https://www.ftc.gov/about-ftc/commissioners-staff/commissioners> [https://perma.cc/67DL-WZ56].

2. See, e.g., Lina Khan, *The New Brandeis Movement: America's Antimonopoly Debate*, 9 J. EUR. COMPETITION L. & PRAC. 131, 131 (2018) (putting forth that "Antimonopoly" is a part of the New Brandeis Movement and is a "key tool and philosophical underpinning for structuring society on a democratic foundation").

3. Dara Kerr, *Lina Khan Is Taking Swings at Big Tech as FTC Chair, and Changing How it Does Business*, NAT'L PUB. RADIO (Mar. 9, 2023), <https://www.npr.org/2023/03/07/1161312602/lina-khan-ftc-tech> [https://perma.cc/SF9F-U7EF].

4. Big Tech refers to the dominant firms in the market for information. At the time of this publishing, the five largest firm, also known as the "Tech Giants," are Alphabet (Google), Amazon, Apple, Meta (Facebook), and Microsoft. *Big Tech*, WIKIPEDIA (Aug. 29, 2023), https://en.wikipedia.org/wiki/Big_Tech [https://perma.cc/N574-VFH5].

5. *Lina Khan Brings a Chance to Reshape Antitrust Policy*, FIN. TIMES (June 20, 2021), <https://www.ft.com/content/e95ad9f5-d9b9-49ec-a71e-8650da5e7ff2> [https://perma.cc/9NU2-WSNL].

6. Lina M. Khan, Note, *Amazon's Antitrust Paradox*, 126 YALE L.J. 710, 718 (2017) ("[E]conomic structuralism rests on the idea that concentrated market structures promote anticompetitive forms of conduct.")

clear understanding about the structure of the market for information on the WWW. Rather than reiterate other objectors' arguments, this Article aims to establish the fallacy of her position and the error of her policy direction.⁷

Khan's antitrust theories focus on purported analogies between the oil and railroad markets in 1890 and the market for information in 2020.⁸ Her clever rhetoric ignores the critical fact that antitrust developed as a solution to centralized power in the markets for oil and railroads, while the market for information is decentralized and distributed. There are many other distinctions between the two markets, of course, and many other criticisms of Khan's antitrust theories.⁹ This Article will set those critiques aside, as it sets aside concerns regarding the non-neutrality of executive agencies like the FTC¹⁰ and problems that arise when someone who, as a law student, has already formed a judgment to destroy a company will sit as its purportedly neutral arbiter.¹¹ This brief Article will focus on Khan's erroneous understanding of the structure of the internet, and it attempts to correct this error. If policymakers and judges realize that the WWW is increasingly a decentralized-distributed structure, then they can begin to articulate antitrust policy that facilitates technological growth and competitive online markets.

(citing JOE S. BAIN, *INDUSTRIAL ORGANIZATION* (2d ed. 1968); DONALD F. TURNER & CARL KAYSEN, *ANTITRUST POLICY: AN ECONOMIC AND LEGAL ANALYSIS* (1959); Joe S. Bain, *Workable Competition in Oligopoly: Theoretical Considerations and Some Empirical Evidence*, 40 AM. ECON. REV. 35, 36–38 (1950)).

7. Others have already shown why a price theory approach is superior to an economic structure approach. See, e.g., ROBERT H. BORK, *THE ANTITRUST PARADOX: A POLICY AT WAR WITH ITSELF* 110 (1978) (“[The price theory approach], which views consumers as a collectivity, does not take [critical factors] into account.”).

8. Khan's popular student Note relies on drawing analogies. First, Khan makes an analogy between Amazon's current pricing model and the seminal predatory pricing case: *Standard Oil v. United States*. Khan, *supra* note 6, at 722–23. Second, Khan makes an analogy between Amazon's vertical integration strategy and the challenged merger between Brown Shoe's acquisition and the G. R. Kinney shoe company in *Brown Shoe Co. v. United States*. *Id.* at 732. More recently, while working for the House Subcommittee on Antitrust, Khan helped write a report which stated Big Tech companies “have become the kinds of monopolies we last saw in the era of oil barons and railroad tycoons.” SUBCOMM. ON ANTITRUST COM. & ADMIN. L., COMM. ON THE JUDICIARY, 117 CONG., INVESTIGATION OF COMPETITION INTO DIGITAL MARKETS pt. 1, at 2 (Comm. Print 2022).

9. E.g., Robert D. Atkinson & Michael R. Ward, *The Flawed Analysis Underlying Calls for Antitrust Reform: An Assessment of Lina Khan's Amazon's Antitrust Paradox*, 68 ANTITRUST BULL. 205 (2023) (arguing that Khan “ignored or misapplied the economics of two-sided markets, mischaracterized competitive conditions, and did not consider the pro-competitive effects of Amazon's conduct”); Jennifer Cascone Fauver, *A Chair with No Legs? Legal Constraints on the Competition Rule-Making Authority of Lina Khan's FTC*, 14 WM & MARY BUS. L. REV. 243 (2023) (arguing that Khan's interpretation of the FTC Act “fails under both modern methods of statutory interpretation and on constitutional grounds”); Brianna L. Alderman & Roger D. Blair, *Preserving Potential Entry Is Not the Holy Grail in Vertical Merger Enforcement*, 36 ANTITRUST 42, 47 & 48 n.43 (2022) (using Khan's position relating to vertical mergers as an example of not understanding “something” and using “monopoly explanation[s]” to explain it); Victor Glass & Timothy Tardiff, *Analyzing Competition in the Online Economy*, 68 ANTITRUST BULL. 167, 190 (2023) (identifying the differences between online and brick-and-mortar economies).

10. See Khan, *supra* note 6, at 727 (explaining how the FTC abandoned enforcement of the Robinson-Patman Act under the Reagan administration).

11. See Andrew Ross Sorkin et al., *Lina Khan Raises the Heat on Amazon*, N.Y. TIMES (June 22, 2023), <https://www.nytimes.com/2023/06/22/business/dealbook/ftc-lina-khan-amazon.html> [<https://perma.cc/SS2J-NLLJ>] (discussing Khan's accusations that Amazon tricks customers into signing up for Prime); David Streitfeld, *Amazon's Antitrust Antagonist Has a Breakthrough Idea*, N.Y. TIMES (Sept. 7, 2018), <https://www.nytimes.com/2018/09/07/technology/monopoly-antitrust-lina-khan-amazon.html> [<https://perma.cc/K6BT-3AEM>] (describing Khan's interest in taking down Amazon).

Khan's error hinders the continued development of the internet by preventing competition via innovation. This Article illustrates how Khan's regulatory philosophy could reinforce dominant firms by preventing entry by presenting a simple example of a distributed organization named "Duber" that could offer a Web3 alternative to a presumptively dominant firm, Uber. This illustration shows how Khan's strategy may backfire, even when applied to firms with market dominance. The unintended negative consequences of this strategy multiply in the real world, where market dominance is hard to measure with certainty.

This Article hopes to add to the literature by ensuring that antitrust plaintiffs bear their burden of proof by plausibly showing,¹² not nakedly claiming, or simply assuming, that Big Tech is like the robber barons of more than a century ago. To do this, antitrust plaintiffs, including the FTC, would need to convince courts not only that structuralism matters but also that the structure of the information market on the internet reflects a monopoly or, at the very least, an oligopoly. The next part of this Article should cast doubt on whether Big Tech really is as dominant as some claim.

ANTITRUST & THE WORLD WIDE WEB

Khan purports to show Amazon's global dominance by evidencing its "sheer scale and breadth."¹³ However, her statement may not necessarily be true. A quick scan of Barret Lyon's visualization of the web tells a different story. Lyon's Opte Project offers a snapshot of the WWW by tracing Border Gateway Protocol (BGP) routes.¹⁴ Neighboring BGP routes are called peers, and these peers form a network for the propagation of code-based information that switches relationships based on automated route-selection processes. The result of these processes is the pathway upon which information travels throughout the WWW. Thanks to the Opte Project's snapshot of these routes, we can see what the WWW looks like at any given time.

12. See *Bell Atl. Corp. v. Twombly*, 550 U.S. 544, 545 (2007) ("An allegation of parallel conduct and a bare assertion of conspiracy will not suffice."); *Ashcroft v. Iqbal*, 556 U.S. 662, 682 (2009) (stating the pleading stage's plausible grounds standard).

13. See Khan, *supra* note 6, at 715.

14. *About, THE OPTE PROJECT*, <https://www.opte.org/about> [<https://perma.cc/64A9-VRB7>].

Figure 1. Partial map of Web2 generated showing its branching decentralized structure.
Credit The Opte Project (Jan. 1, 2021), CC-A 2.5 open-source license

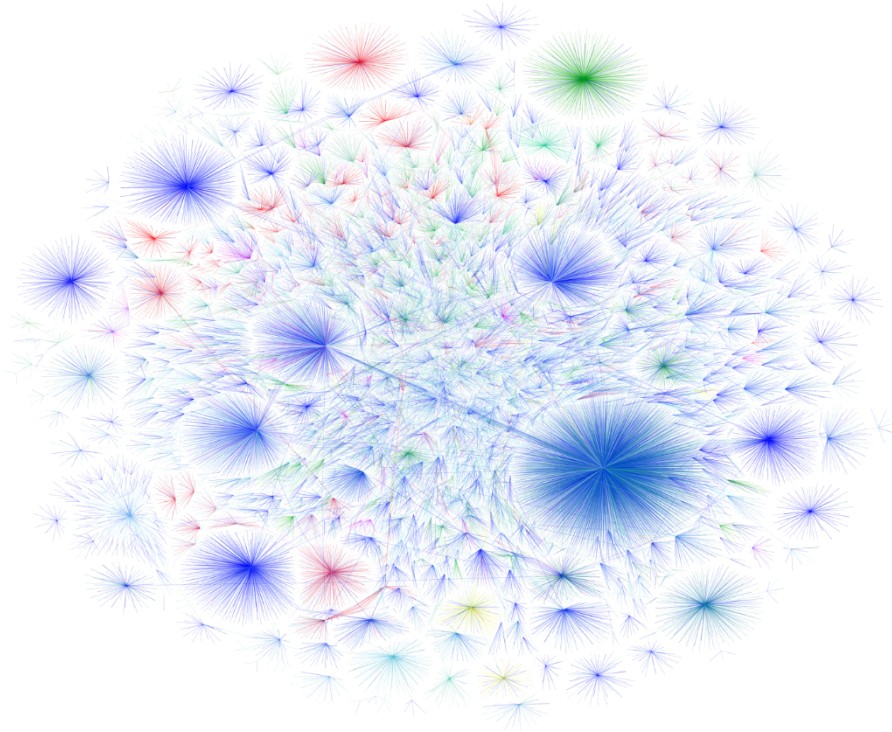


Figure 1 highlights how structural concentration can appear differently depending on the perception in which it is viewed: broadly or narrowly. A substantial portion of the internet is shown in the center of the image. The small call-out image in the lower right shows an enhanced view of one of its nodes. The more detailed picture makes one central address appear dominant—all local information must pass through that node, giving it seemingly total power over that information network. As one zooms out, however, one sees a multitude of alternative branches that could also provide this access. On a large scale, the once formidable central firm becomes an insignificant, and almost undistinguishable, part of a much larger system. Yet, for such a large system, it is incredibly easy for one part to access any other. For example, Hungarian physicist Albert-László Barabási discovered in 2013 that it would take at most 19 clicks to navigate from any of the one trillion websites to any other.¹⁵

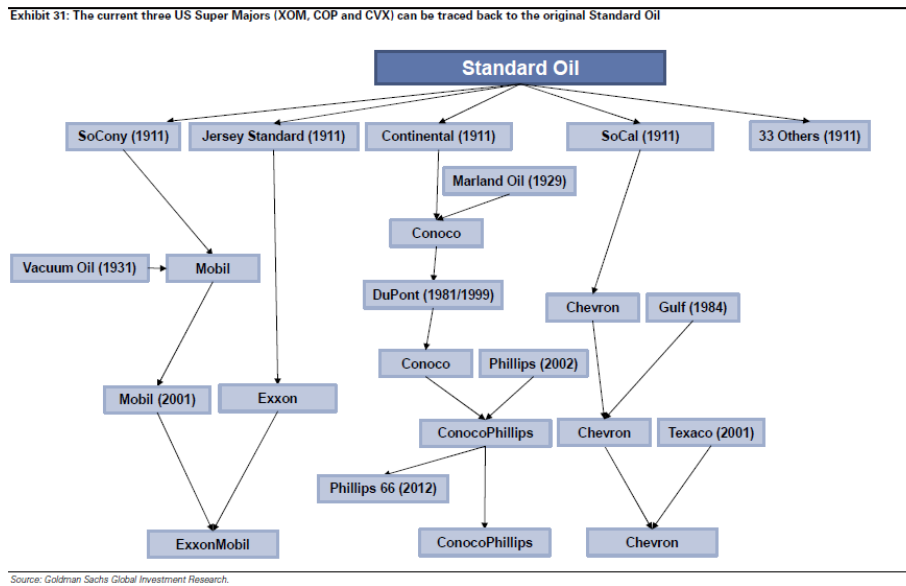
However, this static picture cannot show how the links dynamically change over time—an apparently dominant firm today could be negligible tomorrow. The WWW changes in response to economic, political, and technological factors by quickly growing new branches and cutting off old ones. Unlike rail lines laid in the 19th century, which

15. Stephanie Mlot, *Every Webpage is Connected in 19 Clicks or Less*, PCMAG (Feb. 19, 2023), <https://www.pcmag.com/news/every-webpage-is-connected-by-19-clicks-or-less> [https://perma.cc/Z2HS-9SPT].

were so difficult to move that economists coined the term “sunk costs” to describe them, internet links are incredibly fickle. Dominance on the web may be dominance for just a day, which, to many, is not really dominance at all. It is therefore not analogous to compare the structure of the internet, which changes on a minute-to-minute basis, to the structure of the railroads that prompted antitrust scrutiny, where those rail lines often remain in the same place and belong to the same structure for dozens of years or more.

Antitrust law was created and developed to address centralized power in classical commodities markets that look completely different than how the market for information looks today.¹⁶ Antitrust doctrine was developed in response to specific concerns about centralized power, especially Standard Oil’s power to set oil prices.¹⁷ Figure 2 below shows how Standard Oil centralized control of virtually all of America’s oil production and distribution, while its power was concentrated in the hands of its chair, John D. Rockefeller.

Figure 2. *How Big Would Standard Oil Be Today? - American Money Management (amminvest.com)*



16. See Alexandra Twin, *Antitrust Laws: What They Are, How They Work, Major Examples*, INVESTOPEDIA (Jan. 31, 2023), <https://www.investopedia.com/terms/a/antitrust.asp> [<https://perma.cc/6QHE-LXB9>] (explaining the basics of antitrust laws and their usage today).

17. ELIOT JONES, *THE TRUST PROBLEM IN THE UNITED STATES* 80 (1921).

Figure 3. Political cartoon titled “Next!” depicting Standard Oil as an evil octopus. Credit J. Ottmann Lith, Co. (Sept. 7, 1904). Public domain work, Library of Congress No. LC-DIG-ppmsca-25884

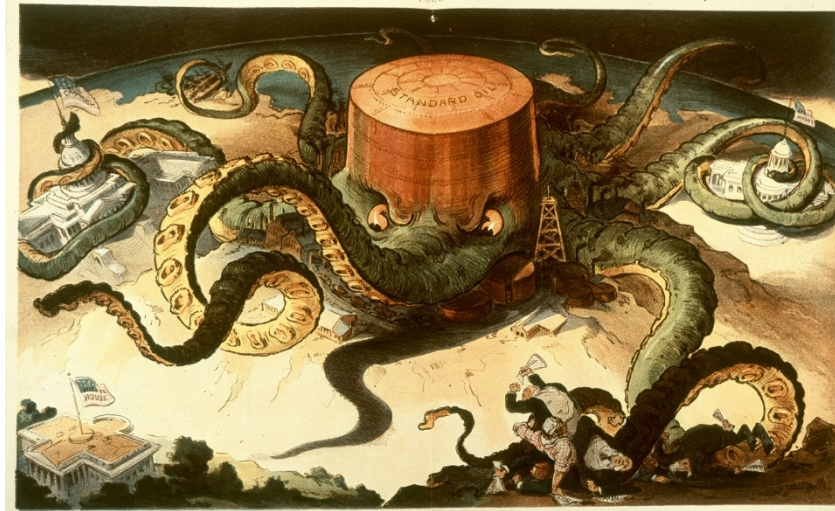


Figure 3, a popular 1904 political cartoon depicting Standard Oil as an octopus whose large central body captured various people and institutions through its many tentacles, illustrates contemporary concerns about this company’s centralized power.¹⁸ Standard Oil famously formed stock voting “trusts” as end runs around state laws prohibiting ultra-big businesses.¹⁹ State legislatures determined that Standard Oil’s chair, John D. Rockefeller, accrued too much control for any private person to wield, and in 1890 the anti-monopoly advocates succeeded in pushing the Sherman Antitrust Act through federal Congress.²⁰ Antitrust law thus evolved mainly as a bulwark against centralized market power and corporate control.²¹

The modern information market on the WWW is radically different and easily distinguishable from a classic commodities market such as oil. The WWW began as a decentralized network and now includes distributed network architecture, but it never appeared as centralized as the industrial conglomerates of more than a century ago.²² Moreover, the railroad industrial magnates controlled prototypical hard assets, meaning physical or tangible assets that have fundamental long-term value, like steel tracks, iron cars, oil dirks, and coal mines; whereas WWW software are prototypical soft assets, meaning intangible resources that are difficult to quantify and cannot be measured directly,

18. *Next!*, LIBR. OF CONG., <https://www.loc.gov/item/2001695241/> [<https://perma.cc/NM5H-JYRY>].

19. *Standard Oil Co. of New Jersey v. United States*, 221 U.S. 1, 46 (1911).

20. Paul Sabin, *Overview: Antitrust and Monopoly*, YALE UNIV., <https://energyhistory.yale.edu/antitrust-and-monopoly/> [<https://perma.cc/AH69-2U6P>].

21. See ELEANOR M. FOX & DANIEL A. CRANE, *CASES AND MATERIALS ON U.S. ANTITRUST IN GLOBAL CONTEXT* 10–11 (4th ed. 2012) (explaining the initial history of the Sherman Act).

22. *The Complete History of the World Wide Web (From Web1 to Web 3)*, DOCK BLOG (Aug. 8, 2022), <https://blog.dock.io/the-complete-history-of-the-world-wide-web/> [<https://perma.cc/7EES-HAX2>] (detailing the changes of the world wide web’s network system).

like brand goodwill, patent portfolios, licensing rights, and employees' skills. Thus, neither the structure nor the nature of the WWW bear obvious resemblance to the classical monopolies upon which antitrust jurisprudence was founded.

Recent FTC lawsuits filed under Khan's direction indicate how her notions on WWW competition poorly fit within antitrust doctrine. In order for a market to be dominated or controlled, there must first be some market to dominate or control. The FTC itself acknowledges this on its website.²³ To construct a lawsuit against Amazon.com, however, the FTC invented a new market called "online superstore."²⁴ Then, the FTC asserts that Amazon dominates this market.²⁵ But what is this market? What is the difference between Khan's new concept of an "online superstore" and the dot.com era concept of "e-commerce"?²⁶ The antitrust difference is, of course, that Amazon captures less than 30% of US e-commerce sales,²⁷ so Khan could never prevail in an abuse-of-dominance lawsuit against Amazon unless she defines a new market for it to dominate. The fact that Khan can, and did, invent a new market to pursue her theory undermines her claim: if the WWW is so ephemeral that new markets emerge and disappear with great frequency, then they are hyper-competitive; and if they are hyper-competitive, then there is no need for FTC antitrust action. Courts should not only question Khan's market definition of "online superstore" but should also push back on whether e-markets are different from conventional ones. If Khan can invent a concept called "online superstores," then perhaps the whole concept of "e-commerce" is too vague for antitrust scrutiny. After all, what makes e-commerce so fundamentally different from retail more generally? Unlike oil, which is an essential "hard" good with a scientific definition,²⁸ online superstores, e-commerce, and retailers are "soft" descriptions of fuzzy concepts that are context dependent.

Even if the FTC could define consistent and cogent relevant e-markets based on static models of what happens on the WWW in any given instant, then it still must answer the question of whether the dynamic nature of the WWW makes any purported dominance too ephemeral for antitrust law to address. A very brief history of the structure of the WWW illuminates the fundamental differences that make wholesale application of anti-monopolist antitrust law inappropriate to market power on the modern web.²⁹

The WWW developed in three stages, but was never centralized.³⁰ The first stage of the WWW, known retronymically as "Web1," developed in the 1990s as technologies,

23. *Markets*, FED. TRADE COMM'N, <https://www.ftc.gov/advice-guidance/competition-guidance/guide-antitrust-laws/mergers/markets> [<https://perma.cc/5K9Y-CBAN>].

24. Complaint at 44–48, *FTC v. Amazon.com, Inc.*, No. 23-cv-01495 (W.D. Wash. Sept. 26, 2023).

25. *Id.* at 43.

26. See, e.g., *E-Commerce*, in RUTH A. WIENCLAW, BUSINESS REFERENCE GUIDE: E-COMMERCE & RETAIL MERCHANDISING 18 (Salem Press eds., 2014) ("E-Commerce is the process of conducting business on-line through such transactions as sales and information exchange.").

27. *Lina Khan Is Wrong About Amazon*, WASH. POST (Oct. 3, 2023), https://www.washingtonpost.com/business/2023/10/03/lina-khan-is-wrong-about-amazon-and-antitrust/ca/01f2-3c-61ea-11ee-b406-3ea724995806_story.html [<https://perma.cc/8E3J-9P5G>].

28. *Chemical Constitution of Crude Oil*, PENN STATE UNIV., <https://www.education.psu.edu/fsc432/node/5> [<https://perma.cc/J4LG-C7TJ>].

29. See *infra* notes 30–34 (discussing the starting structure of the WWW).

30. See Charles Silver, *What is Web 3.0?*, FORBES (Jan. 6, 2020), <https://www.forbes.com/sites/forbestechcouncil/2020/01/06/what-is-web-3-0/?sh=3fca7afe58df> [<https://perma.->

such as hypertext markup language (HTML), enabled web browsers, such as Netscape Navigator and Internet Explorer, to display visual content from web servers.³¹ Web1 was decentralized, meaning that it featured many nodes but no central governing body.³² The nodes hosted content that was mostly read-only in the first iteration of the WWW as an open-source library. Decentralized Web1 in the 1990s thus looked very different from centralized Standard Oil in the 1890s. In fact, WWW was named “web” because it structurally resembled a web woven by a spider on cocaine³³ and not an octopus.³⁴

Web2, or the “social web” identifies the second version of the WWW. Web2 was powered by technologies like JavaScript that made it easy for users to generate web content—unlike Web1.³⁵ Instead of creating content as Web1 publishers did, Web2 platforms like Facebook and YouTube leveraged search, tags, and extensions to connect social media users to content creators.³⁶ Web2 platforms are substantially based on information distribution, not information creation.³⁷

cc/SU3Q-8LMF] (“Web 3.0 will bring us a fairer internet by enabling the individual to be a sovereign. True sovereignty implies owning and being able to control who profits from one’s time and information.”).

31. *Web 3.0 Explained, Plus the History of Web 1.0 and 2.0*, INVESTOPEDIA (Oct. 18, 2023), <https://www.investopedia.com/web-20-web-30-5208698> [<https://perma.cc/3UCL-JWZM>].

32. *The Complete History of the World Wide Web (from WEB1 to WEB3)*, *supra* note 22.

33. For images of webs woven by spiders on various drugs, including cocaine, see Christopher Ingraham, *Quiz: What Drugs Were These Spiders on When They Made Their Webs?*, WASH. POST (Apr. 10, 2015), <https://www.washingtonpost.com/news/wonk/wp/2015/04/10/quiz-what-drugs-were-these-spiders-on-when-they-made-their-webs/> [<https://perma.cc/38WP-9428>].

34. See *What Is a Web Crawler? How Web Spiders Work*, CLOUDFARE, <https://www.cloudflare.com/learning/bots/what-is-a-web-crawler/#:~:text=The%20Internet%2C%20or%20at%20least,real%20spiders%20crawl%20on%20spiderwebs> [<https://perma.cc/46KA-RNLE>] (“The Internet, or at least the part that most users access, is also known as the World Wide Web—in fact that’s where the ‘www’ part of most website URLs comes from. It was only natural to call search engine bots ‘spiders,’ because they crawl all over the Web, just as real spiders crawl on spiderwebs.”).

35. See Heather Hall, *Web 2.0 Explained: Everything You Need to Know History*, HIST. COMPUT. (Aug. 7, 2023), <https://history-computer.com/web-2-0/> [<https://perma.cc/V3FA-K7JD>].

36. *Id.*

37. The computer science literature takes the distributed-information nature of Web2 as a given starting point for academic analysis on question such as how the distributed nature of Web2 information presents technical challenges for web crawlers. See Andreas Juffinger et al., *Distributed Web2.0 Crawling for Ontology Evolution*, 22ND INT’L CONF. ON DIGIT. INFO. MGMT. 615 (2007).

Figure 4. Structure of the WWW showing its autonomous systems (AS) connected to each other and via internet exchange points (IX) in a decentralized “web.” Credit B Wenk (Nov. 7, 2018). CC A-S 4 open-source license

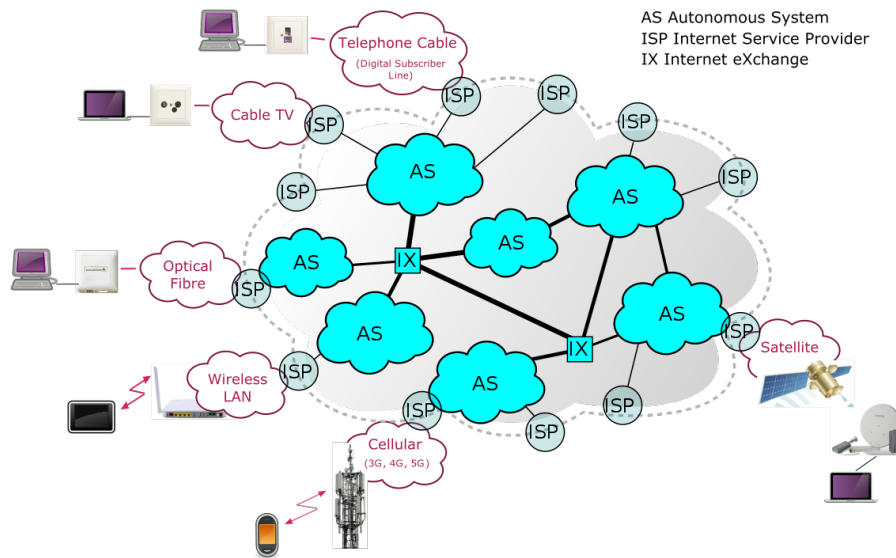


Figure 4, an image of the Opte Project, accurately illustrates WWW decentralization in its Web2 era as a branching architecture resembling images of the biological neural network in the human brain.³⁸ Web2 is clearly distinguishable from the octopus model of market power in the industrialist era.³⁹

Web3 represents an emerging architecture for a distributed WWW based on distributed ledger technology (DLT) or replicated journal technology (RJT) that became popular in the 2010s.⁴⁰ Although Web3 is sometimes described as the decentralized web, it is more accurately described as the distributed web or the distributed-decentralized web due to its defining technology.⁴¹ DLT uses consensus algorithms that reliably replicate information across an entire peer-to-peer computer network.⁴² Unlike heterogeneous information networks such as Web1 (where different information that users can access is stored on various servers) or Web2 (where different information created and accessed by users is maintained in various platforms), Web3 features homogenous information maintained identically throughout its various nodes.⁴³ The most common form of DLT is the blockchain, which uses proof-of-work consensus algorithms.⁴⁴ The most common

38. Barrett Lyon, *The Internet 1997–2021*, OPTe PROJECT, <https://www.opte.org/the-internet> [<https://perma.cc/V32N-9DDA>].

39. *Id.*

40. JP Vergne, *Decentralized vs. Distributed Organization: Blockchain, Machine Learning and the Future of the Digital Platform*, ORG. THEORY, Oct.–Dec. 2020, at 1, 9.

41. *Id.*

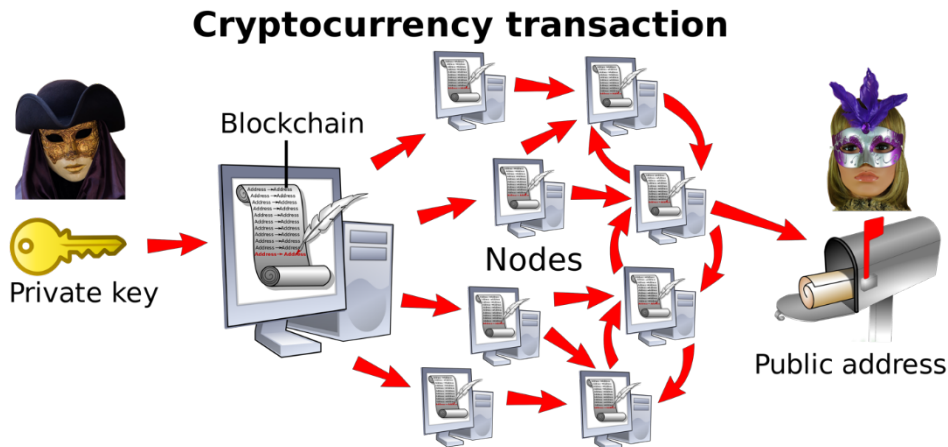
42. *Id.*

43. *Id.* at 4.

44. *Id.*

blockchain today is used by Bitcoin to verify and record cryptocurrency transactions.⁴⁵ Web3 also supports non-fungible tokens (NFTs)⁴⁶ and smart contracts.⁴⁷ Note that Web3 looks nothing like the octopus representation of centralized control that reflects how concerns about industrial conglomerates like Standard Oil prompted original antitrust concerns.⁴⁸

Figure 5. Simplified visualization of a cryptocurrency transaction using Web3 distributed ledger technology. Credit Mikael Häggström (Feb. 2, 2019), CC0 1.0 public domain dedication



As you can see, the WWW does not even remotely resemble the market structure that gave rise to antitrust law in America.⁴⁹ This does not mean that the Web is immune to market power; rather, it means that solutions to market power that worked in a prior era for a different market structure will not necessarily do the same work in this era with regard to

45. *The Most Popular Blockchain Networks*, KRIPTOMAT, <https://kriptomat.io/blockchain/most-popular-blockchainnetworks/#:~:text=Identifying%20the%20Top%20Blockchain%20Networks,blockchain%20is%20the%20most%20popular> [<https://perma.cc/6FWT-QKYA>].

46. See Robyn Conti, *What Is an NFT? Non-Fungible Tokens Explained*, FORBES ADVISOR (Mar. 17, 2023), <https://www.forbes.com/advisor/investing/cryptocurrency/nft-non-fungible-token/> [<https://perma.cc/2JWQ-7MUH>] (explaining that NFTs are digital assets in the form of art, music, videos etc. that can be bought and sold online usually with cryptocurrency).

47. See Stuart D. Levi & Alex B. Lipton, *An Introduction to Smart Contracts and Their Potential and Inherent Limitations*, HARV. L. SCH. F. ON CORP. GOVERNANCE (May 26, 2018), <https://corpgov.law.harvard.edu/2018/05/26/an-introduction-to-smart-contracts-and-their-potential-and-inherent-limitations/> [<https://perma.cc/5Q3U-4J9E>] (explaining that smart contracts refer to computer code that automatically executes all or parts of an agreement and is stored on a blockchain-based platform).

48. Bobby Allyn, *People Are Talking About Web 3. Is it the Internet of the Future or Just a Buzzword?*, NAT'L PUB. RADIO (Nov. 21, 2021), <https://www.npr.org/2021/11/21/1056988346/web3-internet-jargon-or-future-vision> [<https://perma.cc/NJX4-EQKR>].

49. The markets in the years immediately leading up to Congress's passage of the Sherman Antitrust Act in 1890 were notable for remarkable consolidation in the form of "trusts" that rapidly centralized pricing power in commodities markets. See William L. Letwin, *Congress and the Sherman Antitrust Law: 1887-1890*, 23 U. CHI. L. REV. 221, 234 (1956) ("That year [1887] saw the formation of the Sugar and Whisky Trusts . . . [as well as] the Envelope, Salt, Cordage, Oil-Cloth, Paving-Pitch, School-Slate, Chicago Gas, St. Louis Gas and New York Meat trusts . . . trust-making was the 'tendency of the times' . . .").

the market for information on the internet.⁵⁰ The visual dis-analogies and illustrations of distinctions in this Article serve as a warning to caution lawyers and judges from applying antitrust law as it historically existed to modern issues of market power on the WWW. Anyone who seeks to use the economic structuralist approach to antitrust must first determine how this approach applies to the fluid, interconnected, decentralized structure of Web2 and, second, how to map antitrust principles onto the replicated, distributed-decentralized structure of Web3. The core value of Web3 arises from its distributed-decentralized nature,⁵¹ such that antitrust tools developed to prevent centralized monopolists from extracting social welfare may be fundamentally inappropriate for Web3 economies.

Figure 6. Comparison of centralized, decentralized, and distributed network structures

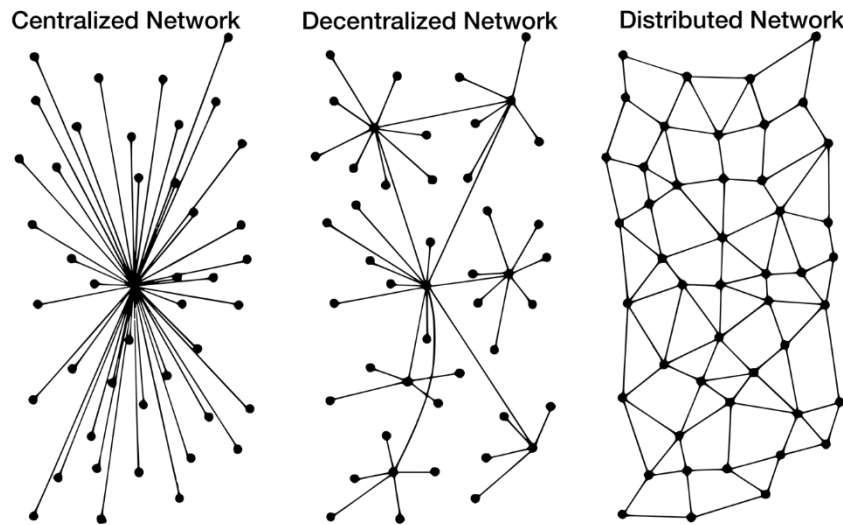


Figure 6 illustrates how the hallmark of monopoly structures (one firm at the center of a network with connections to every other node) is harder to evaluate in decentralized Web2 structures (where some nodes have more connections than others, but the superconnectors each have similar numbers of connects to each other). And that challenge arises from a static model. Imagine identifying the structure of market power in a dynamic image of Web2, where the nodes constantly shift their linkages. Finally, the image of Web3 shows no apparent concentration whatsoever, as every node has the same number of connections. Now imagine the Web3 network dynamically growing, shrinking and changing. Imagine the dynamic Web3 network is also connected to other Web3 networks

50. Robin Mansell, *New Visions, Old Practices: Policy and Regulation in the Internet Era*, 25 J. MEDIA & CULTURAL STUD. 19, 21 (2011).

51. Joe Onisick, *Realizing the Value of Web3*, FORBES (Feb. 14, 2023), <https://www.forbes.com/sites/forbestechcouncil/2023/02/14/realizing-the-value-of-web3/?sh=7b54984a29b1> [<https://perma.cc/2N8Z-9V95>] (“The core value of Web3 is its decentralization, which is enabled by the cheap, readily available trust that blockchain technology delivers.”).

in a distributed-decentralized dynamic superstructure. Where is the structural market power?

The essence of this thought experiment is to illustrate how the economic structural basis for antitrust is hard to apply in Web2 and impossible to apply in Web3. Without some sensible way of applying structural antitrust theories to the WWW, lawyers and judges should return to the first principles of why antitrust law exists and seek to apply those principles to new market structures.

ANTITRUST & BIG TECH

Now that we have established how the structuralist approach to antitrust provides ambiguous results, let us consider alternative approaches that could lead to prescriptions about what to do, if anything, about Big Tech. Big Tech does not own railroads and oil rigs like Standard Oil, but Big Tech companies such as Amazon may have established some dominance on one of the decentralized nodes of the vast internet.⁵² Whether market power over one or more nooks amid the entire WWW gives rise to antitrust liability is beyond the scope of this brief Article. The prior section shows such liability should not be built on the faulty assumption that Big Tech firms in general are like the robber barons of more than a century ago, because the structure of the market for information on the WWW in the 21st century is not like the structure of the market for oil or railroads in the 19th century. This Part presents some ideas about how antitrust could apply to Big Tech. Perhaps a useful and unbiased approach to this question is to identify the first principles of antitrust and then build the application from there.⁵³

Antitrust law is most fundamentally based on the economic notion of utility.⁵⁴ Utility is the total satisfaction or benefit derived from consuming a good or service.⁵⁵ Economic theories based on rational choice usually assume that consumers will strive to maximize their utility.⁵⁶ The total amount of utility existing for everyone at any given time is identified as social welfare.⁵⁷ Two people can each gain utility from a mutually beneficial trade.⁵⁸ When two people gain utility without reducing anyone else's utility, that process

52. See Chris Alcantara et al., *How Big Tech Got So Big: Hundreds of Acquisitions*, WASH. POST (Apr. 21, 2021), <https://www.washingtonpost.com/technology/interactive/2021/amazon-apple-facebook-google-acquisitions/> [<https://perma.cc/67YT-X9TD>] (describing Amazon's vast acquisitional history).

53. See RICHARD A. EPSTEIN, *SIMPLE RULES FOR A COMPLEX WORLD* 53–54 (1995) (attributing “simple rules” that laws should seek to protect); see also RICHARD A. EPSTEIN, *FORBIDDEN GROUNDS: THE CASE AGAINST EMPLOYMENT DISCRIMINATION LAWS* 15–27 (1992) (employing this approach). Others point out the limits of this approach. See Jerry L. Mashaw, *Against First Principles*, 31 SAN DIEGO L. REV. 211, 212 (1994) (“My basic argument is that the broad principles that underlie most such discussions can get us only so far in our analysis of appropriate public policy.”). This Article introduces this debate only to justify the use of the first principles approach as a foil to Lina Khan's approach.

54. James Chen, *Understanding Antitrust Laws*, INVESTOPEDIA (May 2, 2022), <https://www.investopedia.com/ask/answers/09/antitrust-law.asp> [<https://perma.cc/22QM-6TC4>].

55. *Utility in Economics Explained: Types and Measurement*, INVESTOPEDIA (Sept. 25, 2023), <https://www.investopedia.com/terms/u/utility.asp> [<https://perma.cc/7FHU-MDZR>].

56. *Id.*

57. *Welfare Economics Explained: Theory, Assumptions, and Criticism*, INVESTOPEDIA (Sept. 28, 2023), https://www.investopedia.com/terms/w/welfare_economics.asp [<https://perma.cc/W35B-WB6U>].

58. When two people can both gain from trade without hurting anyone else, we call that situation Pareto efficient. *Pareto Efficiency Examples and Production Possibility Frontier*, INVESTOPEDIA (Aug. 3, 2023), <https://www.investopedia.com/terms/p/pareto-efficiency.asp> [<https://perma.cc/YQ3E-Y79F>].

increases social welfare.⁵⁹ Lawyers generally agree that increasing social welfare is good social policy, while economists generally agree that well-ordered and competitive markets produce optimal increases to social welfare. Securities law regulates certain markets to ensure they are well-ordered, while antitrust law regulates markets to ensure they are competitive.

The goal of antitrust law can thus be summarized simply as “protecting competition.”⁶⁰ Antitrust law protects competition by prohibiting certain kinds of “unfair” competition and facilitating more desirable “fair” competition.⁶¹ Protecting competition is a worthy goal for law because competition benefits society: by incentivizing the sellers to increase quality or reduce the price of products and services, competitive pressure encourages activities that increase social welfare.⁶² Social welfare increases regardless of whether a dominant firm, its runner-up incumbent competitor, or some new start-up builds the proverbial better mouse trap or determines how to sell an existing good or service more efficiently. Economics recognizes that start-ups often face higher costs than incumbent firms do when bringing the proverbial better mousetrap to market.⁶³ By protecting the competitive process, law antitrust protects society from certain excesses of capitalism known as monopolies and from their close cousins, monopolization and collusion.⁶⁴ Antitrust law accomplishes its goal by requiring that antitrust plaintiffs prove, first, that there is some dominant firm who has market power, and, second, that entry barrier make it difficult for newcomers to enter that market and dilute market power.⁶⁵

But no legal doctrine can survive as a simple statement of abstract goals or economic principles. The substantive prohibitions against collusion in the original Sherman Antitrust Act of 1890 is only 31 words long.⁶⁶ Its prohibition against monopolization is only 43 words.⁶⁷ Yet over the last 130 years, antitrust law developed its various doctrines, rules, standards, guidelines, and enforcement methods, such that the most recent edition of the leading treatise of the subject⁶⁸ is over 5950 pages long.⁶⁹ This process of growth from

59. See *Utility in Economics Explained*, *supra* note 55 (describing the concept of social welfare and how social welfare can be increased).

60. See *Mission*, U.S. DEP’T OF JUST. (Sept. 14, 2023), <https://www.justice.gov/atr/mission> [<https://perma.cc/RS88-YYD6>] (describing what a competitive market is and how a monopoly can destroy competition).

61. See *id.* (describing what unfair competition is, such as a monopoly).

62. Abbott B. Lipsky, Jr., *Protecting Consumers by Promoting Competition*, FED. TRADE COMM’N (Mar. 6, 2017), <https://www.ftc.gov/enforcement/competition-matters/2017/03/protecting-consumers-promoting-competition> [<https://perma.cc/87XE-T3F4>].

63. GEORGE J. STIGLER, *THE ORGANIZATION OF INDUSTRY* 67–70 (1968).

64. Alexandra Twin, *Antitrust Laws: What They Are, How They Work, Major Examples*, INVESTOPEDIA (Jan. 31, 2023), <https://www.investopedia.com/terms/a/antitrust.asp> [<https://perma.cc/G9NR-ZJNY>].

65. Daniel E. Lazaroff, *Entry Barriers and Contemporary Antitrust Litigation*, 7 UC DAVIS BUS. L.J. 1 (2006).

66. Sherman Act of 1890 § 1, 15 U.S.C. § 1 (“Every contract, combination in the form of trust or otherwise, or conspiracy, in restraint of trade or commerce among the several States, or with foreign nations, is declared to be illegal.”).

67. *Id.* § 2 (“Every person who shall monopolize, or attempt to monopolize, or combine or conspire with any other person or persons, to monopolize any part of the trade or commerce among the several States, or with foreign nations, shall be deemed guilty of a felony . . .”).

68. PHILLIP E. AREEDA & HERBERT HOVENKAMP, *ANTITRUST LAW: AN ANALYSIS OF ANTITRUST PRINCIPLES AND THEIR APPLICATION* (5th ed. 2020 & Supp. 2023).

69. *Id.*

simple standards into complex rules happens frequently in the American legal system of civil law based on precedent, and much has been written elsewhere about the virtues and vices of this process of law writ large.⁷⁰

Here is how substantive antitrust law grew under 100 statutory words to a nearly 6,000-page treatise. Congress passed the Sherman Antitrust Act of 1890 to bust trusts.⁷¹ Trusts meant manufacturing conglomerates like Standard Oil, who grew large not by creating better products but by purchasing competitors and then raising prices. Congress, courts, and the Federal Trade Commission busted these trusts through law that precluded “unreasonable” restraints on trade.⁷² What constitutes an “unreasonable” restraint is the subject of the 5,950-page treatise and cannot be resolved by this short Article. Notably, the definition of “unreasonable” found in those pages results from 130 years of traditional antitrust enforcement in a conventional business world consisting of well-defined business entities.⁷³

Antitrust law evolved coextensively with increasing economic understanding of organizations, business, and markets.⁷⁴ In 1937, Ronald Coase recognized that business entities exist because these “firms” (businesses) have advantages over the market.⁷⁵ As firms’ advantage over markets increases when firms’ centralized governance proves more efficient than markets, firms grow.⁷⁶ This is good for society because, as economics professor E.J. Mishan explained, efficiency increases social welfare.⁷⁷

A firm’s growth may reduce social welfare if its growth is the result of firm managers contracting, colluding, or otherwise using market power to create “unreasonable” restraints on trade, instead of through entrepreneurial skill or dumb luck. For most of modern corporate history, the theory of the firm and antitrust doctrine developed coextensively by promoting entrepreneurial risk-taking and skill, while prohibiting nefarious self-dealing and protectionist cabals.⁷⁸ For example, in 1999, the Swiss pharmaceutical giant Hoffman-La Roche, Ltd. pled guilty to forming a vast conspiracy with other vitamin manufacturers and distributors to fix, increase, and maintain prices by allocating sales volumes and geographic markets among the co-conspirators.⁷⁹ The corporation agreed to pay a 500-

70. See Peter H. Schuck, *Legal Complexity: Some Causes, Consequences, and Cures*, 42 DUKE L.J. 1, 9 (“The legal system as a whole exhibits a marked tendency to become more complex, a feature that it appears to share with other systems, physical and social.”).

71. *Sherman Anti-Trust Act (1890)*, NAT’L ARCHIVES (Mar. 15, 2022), <https://www.archives.gov/milestone-documents/sherman-anti-trust-act> [<https://perma.cc/U4M5-HVED>].

72. *The Antitrust Laws*, FED. TRADE COMM’N., <https://www.ftc.gov/advice-guidance/competition-guidance/guide-antitrust-laws/antitrust-laws> [<https://perma.cc/DE4K-XZ2M>].

73. *Id.*

74. *Id.*

75. See R. H. Coase, *The Nature of the Firm*, 4 ECONOMICA 386, 390–94 (1937) (emphasizing Coase’s claim that business entities exist because it gives the organization an advantage over the market).

76. See *id.* at 393 (explaining how firms grow when their centralized governance is more efficient than the markets).

77. See generally E.J. MISHAN, *ECONOMIC EFFICIENCY AND SOCIAL WELFARE: SELECTED ESSAYS ON FUNDAMENTAL ASPECTS OF THE ECONOMIC THEORY OF SOCIAL WELFARE* (1981) (explaining the connection between efficiency and social welfare and how efficiency and social welfare are, mathematically, the same thing; while an increase in efficiency does not necessarily mean social justice, economic equality, or any sort of equity, it does reflect an overall increase in social resources that means humans are using inputs more efficiently).

78. *Modern Antitrust Enforcement*, YALE SCH. OF MGMT., <https://som.yale.edu/centers/thurman-arnold-project-at-yale/modern-antitrust-enforcement> [<https://perma.cc/RUY8-G329>].

79. *F. Hoffman-La Roche Ltd. v. Empagran S.A.*, 542 U.S. 155, 159–60 (2004).

million-dollar fine for its misdeeds.⁸⁰ The DOJ secured this large fine in part because the corporation's conspiracy reduced competitive pressures and effectively gave co-conspirators a monopoly it did not earn.⁸¹

The upshot from these principles of antitrust is that antitrust law protects competition because competition drives firms to be more efficient and thus tends to increase social welfare.⁸² Therefore, the point of antitrust is to increase social welfare. When evaluating any antitrust doctrine for its applicability to any perceived market failure, the question should be, is this rule likely to increase social welfare in this market?

Unfortunately, Khan's antitrust theory does not take this approach. Rather, she adopts antitrust as she perceives it to be in the 1960s, when antitrust enforcement was more vigorous. She does not arrive at this point on the history of antitrust timeline because it flows from her first principles of antitrust. Rather, she declares her desire to break up monopolies and finds this time to be when courts were most willing to do so. For illustration, Khan celebrates *Brown Shoe*⁸³—a case showing one of the few times that a court was willing to block a vertical integration.

It so happens that, just as this Article went into its first round of editing, the United States District Court for the Northern District of California decided that the FTC could not enjoin a merger between Meta and Within Unlimited, who makes VR games.⁸⁴ Because Judge Edward J. Davila articulated why Khan's theory fails when applied to Web2 firms like Meta, I need not repeat that here. The key takeaway is that antitrust courts are not in the *Brown Shoe* era for good reasons i.e., blocking vertical integrations often causes significant harm to efficiencies while producing little to no protection to competition.

By citing Davila's opinion and the emerging literature developing from it, instead of speculating on the merits of *FTC v. Meta Platforms*, this Article maintains valuable space that it will use to inform the application of Khan's structuralist theories to Web3 companies. What if Khan wanted to enjoin some vertical integration between two Web3 distributed organizations instead of between two Web2 corporations? The next section demonstrates why her theories are inapplicable to the distributed structure of Web3.

ANTITRUST & WEB3

Vertical integration occurs when a firm takes ownership of surrounding stages of its supply chain.⁸⁵ For an example of vertical integration, imagine a firm that makes shoes. Upstream on its supply chain are the rubber, leather, and cloth used in the shoemaking process. Downstream on its supply chain are the shoe retailers where customers try on and

80. Press Release, U.S. Dep't of Just., F. Hoffmann-La Roche and BASF Agree to Pay Record Criminal Fines for Participating in International Vitamin Cartel (May 20, 1999).

81. See Herbert J. Hovenkamp, A Primer on Antitrust Damages 57–59 (Mar. 1, 2011) (unpublished manuscript) (on file with author) (discussing the current antitrust rule on a right to contribution).

82. See *id.* (justifying antitrust laws as being for the greater good of society).

83. *Brown Shoe Co. v. United States*, 370 U.S. 294, 345–46 (1962).

84. David McCabe & Sheera Frenkel, *Judge Is Said to Let Meta's Virtual Reality Deal Move Forward*, N.Y. TIMES (Feb. 1, 2023), <https://www.nytimes.com/2023/02/01/technology/meta-within-deal-ftc.html> [<https://perma.cc/YML8-BHXS>].

85. Adam Hayes, *Vertical Integration Explained: How It works, with Types and Examples*, INVESTOPEDIA (May 30, 2023), <https://www.investopedia.com/terms/v/verticalintegration.asp#:~:text=Vertical%20integration%20is%20the%20business,control%20over%20the%20production%20process> [<https://perma.cc/L5DT-A367>].

buy shoes. A shoe company will engage in vertical integration if it purchases its rubber supply company or its retail store partner.

Compare this with horizontal integration, where a firm purchases its competitors. For an example of horizontal integration, imagine a firm that refines oil in Cleveland, Ohio. Such an oil company would engage in horizontal integration if it purchases another firm that refines oil in New Jersey.

Vertical integration cases generally do not merit as much antitrust scrutiny as horizontal ones because vertical integration alone cannot immediately increase market power, whereas horizontal integration can.⁸⁶ For example, imagine that there are three major publishers of legal education casebooks—call them “Carolina,” “West,” and “Thompson”—with equal market shares of 1/3 each. If West purchases Thompson, West-Thompson now has 2/3 market share, which shows a clear increase in market power. However, if Carolina purchases the book retailer Barnes & Nobles, then nothing immediately changes in the market for publication of casebooks. The fear is that Carolina might then prevent Barnes & Nobles from selling West or Thompson books in its stores. But that fear should be offset by hope for efficiencies gained from this transaction. Accordingly, the doctrine regarding vertical integration is notoriously vague.⁸⁷ And while section 7 of the Clayton Act does allow antitrust law to prevent vertical mergers,⁸⁸ scholars and economists concluded that the alleged harmful effects of vertical mergers are so implausible, and efficiency gains so likely, that vertical mergers should be deemed virtually per se lawful.⁸⁹

Despite the economic consensus that vertical mergers are far more likely to be beneficial than harmful, Khan proposes “prophylactic bans on [Amazon’s] vertical integration[,] . . . thereby forcing it to split up its retail and Marketplace operation.”⁹⁰ Despite her rhetoric, substantially, her proposal goes well beyond prophylactics by preventing mergers: she would affirmatively break up existing entities, even ones that became integrated organically and not via mergers.

Setting aside the fact that Khan’s prophylactic ban on vertical integration ignores law and economics and noting that the FTC already lost cases where it attempted to argue for a prophylactic ban on horizontal integration,⁹¹ her proposal is especially inapplicable to Web3.

86. U.S. DEP’T OF JUST. & FED. TRADE COMM’N, HORIZONTAL MERGER GUIDELINES 19 (2010).

87. PHILLIP E. AREEDA & HERBERT HOVENKAMP, ANTITRUST LAW: AN ANALYSIS OF ANTITRUST PRINCIPLES AND THEIR APPLICATION ¶ 1000a, at 141 (4th ed. 2016) (“Identifying and measuring the probability of anticompetitive effects from vertical mergers is difficult, and thus formulating reasonably precise and administrable rules is difficult as well.”).

88. *Id.* (“There is no doubt about statutory coverage, for an explicit purpose of the 1950 Celler-Kefauver amendments to §7 was to assure proscription of vertical and conglomerate mergers, as well as horizontal mergers, on an appropriate showing of anticompetitive effects.”).

89. *E.g.*, ROBERT H. BORK, THE ANTITRUST PARADOX 245 (1978; rev. ed. 1993); Herbert Hovenkamp, *Robert Bork and Vertical Integration: Leverage, Foreclosure, and Efficiency*, 79 ANTITRUST L.J. 983 (2014) (discussing the advantages of vertical integration).

90. Khan, *supra* note 6, at 797.

91. *See* FTC v. Meta Platforms, Inc., No. 22-CV-04325, 2023 WL 2346238, at *1–2 (N.D. Cal. Feb. 3, 2023). In this case, the FTC tried to enjoin Meta from purchasing a VR fitness software company because Meta publishes a game called Beat Saber that could, theoretically, be used for cardiovascular fitness. The court denied the motion for preliminary injunction because “Within and Supernatural had not even entered the relevant market at the time of this presentation. Consequently, this cannot be evidence of a direct effect within the VR dedicated

The key thing to understand about Web3 is it features distributed organizations. The term “organization” derives from the Latin word “organ,” meaning part of a body. An organization, being comprised of organs, is a collection of subparts.⁹² According to computational biology, an organization is defined by at least three parameters: first, it has some initial structure; second, it has some reliable function over time; and, third, it has redundancy that tends to maintain its structure and function.⁹³ For an organization to function as such, it must have some coordinated communication and decision-making system that are endemic to the organization (and not specific to each organ).⁹⁴ This implies that all organs that comprise an organization must be somehow connected to each other.

The way the organization’s organs connect defines that organization as centralized, decentralized, or distributed. A distributed organization is an organization whose parts (organs) connect with each other, rather than to only one or even just a few switching points.⁹⁵ The distributed organization creates redundancy so that information and decision-making can occur even when some of the nodes are destroyed, because the system can flexibly delegate decisions to alternative nodes.⁹⁶ Such flexible systems are markedly different from centralized industry, and antitrust concepts like sunk costs and entry barriers are not obviously applicable to such flexible systems.

The fundamental different in organizational structure quickly leads to more complicated and technical distinctions in organization operations. Distributed organizations possess distributed knowledge and distributed intelligence.⁹⁷ Distributed intelligence, in turn, is a type of dynamic intelligence in motion that comes to life through the functioning of a system.⁹⁸ Web3 distributed organizations and “dApps” govern autonomously through economic incentives written into their code. Such “tokenomics” often provide incentives for users to participate in governing the distributed organization. These concepts are difficult to explain in nontechnical ways, but an example of their operation can show why these concepts require regulators to rethink antitrust and not merely to assume the antitrust of centralized industry applies to distributed organizations.

Web2 Uber Competes with Web3 dUber

You do not have to understand all the details of these cutting-edge concepts to recognize that this is very different from a corporate organization, which is based on shareholders appointing board members who delegate authority to officers. A simple

fitness app market.” *Id.* at *32. This appears to reject Khan’s theory of prophylactic bans on horizontal mergers, which are scrutinized more heavily than vertical mergers, and thus it implicitly rejects Khan’s prophylactic ban of vertical mergers as well.

92. See Peter de Jong, *Structure and Action in Distributed Organizations*, ACM SIGOIS BULL. (ASS’N FOR COMPUTING MACH., New York, N.Y.), Mar. 1, 1990, at 1, 1 (“An organization is a distributed collected of subparts.”).

93. H. Atlan, *On a Formal Definition of Organization*, 45 J. THEORETICAL BIOLOGY 295–304 (1974).

94. J.P. Vergne, *Decentralized vs. Distributed Organization: Blockchain, Machine Learning, and the Future of the Digital Platform*, ORG. THEORY, Oct.–Dec. 2020, at 1, 5.

95. PAUL BARAN, RAND CORP., RM-3420-PR, ON DISTRIBUTED COMMUNICATIONS, (1964).

96. Vergne, *supra* note 94, at 4.

97. Richard N. Zare, Editorial, *Knowledge and Distributed Intelligence*, SCIENCE, Feb. 21, 1997, at 1047.

98. Aditya Vishwanath & Roy Pea, *Distributed Intelligence*, INT’L SOC. OF LEARNING SCIS., <https://www.isls.org/research-topics/distributed-intelligence/> [https://perma.cc/JA66-74GP].

example of a hypothetical Web3 technology-based entrant can illustrate how Web3 presents competitive challenges to Web2 corporate dominance.

Uber leveraged Web2 technology to launch a new kind of service: in 2009, Uber effectively created the ridesharing market.⁹⁹ Ridesharing apps connect people who want a ride from one place to another with people who want to offer such rides.¹⁰⁰ This market is distinguishable from typical taxi services for several reasons, but one major economic reason for ridesharing's success is it encouraged more drivers to enter the marketplace when demand spiked by having dynamic pricing.¹⁰¹ Unlike pre-Web taxi corporations, Uber's use of Web2 technology allowed it to see demand instantaneously and locally, and it used that same technology to alert and incentivize drivers to go to those locations.¹⁰² Putting this into the language of antitrust economics: Uber leveraged technology to enter a market that would have otherwise been difficult or impossible to enter due to regulatory barriers.¹⁰³

Uber enjoyed considerable success in the ridesharing business and became the overwhelming leader in this new market: according to how you define the ridesharing market, Uber accounts for 74% of that market share.¹⁰⁴ In traditional antitrust measures, this makes Uber dominant in this marketplace.¹⁰⁵ It has only one major competitor, Lyft, so this market is highly concentrated.¹⁰⁶

A recent litigation claims that Uber and Lyft maintain their duopoly by violating antitrust laws.¹⁰⁷ In particular, the class-action complaint alleges that the dominant firms maintain their dominance by preventing drivers from having autonomy over pricing, which results in higher fees for consumers and lower pay for drivers.¹⁰⁸ The complaint alleges that the surge pricing model prevents competitors from entering the market.¹⁰⁹

The complaint ignores the fact that a new entrant, especially one using more modern Web3 technology, could enter the market relatively easily by mimicking the dynamic

99. Adam Volle, *Uber*, BRITANNICA (Sept. 15, 2023), <https://www.britannica.com/topic/Uber> [<https://perma.cc/8DH3-9XT2>].

100. Chonce Maddox Rhea, *What is Rideshare?: Everything You Wanted to Know About Rideshare & More*, RIDESHARE GUY (Oct. 21, 2020), <https://therideshareguy.com/what-is-rideshare/> [<https://perma.cc/S96M-52CR>].

101. Jessica Phillips, *How Uber's Dynamic Pricing Model Works*, UBER BLOG (Jan. 21, 2019), <https://www.uber.com/en-GB/blog/uber-dynamic-pricing/> [<https://perma.cc/77WD-TNAV>].

102. *Id.*

103. See generally Seth C. Oranburg, *Encouraging Entrepreneurship and Innovation Through Regulatory Democratization*, 57 SAN DIEGO L. REV. 757 (2020).

104. Michal Kaczmarek, *Uber vs. Lyft: Who's Tops in the Battle of U.S. Rideshare Companies*, BLOOMBERG SECOND MEASURE (Aug. 9, 2023), <https://secondmeasure.com/datapoints/rideshare-industry-overview/> [<https://perma.cc/7BP6-BFNK>].

105. Most antitrust authorities use the Herfindahl-Hirschman index to calculate market concentration based on the squared sums of market share of each firm in that market. According to this metric, a market is high concentrated when the HHI exceeds 2,500 points. See U.S. DEP'T OF JUST. & FED. TRADE COMM'N, *supra* note 86.

106. *Id.*

107. Class Action Complaint at 2, *Gill v. Uber Techs., Inc.*, No. CGC-22-600284 (Cal. Super. Ct. June 21, 2022).

108. *Id.*

109. *Id.* ¶ 162.

pricing model.¹¹⁰ Moreover, Web3 technology could allow entrants to do this more effectively.

Imagine a new distributed organization called dUber, a name that reflects a distributed organization version of Uber. dUber employs Web3 technology such that anyone who downloads the dUber code connects to its ever-growing network of riders and drivers. The dUber code, which is publicly available and auditable, builds a model for demand pricing: when more drivers enter the network, price goes down such that more riders take rides, and when more riders enter the network, price goes up such that more drivers offer rides. The system can operate in the same manner as Uber or Lyft, but without any centralized organization. The Web3 code, which is distributed to all participants, acts autonomously, without any central involvement. The result could be more efficient than Uber because there would be no need for an Uber office building, high-paid Uber executives, and no Uber legal department.

In fact, it's hard to see how dUber would be subject to antitrust remedies at all. Who, exactly, would claimants sue? They cannot sue the code. Meanwhile, without a central organization to organize concerted actions, who is taking the illegal actions? The riders and drivers are simply responding to information. With dUber, instead of having a highly concentrated market with two major corporate players, you have a market consisting of millions of drivers and riders, which would by definition be so unconcentrated that any antitrust cabal would be theoretically impossible and thus any legal action would be fundamentally implausible.

The final step in this thought experiment is to consider what happens when the antitrust authorities and private plaintiffs begin to succeed in antitrust litigation against Uber. That would surely raise Uber's costs and increase its risks of doing business. The result of those increased costs is not likely to be some third entrant into the Web2 ride-sharing market, because a new but similar entrant would face the same risks without lesser scale and scope and thus less ability to afford these costs. Rather, given new Web3 technology, we might see a new entrant in the form of distributed code. Such code would be impervious to antitrust challenge and may not be subject to law at all.

For a real-world example of how difficult it is to regulate distributed code, simply look to the government's inability to regulate cryptocurrency. Bitcoin launched in 2009, and, as of 2022, the Biden administration continues to struggle to understand the risks and opportunities of digital assets, while executive agencies appear unable to meaningfully regulate them.¹¹¹ Pundits analogize the Biden administration efforts to regulate cryptocurrency to a global game of "whack-a-mole," where the resilient, distributed nature of cryptocurrency networks makes it virtually impossible for regulators to target any given node in an effort to shut down the system.¹¹²

110. Cf. Matthew T. Wansley & Samuel N. Weinstein, *Venture Predation*, 48 J. CORP. L. 814, 841 (2023) (noting how non-unique Uber's and Lyft's apps are and that many companies could emulate their platforms).

111. Katie Rogers & Ephrat Livni, *Biden Takes Step Toward Regulating Cryptocurrencies*, N.Y. TIMES (Mar. 9, 2022), <https://www.nytimes.com/2022/03/09/us/politics/crypto-regulation-biden.html#:~:text=The%20president%20signed%20an%20executive,opportunities%20presented%20by%20digital%20assets> [https://perma.cc/DB5C-NM9D].

112. Eric Geller, *Global 'Whack-a-Mole': Why It's So Hard for the U.S. to Go After Hackers' Digital Wallets*, POLITICO (Aug. 14, 2021), <https://www.politico.com/news/2021/08/14/crypto-hackers-ransomware-fight-504460> [https://perma.cc/E9NB-CBLK].

The point of this illustration is to tell a cautionary tale. Seemingly dominant Web2 firms like Uber may quickly lose their dominance when centralized organizations become costlier than distributed organizations. The result may be more competition from Web3 distributed organizations who mimic centralized functions, but it is not clear that these Web3 solutions will result in increased social welfare. Instead, we might find ourselves in a world where unregulated and unregulatable new forms of distributed business operations come to dominate the landscape.

This is not to say that we should protect Web2 incumbent firms from Web3 entrants. However, our antitrust analysis should consider how this new technology could become economically viable precisely because we ignore how Web2 dominance is subject to changing technology.¹¹³ If we only look at Big Tech as if it were static, then we may over-apply antitrust remedies, and that, in turn, could result in artificially disadvantaging traditional organizations in favor of non-traditional distributed organizations. We currently lack understanding of distributed organizations and have little to no comprehension of how to effectively regulate them as a matter of law. We should therefore be careful before taking further antitrust action against Big Tech.

Web3 Competition in General

The illustration above shows how a new distributed organization could compete with a traditional centralized organization. Analysis of that illustration shows how we are unprepared to regulate distributed organizations, which may be judgment-proof under current law. This concern is also relevant to the antitrust of vertical integration, which governs the merger of two separate corporations, usually where one purchase all the stock of its upstream supplier or downstream distributor. How could we apply this rigid concept of vertical integration to the fluid form of Web3 distributed organizations?

Web3 distributed networks are similar to what biology calls superorganisms, like colonies of termites. There is no clear boundary where the superorganism stops and starts. When one organism dies, leaves, joins, or is born, the colony itself does not fundamentally change, yet the superorganism adapts.¹¹⁴

For example, the Cathedral Termite Mound is the home for the superorganism known as a colony of the *Nasutitermes triodiae* termites.¹¹⁵ Individual termites live for about one to two years,¹¹⁶ yet the Cathedral Mound reflects at least 50 years of collective colonial

113. See Bobby Allyn, *Hard Times are Here for News Sites and Social Media. Is This the End of Web 2.0?*, NAT'L PUB. RADIO (Apr. 28, 2023), <https://www.npr.org/2023/04/28/1172599212/web-buzzfeed-vice-gawker-facebook-twitter-media-news> [<https://perma.cc/NU3N-DD3N>] (explaining that Web2 dominance is already showing signs of crumbling which raises further doubts about whether FTC efforts to break up big tech are necessary or appropriate).

114. For a discussion on superorganisms and group adaption, see Andy Gardner, *Adaptation of Individuals and Groups*, in FROM GROUPS TO INDIVIDUALS: EVOLUTION AND EMERGING INDIVIDUALITY 99 (Frédéric Bouchard & Philippe Huneman eds., 2013).

115. Daej A. Arab et al., *Parallel Evolution of Mound-Building and Grass-Feeding in Australian Nasute Termites*, BIOLOGY LETTERS, Feb. 2017, at 1, 1–2.

116. *Termite Lifespan: How Long Do Termites Live?*, ORKIN, <https://www.orkin.com/pests/termites/life-cycle/how-long-does-a-termite-live> [<https://perma.cc/8K52-5D2M>].

development. Biology¹¹⁷ and, more recently, mathematics¹¹⁸ recognize how these superorganisms exist beyond the lifespans of their constituent parts.

Figure 7. Cathedral Termite Mound, the home of a colonial superorganism. Credit J. Brew (2009). CC A-S 2.0 license



117. Jeffrey Gordon et al., *Superorganisms and Holobionts*, 8 *MICROBE* 152, 152 (2013).

118. Ed Yong, *Mathematical Support for Insect Colonies as Superorganisms*, *NAT'L GEOGRAPHIC* (Jan. 18, 2010), <https://www.nationalgeographic.com/science/article/mathematical-support-for-insect-colonies-as-superorganisms#:~:text=The%20mighty%20insect%20colonies%20of%20ants%2C%20termites%20and,canot.%20That%E2%80%99s%20more%20than%20just%20an%20evocative%20metaphor> [https://perma.cc/SG9T-ZNKE].

Moreover, superorganisms organically experience vertical integration as a natural part of their processes. Termite colony superorganisms, for example, integrate “upstream” with monocultures of the fungus *Termitomyces*.¹¹⁹ When the termite colony brings their food source in-house, it is superficially similar to when, for example, a hotel corporation purchases its catering food supplier.¹²⁰ But the huge difference is, obviously, the termite colony acquired its new capacity in food procurement through subtle organic processes, whereas the hotel acquired its new capacity in food procurement through well-defined legal processes.

If this analogy seems like science fiction, consider that Web3 mergers already happened. For example, on December 15, 2022, Futureverse announced that its technology,¹²¹ which it describes as a metaphor for an operating system,¹²² technologically connects eight virtual metaverses.¹²³ This merger occurred without FTC scrutiny because it did not involve a traditional merger of entities through legal process. Rather, this was a merger via the rule of code. Futureverse created software that allows users to traverse between worlds.¹²⁴ The result is a merger of these worlds into a larger virtual multiverse.

Mergers in Web3 superorganisms are more likely to look like termite colonies symbiotically raising fungus than like hotel corporations purchasing the stock of catering corporations. Given the vast differences in form and function, courts should be very skeptical before extending Khan’s radical theories even further.

CONCLUSIONS

Antitrust law is experiencing a revival of sorts, with a particular focus on using archaic antitrust law to break up Big Tech.¹²⁵ These efforts are misguided when they are based on economic structuralism because antitrust tools were designed to operate on power structures found in classical industries, not in decentralized market structures with distributed organizations. In particular, Web3 firms do not feature single-minded profit-maximizing controllers like John D. Rockefeller, whose consolidation of Standard Oil led to the first American antitrust laws more than a century ago. This does not mean that the

119. Margo Wisselink, Duur K. Aanen & Anouk van’t Padje, *The Longevity of Fungus-Growing Termites and the Stability of Symbiosis*, 11 *INSECTS* 527, 534 (2020), <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7469218/pdf/insects-11-00527.pdf> [<https://perma.cc/P8EY-PBEQ>].

120. See *Pyramid Global Hospitality Closes Acquisition of Provenance Hotels’ Operating Division*, HOTEL ONLINE (Dec. 19, 2022), https://www.hotel-online.com/press_releases/release/pyramid-global-hospitality-closes-acquisition-of-provenance-hotels-operating-division/ [<https://perma.cc/EU6X-T2RH>] (detailing the Pyramid Hotel group acquiring the operating division of Provenance Hotels).

121. Dean Takahashi, *Futureverse Merges 8 Web3 Companies to Create an Open Metaverse Ecosystem*, GAMESBEAT (Dec. 15, 2022), <https://venturebeat.com/games/futureverse-merges-8-web3-companies-to-create-an-open-metaverse-ecosystem/> [<https://perma.cc/A5RN-F83W>] (describing how Futureverse merged with eight metaverse companies).

122. *Id.* (“‘The idea of the operating system is more of a metaphor than the traditional notion of an operating system technically,’ [co-founder Aaron] McDonald said. ‘But these are the core components that we think are the most important things that will form the layer of what we would say is the metaverse. And by that I mean the metaverse exists at the data layer, primarily, not in some super app.’”).

123. *Id.*

124. *Id.*

125. See, e.g., Khan, *supra* note 6, at 790–92 (explaining how traditional antitrust principles can be used as an approach to improve Amazon’s distress).

internet is free from antitrust concerns; rather, the upshot of this Article is that we may need new tools to understand and address whatever antitrust concerns arise in Web2 and Web3.

Antitrust law was not established to address decentralized power, and antitrust emerged and developed one hundred years before distributed networks were technologically plausible. As new business entities such as Decentralized Autonomous Organizations and new models of distributed corporate governance become increasingly dominant, antitrust law's traditional toolkit will increasingly struggle to protect competition.

But, before we make new tools that adapt the first principles of antitrust law to the new machinations on the WWW, we should confirm that there really is a problem worth solving. Even if some static model of the market for information on Web2 shows that Big Tech should be broken up, then the antitrust bar should recognize how Web3 competes with Web2. In other words, before concluding that the web is broken and captured by durable monopolists, consider whether a dynamic picture including new technology shows that dominance will likely erode.

If new DLT and distributed organizations perform internet functions more efficiently than the current titans of e-commerce, then Web3 platforms will erode Web2 firms' market power. An unintended consequence of increased antitrust pressure on Web2 firms is to tilt the cost-benefit analysis further in favor of Web3 platforms. Scholars should challenge whether currently dominant Web2 firms like Alphabet (Google), Amazon, Apple, Meta (Facebook), and Microsoft can maintain their market power while the internet adopts Web3 technology and changes its fundamental structure.

As President John F. Kennedy said, "There is nothing more certain and unchanging than uncertainty and change."¹²⁶ (Ironically, Kennedy was paraphrasing Heraclitus, who allegedly wrote the same sentiment in 500 B.C.E., that "change is the only constant in life."¹²⁷ It seems that our aphorisms about change do not themselves change very much.) In our rapidly changing times, on our rapidly evolving internet, we should be skeptical that Big Tech's market dominance is lasting. If the distributed web is as powerful as it promises to be, then it will undermine seemingly dominant power structures like a giant octopus crushed under its own immense weight.

If scholars can recognize this emerging problem, we can collaborate on resolving it, and so this Article hopes to jumpstart that collaboration by identifying and explaining the problem of antitrust and Web3.

126. John F. Kennedy, President, United States, State of the Union at the House of Representatives (Jan. 11, 1962).

127. JOHN BARTLETT, *FAMILIAR QUOTATIONS* 62 (16th ed. 1992).