

Illusions of Dominance?:

Revisiting the Market Power Assumption in Platform Ecosystems

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It is widely assumed that platform technology markets are inherently prone to converge on monopoly outcomes in which a single firm or a handful of firms enjoy market power due to a combination of network effects and switching costs. This assumption supports both proposed and enacted regulatory interventions under competition law that place significant limitations on a wide range of practices by platform incumbents. In this paper, I revisit this market power assumption from theoretical and empirical perspectives. As a matter of theory, informed by selected real-world examples, I show that the conditions under which a platform incumbent can plausibly exercise market power are substantially more demanding than is commonly supposed. As a matter of empirics, I provide evidence from the food-delivery and cloud-computing markets, showing that widespread attributions of market power to leading platforms in these markets lack persuasive evidentiary support. Contrary to conventional wisdom, both theory and evidence cast significant doubt on the standard view that platform ecosystems are prone to converge on entrenched monopolies that justify preemptive intervention by competition regulators.

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Legislators and regulators in the United States, European Union, China, the United Kingdom and other jurisdictions have adopted, or have advocated, some of the most significant changes to antitrust and competition law in several decades.² The business and general press, which plays an influential role in impacting public sentiment, have largely applauded these steps. These changes would place (and, in the case of China and the European Union, have already placed) much of the digital economy under a regime of preemptive rules, effectively substituting the conventional regime of *ex post* fact-intensive, case-by-case adjudication with a regulatory regime comprising a wide array of *ex ante* antitrust violations, often without requiring evidence of competitive harm. This effectively places much of the digital economy under a standing regime of regulatory investigation, enforcement, or waiver.

These dramatic interventions—both actual and proposed—rest on the assumption that leading platforms typically enjoy market power and regularly exercise that power to harm competitive conditions. Following what has become conventional wisdom, digital platform markets are purportedly “winner-take-all” environments prone to high levels of antitrust risk because incumbents are inherently shielded by network effects and switching costs that inhibit entry. If that assumption is correct, then the digital economy represents a massive case of market failure that merits fast-track regulatory intervention unencumbered by the conventional safeguards supplied by case-specific factual examination. In a more extreme version of this line of thought, it is argued (including by the current Chair of the Federal Trade Commission) that platform markets are akin to natural monopolies that should be regulated as public utilities³—in effect, largely placed outside the realm of the market altogether.

Given the significant implications of these actual and proposed interventions in digital markets, which comprise large portions of the global economy, it is imperative to assess rigorously the theoretical and factual basis for the market power assumption in platform environments. I do so in two steps.

In Part I, I identify the conditions under which a platform leader would plausibly be in a position to exercise pricing power in a digital market. Contrary to increasingly common views expressed by regulators, legislators, and a significant portion of the scholarly literature, a platform entity can only plausibly exercise market power under specific circumstances and, even in such circumstances, any adverse competitive effects attributable to a platform’s market power must be balanced against the transaction-cost savings and other efficiencies enabled by the platform’s matchmaking and related functionalities. I also review evidence concerning market power in selected historical and contemporary platform markets, which suggests that dominant platforms often face competition and can rapidly lose market leadership to more innovative entrants. In the aggregate, theoretical and empirical considerations favor the view that a platform leader generally lacks durable market power, even if it often enjoys high market share for certain periods of time.⁴

² Throughout this paper, “antitrust law” and “competition law” are used interchangeably.

³ See, e.g., Lina M. Khan, *The End of Antitrust History Revisited*, 133 HARV. L. REV. 1655, 1664 (2020) (referring to the “dominance of a small number of technology platforms, certain aspects of which seem to exhibit natural monopoly features”); CHICAGO BOOTH, STIGLER CENTER FOR THE STUDY OF THE ECONOMY AND THE STATE, STIGLER COMMITTEE ON DIGITAL PLATFORMS, FINAL REPORT 21 (2019) [hereinafter STIGLER REPORT] (stating that, in the search engine market, “there are increasing returns to scale and thus it is efficient to have a single provider” and suggesting that dominant platforms should be subject to a fiduciary duty that constrains profit-maximization). For similar thoughts, see FRANCESCO DUCCI, NATURAL MONOPOLIES IN DIGITAL MARKETS 10-46 (2022).

⁴ This outcome is hardly novel. The economics literature has recognized that high concentration levels do not necessarily reflect entry barriers that confer monopoly power but rather, may reflect incumbents’ superior

In Parts II and III, I explore this proposition further through case studies of the food-delivery and cloud computing markets. Both markets have been characterized as platform “monopolies” that require preemptive intervention by competition or other regulatory authorities, resulting in caps being imposed by certain US cities on commissions paid by restaurants to delivery platforms, challenges by European and British competition regulators to acquisitions in the food delivery market, and investigations by US, European and British competition regulators in the cloud computing market.

In the case of both markets, I find that leading platforms face competition from existing and potential rivals. In food delivery, any market-power assertion is challenged by two inconvenient facts: users on both sides of the platform can easily switch among providers and the industry remains unprofitable since its inception almost two decades ago. In cloud computing, widespread assertions of user lock-in and resulting market power are difficult to reconcile with the fact that business users widely use multiple cloud services and most of the potential user population has not yet adopted (or fully adopted) cloud services, leaving most of the market open to competition. Contrary to common assertions, neither market conforms to the limited circumstances in which an incumbent platform could increase pricing or degrade quality relative to competitive levels without a penalty being imposed by rivals. These findings cast significant doubt on the standard view that platform markets are inherently prone to monopoly conditions (or, following some assertions, are analogous to natural monopolies⁵) that necessitate preemptive intervention by competition regulators.

Part I. Are Platform Markets Really Prone to “Monopoly”?

Assertions that digital platform markets are prone to monopoly have proliferated in scholarly, policy, and popular discussions. In the “Furman Report” presented in 2019 to the UK Competition and Markets Authority, it is stated that “[t]he barriers to entry that exist in established digital platform markets mean that they cannot generally be considered freely contestable.”⁶ In the “Stigler Report” issued in 2019 by the Stigler Center for the Study of the Economy and the State at the University of Chicago, it is stated that a digital platform market will naturally tend toward a single, very dominant player” and “[a]n entrant will most likely be unable to overcome the barriers to entry . . .”⁷ In the Majority Staff Report issued by the Committee on the Judiciary of the US House of Representatives in 2020 (Majority Staff Report), it is stated that “[c]ertain features of digital markets . . . make them prone to winner-take-all effects,” causing the market to “‘tip’ in favor of one or two large companies.”⁸ In a 2021 report by the European Commission’s Joint Research Center, it is asserted that digital platform markets “have the tendency . . . to assume natural monopoly or near-natural monopoly features . . . [which] makes actual competition difficult to sustain.”⁹ A report published by the OECD in 2022 similarly states that digital markets “exhibit a range of characteristics that may lead to concentration, market power, and winner-takes-most

efficiencies or an industry’s scale economies. For the classic source, see Harold Demsetz, *Industry Structure, Market Rivalry, and Public Policy*, 16 J. L. & ECON. 1 (1973).

⁵ See *supra* note 3.

⁶ UNLOCKING DIGITAL COMPETITION: REPORT OF THE DIGITAL COMPETITION EXPERT PANEL 39 (2019).

⁷ STIGLER REPORT, *supra* note 3, at 8.

⁸ MAJORITY STAFF REPORT, COMMITTEE ON THE JUDICIARY, U.S. HOUSE OF REPRESENTATIVES 37 (2020) [hereinafter MAJORITY STAFF REPORT].

⁹ LUIS CABRAL ET AL., THE EU DIGITAL MARKETS ACT: A REPORT FROM A PANEL OF ECONOMIC EXPERTS 12 (Publications Office of the European Union 2021).

dynamics,” although it more modestly counsels against “dramatic reform of competition law and policy.”¹⁰

Mere repetition does not make a proposition true. In this paper, closer scrutiny on both theoretical and empirical grounds shows that the reflexive attribution of monopoly power to leading platforms—what I will call the “platform monopoly” assertion—is an intellectual and rhetorical shortcut that falls short on both counts. At a minimum, the factual basis for any such assertion requires detailed analysis of the competitive conditions that characterize particular markets, rather than making reflexive generalizations, based on theoretical models and anecdotal reports, that platform markets inherently converge on monopoly outcomes.

Theory: Overlooked Complexities of Platform Markets

It is elementary that a firm can only exercise market power if it is insulated for some substantial period from punitive responses from actual or potential competitors. Hence, any firm will operate under competitive, or reasonably competitive, conditions so long as (1) the market comprises other firms that can supply a quality-comparable or quality-superior product at the same or lower price, or (2) the market is open to entry by such firms at a reasonable cost and within a reasonable time.¹¹ The platform monopoly assertion implies that these predicate conditions for competitive markets are not typically satisfied in digital environments. This argument relies in turn on the view that those environments exhibit four characteristics that inherently drive these markets toward monopoly outcomes. Closer scrutiny shows that only one of these four characteristics typically or necessarily characterizes digital platform markets.

Characteristic #1: Network Effects

It is assumed that platform services exhibit network effects—that is, the value of a platform increases as the number of users on the same side of the platform increase (direct network effects) or as the number of users on the other side of the platform increase (indirect network effects). Or both effects may prevail concurrently. To illustrate: the value of a smartphone increases as the number of users increases (direct network effects) and as the number of apps released by developers for the smartphone increases (indirect network effects). Network effects constitute a barrier to entry in this context insofar as users are reluctant to migrate to a competing communications device that may not have acquired a comparable population of users and apps and therefore has not yet realized the value generated by direct and indirect network effects. This is reinforced by the fact that developers are similarly disinclined to write apps for a new competing device, which lacks a comparable number of users and therefore has not yet realized the value generated by indirect network effects. Hence, any potential entrant into the communications device market faces significant costs in delivering a competitive product that can cause users and developers to abandon the existing technology.

This well-established line of argument¹² (which formed the basis for the government’s case in *US v. Microsoft*¹³) has substantial merit. However, economists, legal academics, and other commentators tend to overstate the extent to which it can block entry. For example, scholars writing in 1999 identified Palm Pilot as an example of a device that was protected by a

¹⁰ OECD, OECD HANDBOOK ON COMPETITION POLICY IN THE DIGITAL AGE 17, 21 (2022).

¹¹ For further discussion, see U.S. DEPARTMENT OF JUSTICE AND FEDERAL TRADE COMMISSION, HORIZONTAL MERGER GUIDELINES §§ 1.0-1.3 (Aug. 9, 2010) [hereinafter HORIZONTAL MERGER GUIDELINES].

¹² The literature is extensive. For a classic treatment, see Michael Katz and Carl Shapiro, *Network Externalities, Competition and Compatibility*, 75 AMER. ECON. REV. 424 (1985).

¹³ *U.S. v. Microsoft*, 253 F.3d 34 (D.C. Cir. 2001).

network-effects entry barrier that is challenging for entrants to overcome.¹⁴ The contention might have seemed reasonable when Palm, the maker of Palm Pilot, was valued at its 2000 IPO more than General Motors or McDonald's.¹⁵ Yet, shortly thereafter, it soon lost ground to smartphones and after the release of Apple's iPhone in 2007, faded into obscurity. As will be illustrated subsequently by various examples, the Palm Pilot example is not a "one-off": the significant entry barrier posed by network effects can be (and has been) overcome by competitors with sufficient technical expertise, business acumen, and innovative capacity.

Characteristic #2: Switching Costs

It is assumed that users of leading platforms typically incur high switching costs when moving to another platform. This is only sometimes correct. Consider MS Word and the larger MS Office applications suite, which are often identified as classic examples of a dominant product that is shielded against competitive threats due to network effects and switching costs that discourage user migration. Yet closer examination finds a more complex state of affairs. Whereas it may be costly for long-time users of MS Word to adopt a substitute program such as Google Docs, it is apparently not costly for new *potential* users of MS Office (which encompasses Word) to adopt Google's G office applications suite. As of February 2022, it was reported that Google and Microsoft enjoyed virtually identical shares (48% for MS Office and 46% for Google) of the worldwide market for office productivity software.¹⁶ As of October 2020, it was reported that Google's G suite enjoyed the larger share of the US market for office suites technologies (59%, compared to 40% for MS Office).¹⁷ Other evidence suggests that students and younger users (who by definition do not bear switching costs prior to adoption) tend to prefer Google Docs due to its zero price and integrated cloud connectivity features.¹⁸ Contrary to the characterization of MS Office as an impregnable monopoly, it appears to be losing market share to Google's competing services that outperform on price and certain product features.

Critically, users can sometimes use multiple platforms (known as "multi-homing"), in which case no single platform can plausibly exert market power since users can use alternative providers for the same or different purposes. Hence, users can use Google Search for general searches, while using other providers for specialized (also known as "vertical") searches, such as Amazon for shopping-related services, Yahoo! Finance for financial news searches, Expedia for travel searches, and Zillow for home price searches. Each of these vertical search categories in turn often comprise multiple competing services. Even in general search, some users are apparently now using social media platforms such as TikTok or Instagram to locate certain types of information through those sites' visually-oriented search

¹⁴ Steven C. Salop and R. Craig Romaine, *Preserving Monopoly: Economic Analysis, Legal Standards, and Microsoft*, 7 GEO. MASON L. REV. 617, 621 (1999).

¹⁵ Harry McCracken, *Palm's progress: The rise, fall—and rebirth—of a legendary brand*, FAST COMPANY, Oct. 15, 2018, <https://www.fastcompany.com/90246716/palms-progress-the-rise-and-fall-and-rebirth-of-a-legendary-brand>

¹⁶ STATISTA, *Market share of major office productivity software worldwide as of February 2022* (based on survey by Enlyft), <https://www.statista.com/statistics/983299/worldwide-market-share-of-office-productivity-software/>

¹⁷ STATISTA, *Market share of major office suites technologies in the United States as of October 2020* (based on survey by Datanyze), <https://www.statista.com/statistics/961105/japan-market-share-of-office-suites-technologies/>

¹⁸ Jack Wallen, *Google Docs has won the office suite war among one generation*, TECHREPUBLIC, May 12, 2021; Matt Richman, *Millennials prefer Microsoft Word for individual work, Google Docs for collaborative work*, VOX, July 29, 2016.

functionalities.¹⁹ As these examples suggest, even a firm that leads in a particular platform market may operate under a substantial degree of competitive discipline if users can migrate to, or concurrently use, providers that offer similar services in closely adjacent markets.

Characteristic #3: Homogenous Goods and Preferences

Commentators who rely on the platform monopoly thesis often do not make clear that the thesis assumes that the relevant service is reasonably homogenous across all providers²⁰, which in turn reflects homogeneity of user preferences or technological barriers to product differentiation. This assumption is necessary because a platform market in which product differentiation is commercially and technically feasible would be expected to support several specialized platform services with somewhat distinct user groups, which would in turn tend to preclude a single platform from capturing the entire market. The search engine market—perhaps the most commonly-cited example of a digital monopoly—exhibits differentiation when understood to encompass both general search services and specialized search services that focus on specific fields such as finance, travel, or real estate. Similarly, online dating markets comprise multiple platforms that address different user populations and no single platform has a predominant share in the general market for online dating services.²¹

Product differentiation can operate to counteract market concentration and restrain any pricing power exerted by incumbents.²² Even an apparently homogenous market dominated by a single provider may nonetheless be open to entry by competitors that develop appropriately differentiated services that elicit consumer interest. This is illustrated by the successful entry of TikTok into the social media networking market in which Facebook had been the clear leader or, as discussed previously, the successful entry of Google’s G Office into the office productivity software market in which MS Office had been dominant.²³ All these examples support a more general proposition. Barring technological barriers, the homogenous goods assumption is unlikely to be satisfied whenever network effects are a function of not only the quantity but the *quality* (that is, type) of users. In that case, any leading platform is vulnerable to competition from differentiated services that more closely match the differentiated preferences of certain user populations.

Characteristic #4: Economies of Scale

It is often asserted that platform markets exhibit economies of scale (that is, high fixed costs and low to nominal marginal costs), which compel all but the most efficient platforms to exit, resulting in the deadweight losses and other inefficiencies associated with a securely monopolized market.²⁴ The first part of this proposition is correct but the second and third parts do not necessarily follow. Platform markets exhibit economies of scale that yield declining per-unit costs as output expands and increasing levels of concentration as demand

¹⁹ Khari Johnson, *Google Borrows from TikTok to Keep GenZ Searching*, WIRED, Sept. 28, 2022; Samantha Delouya, *Nearly half of Gen Z is using TikTok and Instagram for search instead of Google, according to Google’s own data*, BUSINESS INSIDER, July 13, 2022.

²⁰ For an exception to this tendency, see Herbert Hovenkamp, *Antitrust and Platform Monopoly*, 130 YALE L. J. 1952, 1996-2001 (2021).

²¹ David Curry, *Dating App Revenue and Usage Statistics (2022)*, BUSINESS OF APPS, Aug. 31, 2022, <https://www.businessofapps.com/data/dating-app-market/>.

²² On this point generally, see Avinash K. Dixit and Joseph E. Stiglitz, *Monopolistic Competition and Optimum Product Diversity*, 67 AMER. ECON. REV. 297 (1977).

²³ See *supra* notes 16-17 and accompanying text.

²⁴ See, e.g., MAJORITY STAFF REPORT, *supra* note 6, at 45 (stating that “[i]ncreasing returns to scale are another feature of technology markets that make them prone to tip towards concentration and monopolization”). On the claimed analogy between platform markets and natural monopolies, see *supra* notes 3 and 9.

flows to the most efficient platforms. However, if there is substantial pass-through of the efficiencies generated by economies of scale, then this outcome enhances consumer welfare in the form of lower prices, increased output, or improved quality.

This favorable contingency can arise in at least three cases. First, a platform cannot realize the cost-savings from economies of scale without expanding production and, as a result, even a monopolist will always pass on at least a portion of those savings to consumers as it “moves down” the demand curve.²⁵ Second, a platform may sometimes maximize revenues by selecting a zero price to cultivate user adoption on the “free” side of the platform (for example, search services), which then drives revenue growth on the “pay” side (for example, targeted advertising services).²⁶ Third, to the extent competitive discipline persists (which will depend on users’ switching costs and entrants’ differentiation costs, among other factors), the incumbent will have incentives to pass on to consumers a large portion of the cost-savings generated by economies of scale. This is consistent with the pricing strategy often adopted by online retail platforms that results in low profits on each transaction. The apparent longevity of these strategies is notable (and disfavors predation explanations²⁷). Based on data for 2012 and 2013, almost two decades after the Amazon site was launched, Amazon’s pricing in the physical and e-books markets still fell below the static profit-maximizing price.²⁸ As of 2017, a major investment bank observed indications that Amazon’s low-margin pricing appeared to push down retail prices in the economy as a whole²⁹—obviously, a favorable effect from a competition policy perspective. Contrary to claims that economies of scale promote concentrated markets in which prevailing platforms are shielded from entry and can raise prices without constraint, the prevalence and persistence of zero and low-margin pricing strategies in real-world platform markets suggest that consumers often capture a great deal of the efficiencies generated by the economies of scale that characterize platform environments.

Summary

Regulators, policy advocates, and an increasingly large number of scholarly commentators—as well as much of the business and general press—have adopted the proposition that digital platform markets are doomed to converge toward monopoly conditions in which any potential rival faces insurmountable entry barriers and users are therefore “locked in” to the prevailing platform, which then faces little or no competitive discipline. In this scenario, a nearly perfect monopoly prevails since users have no incentive to abandon the prevailing platform, potential rivals have no incentive to enter, and the platform can then increase prices and degrade quality at will. Yet this outcome is only plausible when four conditions are fully or substantially satisfied: (1) network effects characterize one or both sides of the platform,

²⁵ For further discussion, see Jerry A. Hausman and Gregory K. Leonard, *Efficiencies from the Consumer Viewpoint*, 7 *GEORGE MASON L. REV.* 707, 708-10 (1999).

²⁶ Benjamin Klein, Andres V. Lerner, Kevin M. Murphy, and Lacey L. Plache, *Competition in Two-Sided Markets: The Antitrust Economics of Payment Card Interchange Fees*, 73 *ANTITRUST L. J.* 571 (2006); Thomas Eisenmann, Geoffrey Parker, and Marshall W. Van Alstyne, *Strategies for Two-Sided Markets*, *HARVARD BUS. REV.* 2-10 (Oct. 2006).

²⁷ See, e.g., Judith Chevalier and Austan Goolsbee, *Measuring Prices and Price Competition Online: Amazon and Barnes and Noble*, NATIONAL BUREAU OF ECONOMIC RESEARCH WORKING PAPER 9085 (2002), at 19, who observed Amazon’s low book prices but cautioned that “[w]hen Amazon’s growth stops, we may see prices rise substantially.” As discussed above, there is no evidence this risk has yet materialized in the books market.

²⁸ Imke Reimers and Joel Waldfogel, *Throwing the Books at Them: Amazon’s Puzzling Long Run Pricing Strategy*, 83 *SOUTHERN ECON. J.* 869 (2017).

²⁹ Laura Berman, *Amazon Effect One Cause of Low U.S. Inflation, According to Goldman Sachs*, *THE STREET*, Oct. 8, 2017, <https://www.thestreet.com/investing/stocks/amazon-effect-one-cause-of-low-us-inflation-according-to-goldman-sachs-4325688>

(2) switching costs are high on one or both sides of the platform, (3) the platform market is not amenable to product differentiation, and (4) platforms retain all or most of the cost-savings generated by economies of scale. While condition (1) is typically satisfied in platform markets, the remaining conditions may only be partially satisfied or not satisfied at all. These considerations suggest that the platform monopoly thesis may describe an exceptional, rather than a typical, case in the digital economy.

Empirics: Some Inconvenient Facts About Platform Markets

Remarkably, antitrust regulators and other policymakers sometimes seek, and courts sometimes (but less frequently) endorse, disruptive structural remedies based solely on theoretical models and anecdotal observations. Yet it is only evidence drawn from the observed performance of real-world markets that can determine whether a particular theoretical model provides a reliable guide for competition policy. While regulators, policy advocates, some legislators, the business and general press, and much of the scholarly community have adopted the view that digital platform markets are prone to converge on monopoly outcomes, this proposition finds at best mixed, and often little to no, support when applied to actual platform markets.

There are abundant examples in which regulators, scholars, or the business press have jumped to the conclusion that a dominant platform is virtually insulated from entry.

Writing in 2007, a technology commentator published an article entitled, “MySpace is a Natural Monopoly,” predicting that MySpace, the then-leading social networking site (with an estimated 80% market share), would be the “only [social-networking] site of significance” and competitors would be “condemned to niche markets and subsets.”³⁰ The same assertion was made in *The Guardian*, a prominent British newspaper.³¹ These assertions were soon proved wrong. By 2008, Facebook had already overtaken MySpace and, in 2011, MySpace was acquired for \$35 million, a fraction of the \$580 million for which it had been acquired by News Corporation in 2005 (reflecting those same assumptions of market dominance).³² It is now Facebook that is regularly characterized as a monopoly by scholars (see a 2022 paper co-authored by a former Chief Economist of the Department of Justice Antitrust Division³³), business commentators (see a 2019 piece in the *Harvard Business Review*, which asserts that Facebook should be regulated as a public utility³⁴), and regulators (see the ongoing antitrust suit brought by the Federal Trade Commission (FTC) in 2021).³⁵ As will be discussed, this claim is difficult to reconcile with substantial user migration away from Facebook to competitors and the dramatic plunge in the stock market’s valuation of its parent, Meta Platforms.

eBay, perhaps the first successful online e-commerce platform, provides another illustration of the manner in which observers consistently overestimate the staying power of apparently dominant platforms. In 2005, a paper published in the *Journal of Economic Perspectives* observed eBay’s persistently high market share, as illustrated by its 81% share of the US market for online auctions as of 1999, which had risen to 93% as of 2001 (in each case as

³⁰ John Barrett, *My Space is a Natural Monopoly*, TECHNEWSWORLD, Jan. 17, 2007.

³¹ Victor Keegan, *Will MySpace ever lose its monopoly?*, GUARDIAN, Feb. 8, 2007.

³² Jennifer Saba, *News Corp sells Myspace, ending six-year saga*, REUTERS, June 29, 2011.

³³ Fiona M. Scott-Morton and David C. Dinielli, *Roadmap for an Antitrust Case Against Facebook*, 27 STANFORD J. L. BUS. & FIN. 267 (2022).

³⁴ Dipayan Ghosh, *Don’t Break Up Facebook—Treat It Like a Utility*, HARVARD BUS. REV., May 30, 2019.

³⁵ Federal Trade Commission, First Amended Complaint for Injunctive Relief and Other Equitable Relief (filed D.D.C. Aug. 19, 2021).

measured by the value of goods auctioned).³⁶ Attributing eBay’s dominance in part to the standard combination of network effects and switching costs, the authors described “[t]he ease with which it [eBay] retained its dominance despite challenges by Amazon and Yahoo! in late 1998 and early 1999”³⁷ In reality, eBay’s predicted longevity was short-lived. Amazon persisted in challenging eBay by investing in an independent distribution and warehouse network that offered a more reliable shopping experience than eBay’s dispersed network of independent third-party sellers. By 2008, this investment yielded returns as Amazon overtook eBay’s US market share (as measured by user traffic).³⁸ Today eBay is no more than a niche player in the e-commerce market that it pioneered.

The persistence of the platform monopoly thesis in academic, policy, and popular discussions stands in stark contrast to the frequency with which it fails to describe real-world digital markets. In a recent article, Herbert Hovenkamp states: “Contrary to common belief, large digital platforms that deal directly with consumers, such as Amazon, Apple, Facebook, and Google, are not ‘winner-take-all’ firms.”³⁹ Even these apparently dominant platforms face competition: for example, Amazon faces both online and “offline” competition from firms such as Walmart and Target in online general retailing, thousands more suppliers in specialized online retailing markets, and tens of thousands more suppliers in combined online and physical retailing markets. Even when a single platform has secured leadership of a specific market, many such platforms were subsequently challenged successfully by new platforms that offered services that outcompeted on price, quality, or other relevant parameters. Yahoo! (internet search), AOL (internet service portal), PalmPilot (handheld computing), Blackberry (mobile communications device), Sony (mobile MP3 player), Atari (video games), and IBM (personal computer) are some examples of apparently unbeatable market leaders who were toppled by more innovative entrants.

Examination of two specific markets sheds more light on the overlooked fragility of platform incumbents.

Mobile Communications Devices and Operating Systems

Consider the fate of Nokia and Blackberry, each of which were once leaders in the worldwide mobile communications device market. As of 2007, Nokia enjoyed an impressive market share of almost 51% of global sales.⁴⁰ The entry of Apple’s iPhone in that same year challenged Nokia by offering a competing device with a novel design and functionalities. By 2010, Nokia’s share had fallen to 27.6% and, by 2012, it stood at 2.9%.⁴¹ Blackberry experienced a similar fate: as of 2009, its share of the global handset market peaked at about 20% but then declined to a nominal share by 2013.⁴² Both Nokia and Blackberry, which used proprietary operating systems, declined rapidly following the release in 2008 of Google’s royalty-free Android operating system. Android’s share of the worldwide market in mobile operating system platforms increased from less than 1% in 2009 to approximately 42% in 2013 and 72% in 2018.⁴³ The royalty-free distribution of the Android operating system

³⁶ Glenn Ellison and Sara Fisher Ellison, *Lessons About Markets from the Internet*, 19 J. ECON. PERSPECTIVES 139 (2005).

³⁷ *Id.*, 144.

³⁸ Brad Stone, *Amid the Gloom, an E-Commerce War*, N.Y. TIMES, Oct. 11, 2008.

³⁹ Hovenkamp, *supra* note 20, at 1952.

⁴⁰ STATISTA, *Market share held by Nokia smartphones 2007-2013*, <https://www.statista.com/statistics/263438/market-share-held-by-nokia-smartphones-since-2007/>

⁴¹ *Id.*

⁴² Ron Miller, *BlackBerry phones once ruled the world, then the world changed*, TECHCRUNCH, Jan. 3, 2022.

⁴³ statcounter GlobalStats, *Mobile Operating System Market Share Worldwide*, <https://gs.statcounter.com/os-market-share/mobile/worldwide>

spurred the production of Android-compatible devices by Samsung, LG, HTC, and other handset manufacturers, which proceeded approximately in tandem with a continuous decline in the quality-adjusted prices for these devices.⁴⁴

In contrast to the standard model of a platform monopoly, the fall of BlackBerry and Nokia in the mid to late-2000s, which was followed by vigorous turnover in the mobile communications device market, shows that dominant firms can rapidly lose leadership to challengers that offer a product or service that is superior on quality (Apple iPhone), price (Android-based handsets), or other competitive parameters. Entrants with a lower-cost or higher-quality product can elicit sufficient consumer interest to overcome the combination of network effects and switching costs that can raise formidable, but not insurmountable, barriers to entry.

Social Networking

It is possible that current platform markets are “different”—that is, for various reasons, they conform more closely to the theoretical model of a platform monopoly and are therefore insulated from competitive discipline to a substantial extent. To gain some insight into the strength of this hypothesis, we can return to the example of Facebook. As noted above, it is commonly referenced in scholarly, policy, and popular discussions as a “clear” case of an overwhelming monopoly in the social networking market.⁴⁵ Yet, in its antitrust suit filed against Facebook in 2021, the FTC was initially unable to survive a dismissal motion because the court found that it had not brought sufficient evidence that Facebook had pricing power in an adequately defined relevant market.⁴⁶ While legislators and much of the press attacked the court’s decision⁴⁷, there is substantial lack of clarity concerning the appropriate definition of the relevant market and Facebook’s share of that market.

There are multiple estimates of Facebook’s market share, which vary based on market definition, the “side” of the market (users or advertisers), geographic region, and the metric used to measure usage. As measured by monthly active users as of January 2022, Facebook’s share of the worldwide “social networking” market was estimated at 16.9% (or 42.7%, when including its Instagram, Messenger, and WhatsApp services), compared to 14.9% for YouTube, 5.8% for TikTok, 3.2% for Snapchat, 2.6% for Pinterest, and 2.5% for Twitter.⁴⁸ As measured by monthly active users as of September 2022, Facebook held an estimated 64.32% of the US “mobile and tablet social media” market (and 73.16% when combined with Instagram); however, this estimate is based on a market definition that implausibly excludes TikTok.⁴⁹ Similarly, while the FTC alleged in its amended filing in September 2021 that Facebook has represented 65% to 80% of the US “personal social networking” market since 2011, based on monthly active users, daily active users, and other metrics⁵⁰, this market

⁴⁴ Alexander Galetovic, Stephen Haber, and Ross Levine, *An Empirical Examination of Patent Holdup*, 11 J. COMPETITION L. & ECON. 549 (2015).

⁴⁵ See *supra* notes 34–35 and accompanying text.

⁴⁶ Cecilia Kang, *Judge Throws Out 2 Antitrust Cases Against Facebook*, N.Y. TIMES, June 28, 2021.

⁴⁷ Leah Nylen, *Federal court tosses antitrust suits against Facebook, in huge blow to D.C.’s fight with tech*, POLITICO, June 28, 2021.

⁴⁸ Author’s calculations, based on: Statista, *Most popular social networks worldwide as of January 2022, ranked by number of monthly active users*, <https://www.statista.com/statistics/272014/global-social-networks-ranked-by-number-of-users/>. Market share percentages are calculated based on number of users attributed to networks (17 in total) for which the source provides information and therefore excludes users on other networks.

⁴⁹ statscounter GlobalStats, *Desktop, Mobile & Tablet Social Media Stats United States of America*, <https://gs.statcounter.com/social-media-stats/desktop-mobile-tablet/united-states-of-america>

⁵⁰ *FTC v. Facebook Inc.*, Substitute Amended Complaint for Injunctive and Other Equitable Relief, Case no. 1:20-cv-03590-JEB (filed D.D.C. Sept. 8, 2021), at 65-66.

definition even more implausibly excludes TikTok, Twitter, and YouTube. In short: there is no empirical consensus concerning Facebook’s market share or the relevant market definition and usage metrics that should be used to make that determination.

While the court allowed the FTC’s suit to proceed based on an amended complaint, ongoing developments suggest that the government will likely have difficulty establishing that Facebook enjoys market power if the court ultimately rejects the arbitrary omission of TikTok, Twitter, and YouTube from the relevant market. The recent performance of the stock of Meta (Facebook’s parent) reflects, among other things, significant user migration away from Facebook to competing social media platforms. During the 12-month period starting October 24, 2021, Meta’s stock declined by almost 62% in value. This loss in value substantially exceeds the almost 17% decline in the S&P 500 index during this time and is widely attributed to a significant change in competitive conditions in the social networking market. In particular, Facebook has lost substantial US market share to TikTok. According to a Pew Industry survey, the percentage of US teens who reported using Facebook declined from 71% during 2014-15 to 32% as of 2022, while the same figures for TikTok increased from 52% to 67%, although Instagram (owned by Meta) increased from 52% to 62%.⁵¹ This data implies widespread multi-homing across competing platforms, which is consistent with estimates that, as of approximately April 2022, 37% of monthly Facebook users and 51% of monthly Instagram users also TikTok.⁵² In light of what appears to be substantial user migration to competitors in significant segments of the social networking market, coupled with users’ nominal costs in spreading usage across platforms, there must be limited confidence in the assertion that Facebook is a “clear” case of a digital monopoly.

Part II. Food Delivery Services

In this Part, I assess whether the structure and performance of the ready-to-eat food delivery services (FDS) market conform to the platform monopoly thesis. As I describe, policymakers have called for legal intervention to restrain the purported dominance of leading providers, by blocking acquisitions at the national level and capping the fees that providers charge to vendors at the local level. Closer analysis shows little support for these concerns. Providers in FDS markets cannot achieve economic viability without high market share but the resulting high levels of concentration do not appear to translate into pricing power or even profitability. Proposed and implemented interventions on preemptive grounds that such action is necessary to foreclose a monopoly outcome are likely to be counterproductive and even endanger the ability of FDS platforms to earn any positive returns on investment.

Market Structure

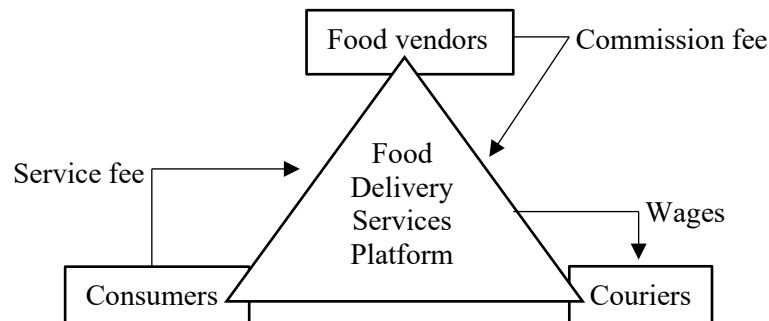
There are two principal varieties of an FDS platform, which implements a multi-sided model in which the platform matches restaurant vendors with consumers, typically through digital applications that consumers can access through a smartphone device. In one version, the platform enables users to select from subscribing restaurants and handles payment for the order, which it then transmits to the restaurant for delivery to the customer. In another and more familiar version (depicted below in Figure 1), the platform also executes delivery, in which case it operates as a three-way platform that also matches couriers with vendors. The delivery function necessitates greater capital expenditures by the platform, which must assemble and operate a delivery infrastructure, including managing couriers and other

⁵¹ PEW RESEARCH CENTER, TEENS, SOCIAL MEDIA AND TECHNOLOGY 2022, Aug. 10, 2022, <https://www.pewresearch.org/internet/2022/08/10/teens-social-media-and-technology-2022/>

⁵² Gina Chon, *TikTok is eating Facebook from the inside*, REUTERS, Apr. 27, 2022.

personnel. In both the two-way and three-way versions, vendors pay a commission fee and customers pay delivery and service fees to the platform when a transaction is executed.⁵³

Figure 1. Three-Way Food-Delivery Services Ecosystem



In either the two-way or three-way version, the platform generates efficiencies by lowering the matching and other transaction costs that any individual participant would incur to replicate the same set of transactions absent the platform. This must be the case since the prevailing platforms would otherwise fail to persuade users and vendors to abandon bilateral substitutes for executing these transactions.

The Inevitability of Scale

Like other platform markets, the FDS market is prone to evolve toward high concentration levels. This is for two reasons.

First, the FDS market is characterized by the high fixed costs associated with assembling and implementing the matching technology and the low variable costs of executing each individual transaction on the platform. While the platform incurs ongoing costs to maintain the platform technology (and, in the case of the three-way model, significant costs associated with each delivery), variable costs are nonetheless significantly lower compared to fixed costs. The imbalance between these two cost categories implies that, as in any market characterized by scale economies, unit costs decline as the number of users and vendors increase, which favors larger over smaller platforms that can offer the lowest commission fees to vendors and delivery fees to consumers. Additionally, larger platforms that engage a larger number of couriers may be able to provide faster delivery times, a service feature that is valued by both vendors and consumers.

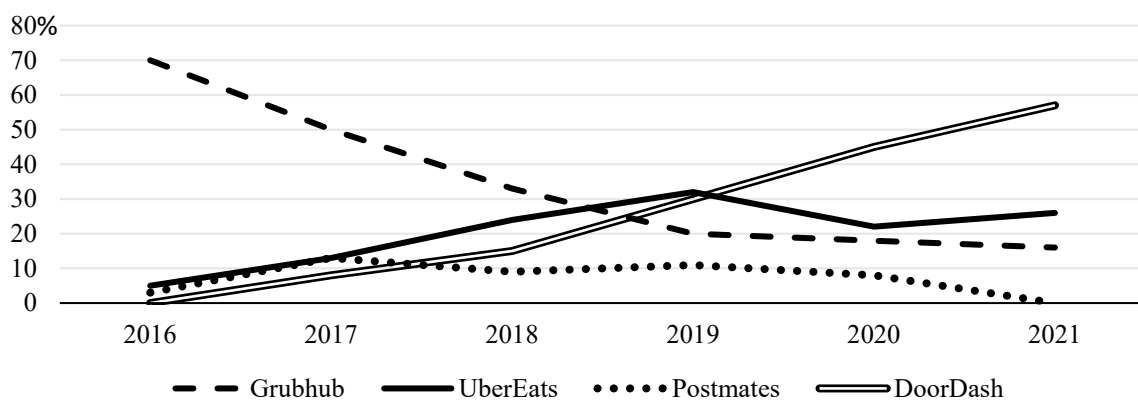
Second, users on all sides of an FDS platform—that is, consumers, vendors, and couriers—prefer to minimize transaction costs by using a limited number of platforms. Subject to differences in the commission fee and delivery speed, vendors will prefer platforms that have the largest number of customers and couriers. Subject to differences in the delivery fee, delivery speed, and variety of vendors, consumers will prefer platforms that have the most vendors. Subject to differences in pay, couriers will prefer platforms that have the most vendors and customers. In the case of consumers and vendors, these preferences are probably qualified by a countervailing preference to retain the ability to switch among platforms. The interaction between the preferences of customers, vendors, and couriers concerning volume,

⁵³ Kabir Ahuja, Vishwa Chandra, Victoria Lord, and Curtis Peens, *Ordering in: The rapid evolution of food delivery*, MCKINSEY, Sept. 22, 2021.

price, and delivery speed generates a positive feedback loop that rewards a handful of the largest platforms.

The interaction between these two factors—scale economies and network effects—implies that an economically successful platform market will necessarily exhibit high concentration levels. As shown in Figure 1, the historical increase in concentration levels in the national FDS market during 2016-2021 is consistent with these expectations, showing consolidation of market shares (as measured by revenues) among three major providers (DoorDash, Grubhub, and Uber Eats). However, the market was even more concentrated at its inception, when GrubHub held the largest market share, which proved to be contestable following entry by DoorDash and Uber Eats. Smaller competitors have been acquired (such as Postmates, acquired by Uber in 2020) or failed to scale. As of May 2022, DoorDash continued to hold the largest market share on a national basis (59%), trailed by Uber Eats (24%), and GrubHub (16%, when consolidated with Postmates).⁵⁴ Subsequently, I will assess whether these high concentration levels persist when the potentially relevant market is defined more appropriately based on geographic parameters, which narrow market scope, and service parameters, which expand it.

Figure 2. US Food-Delivery Services Market (Monthly sales, 2016-2021)



Note: Postmates was acquired by Uber Eats in 2020.

Source: Business of Apps, Food Delivery App Revenue and Usage Statistics (2022) (based on Bloomberg Second Measure, McKinsey data)

As the antitrust agencies have long recognized, presumptions of competitive harm based on concentration levels are rebuttable by evidence showing a lack of market power and countervailing efficiency gains that may reduce or entirely offset the risk of competitive harm.⁵⁵ In the case of platform markets, it is important to observe that high concentration levels are not only expected but *preferred*. If the FDS market had not converged upon a small number of providers, this would imply that competing platforms were failing to maximize the scale economies and network effects that deliver efficiency gains relative to a non-platform market in which food delivery services are provided by vendors individually. Those efficiency gains include not only the transaction-cost savings of a centralized platform

⁵⁴ Janine Perri, *Which company is winning the restaurant food delivery war?*, BLOOMBERG SECOND MEASURE, June 15, 2022, <https://secondmeasure.com/datapoints/food-delivery-service-grubhub-uber-eats-door-dash-postmates/>

⁵⁵ HORIZONTAL MERGER GUIDELINES, *supra* note 11, at §§ 2.1.3; 10.

as compared to a disaggregated market of individually negotiated transactions, but the resulting expansion of output and, given consumers' reduced search and comparison costs, an increase in price competition among vendors.

Both outcomes track the fundamental objectives of antitrust policy. Any position that recommends policy intervention based on the mere possibility that high concentration levels may imply market power (an approximation of the "big is bad" rhetoric that characterizes views expressed by some legislators, regulators, and commentators), without seriously assessing the output and pricing efficiencies that arise from economies of scale and the potential persistence of competitive threats from adjacent markets, inherently runs the risk of reducing consumer welfare by reversing these favorable outcomes.

Do FDS Platforms Have Market Power?

The FDS market's expected convergence toward high concentration levels at the national level raises antitrust concerns to the extent that high concentration levels *may* imply market power that translates into unfavorable outcomes on price, quality, or other competitive parameters. However, any such concerns would lack any compelling basis to support intervention without evidence confirming that estimated market shares reliably imply pricing power. Any such implication may be unsound if estimated shares reflect an inappropriately broad definition of the relevant geographic market or an inappropriately narrow definition of the relevant services market. As I discuss below, the latter concern is significant: a more precise definition of the potentially relevant service market strongly suggests that the high market shares apparently enjoyed by leading FDS platforms in major metropolitan markets do not reasonably support an inference of market power.

Geographic Market

Standard antitrust analysis defines the appropriate geographic market for a given product or service as a function in part of transportation costs. Following this principle, FDS markets must be defined in appropriately tailored geographic terms since physical delivery is executed by car or bicycle and ready-to-eat meals are highly perishable. The most granular available data for the FDS market operates at the level of major metropolitan markets. As shown in the Table below, substituting metropolitan-level data for national data presents a more accurate picture of competitors' shares in economically relevant FDS markets. With some qualifications, metropolitan markets exhibit high levels of concentration among the three major providers (as measured by the Hirschman-Herfindahl (HHI) Index used by federal antitrust agencies).⁵⁶ As is the case nationally, DoorDash leads in revenue share in most metropolitan markets, although, in certain cities, it is closely matched (Boston, Chicago, and Atlanta) or outmatched (New York, Los Angeles, and Miami) by Uber Eats or Grubhub, reflecting reduced concentration in certain local markets as compared to the national market. Data is current as of February 2021.

⁵⁶ U.S. antitrust agencies generally deem a market to be "highly concentrated" if it exhibits a HHI measure in excess of 2500 points, see HORIZONTAL MERGER GUIDELINES, *supra* note 11, at §§ 1.51, 5.3.

Table 1. Revenue Shares of Leading Firms in US Metropolitan FDS Markets (February 2021)

Geographic Region	DoorDash	Grubhub	Uber Eats (incl. Postmates)	HHI
National (Jan. 2021)	56%	17%	27%	4154
Atlanta	47%	10%	43%	4158
Boston	37%	32%	31%	3354
Chicago	38%	30%	32%	3368
Dallas-Fort Worth	53%	10%	37%	4278
Houston	61%	8%	31%	4746
Los Angeles	40%	13%	47%	3978
Miami	31%	7%	62%	4854
New York	35%	37%	28%	3378
Philadelphia	54%	30%	16%	4072
Phoenix	52%	10%	38%	4248
San Francisco	75%	10%	15%	5950
Washington DC	47%	15%	38%	3878

Note: HHI figures ignore providers with small market shares and may therefore slightly overestimate concentration levels. Uber Eats acquired Postmates in 2020.

Source: Bloomberg Second Measure.

It should be noted that even metropolitan-level definitions may sometimes be excessively broad. As Geoffrey Manne has observed, transportation costs mean that the appropriate geographic market can be “hyperlocal” such that certain platforms may lead in only certain neighborhoods of a metropolitan area.⁵⁷ Consistent with this conjecture, the business press observes that competitive conditions can differ across urban and suburban neighborhoods depending on residents’ income, which impacts the size of orders, and traffic conditions, which impact delivery times.⁵⁸ Given currently available data, however, empirical analysis of the FDS market must use metropolitan-level data, subject to the understanding that even this data may sometimes be insufficiently granular to capture neighborhood-level effects.

Service Market

To appropriately define the relevant service market, it is necessary to consider whether to include adjacent delivery services markets that may offer a reasonable substitute for at least some consumers and therefore constrain the pricing power of FDS platforms. Table 2 lists leading firms in the FDS market and adjacent delivery services markets. Some observers include “food-kit” delivery services as a potential competitor; however, I have omitted these services because they cannot offer immediate delivery like FDS and the other types of delivery services listed below.

⁵⁷ Geoffrey Manne, *Don’t listen to the naysayers, Uber’s acquisition of Postmates should be welcomed*, THE HILL, July 13, 2020.

⁵⁸ Laura Forman, *DoorDash Loves the ‘Burbs as Much as You Do*, WALL ST. J., Nov. 17, 2020.

Table 2. FDS and Adjacent Delivery Service Segments

Service segment	Type of service	Leading firms
Ready-to-eat food delivery services (FDS)	Local delivery of ready-to-eat meals from vendors to consumers through digital platform	DoorDash, Grubhub, Uber Eats
Specialized ready-to-eat food services (specialized FDS)	Same, but specializes in particular type of cuisine	Slice, Hungry Panda, Caviar
Restaurant-to-customer delivery services (RTC)	Local delivery of ready-to-eat meals through “in-house” website	Domino’s, Jimmy John’s, Panera
Instant-delivery services (IDS), incl. grocery delivery services	Local delivery of groceries and other small items from vendors to consumers through digital platform	Instacart, GoPuff, Walmart Grocery, FreshDirect

There are several indications that these adjacent delivery service markets (RTC, IDS, and specialized FDS) operate in competition with the FDS market.

First, IDS providers such as Instacart and GoPuff are attempting to enter the meal delivery market⁵⁹ while FDS platforms are entering the IDS market through “last mile” delivery services for pet food, department stores, and “big box” stores.⁶⁰ This suggests that putative boundaries drawn between FDS and IDS markets have limited economic relevance and should be substantially discounted for purposes of competition analysis. Second, RTC delivery services may lack the “one-stop-shopping” convenience of a single platform but nonetheless likely exert competitive pressure on an FDS provider to the extent that they deliver similar products within a similar geographic area.⁶¹ As shown in the Table above, certain national chains have developed in-house order-and-delivery services, an option that is generally feasible for any substantially sized national or regional chain or even smaller local businesses (for example, a local pizzeria) that service a limited geographic area.

The estimated size of the RTC market is considerable both in absolute and relative terms. As of 2022, Statista reports that the US RTC market is expected to earn an estimated \$31 billion, as compared to an estimated \$32 billion for the US FDS market.⁶² If the respective sizes of the US RTC and US FDS markets are roughly comparable, then the collective national

⁵⁹ Michael Waters, *Why Gopuff and Instacart are testing out meal delivery*, MODERNRETAIL, Oct. 27, 2021.

⁶⁰ Ahuja et al., *supra* note 53; YIPITDATA, *Grocery & Convenience Growth on Third-Party Platforms*, <https://www.yipitdata.com/blog/grocery-growth-third-party>; Preetika Rana and Heather Haddon, *Door Dash and Uber Eats are Hot, They’re Still Not Making Money*, WALL ST. J., May 28, 2021.

⁶¹ For this reason, DoorDash has reportedly focused on suburban markets in which there are fewer local delivery options, *see* Forman, *supra* note 58.

⁶² STATISTA, *Restaurant-to-Consumer Delivery (United States)*, <https://www.statista.com/outlook/dmo/eservices/online-food-delivery/restaurant-to-consumer-delivery/united-states>; STATISTA, *Platform-to-Consumer Delivery (United States)*, <https://www.statista.com/outlook/dmo/eservices/online-food-delivery/platform-to-consumer-delivery/united-states>. Estimates are based on the Statista Global Consumer Survey, comprising a sample of customers “who have made at least one online purchase within the last 12 months.”

market share of FDS platforms in a combined FDS-plus-RTC market would fall approximately by half. This would likely mean that concentration levels in any metropolitan region for this expanded market of FDS-plus-RTC services would be significantly diminished and possibly fall below the threshold that raises antitrust concerns. Hence, even in a particular geographic market in which a major FDS platform might appear to enjoy a dominant position, there is a strong possibility that this would not remain the case once the platform is situated in a more broadly defined market that comprises all reasonably substitutable local delivery services.

The Competitive Pressures of Low Margins

There is a fundamental reason why large shares in FDS markets, even when geographically limited to metropolitan markets to reflect transportation costs, are unlikely to translate into market power. FDS platforms must achieve high transaction volumes to amortize the platform's high fixed costs and achieve positive economic returns over the medium to long term. The urgency to achieve scale is exacerbated in the FDS context since platforms (especially in the more typical order-plus-delivery model) must incur significant ongoing capital and personnel costs in maintaining and operating a delivery infrastructure. Contrary to the assertions made by some policymakers that FDS platforms earn "exorbitant" profits⁶³, even the largest FDS platforms lose money or at best earn a modest positive return on each transaction, after adjusting for payments to drivers and other costs. Analysis by McKinsey found that, as of 2021, a platform earns on average a margin of approximately three percent on the average order.⁶⁴ Even this estimate may be optimistic. In 2020, Uber management stated in an earnings release that "cumulative payments to Drivers for Delivery deliveries [*sic*] historically have exceeded the cumulative delivery fees paid by consumers."⁶⁵ In short: UberEats appears to be a failing business, at least in the short-term.

Remarkably, no major FDS platform has yet achieved profitability. The Table below shows the financial results of industry leaders, DoorDash and GrubHub, during 2018-2021 and, for DoorDash, the first three quarters of 2023.⁶⁶ Both companies have incurred net losses and negative operating margins throughout almost the entire period. This dismal record does not favor the platform monopoly thesis.

⁶³ See *infra* note 76.

⁶⁴ Ahuja et al., *supra* note 53.

⁶⁵ UBER INVESTOR, *Uber Announces Results for Third Quarter 2020* (Nov. 5, 2020), <https://investor.uber.com/news-events/news/press-release-details/2020/Uber-Announces-Results-for-Third-Quarter-2020/>

⁶⁶ Uber Eats is not shown because Uber does not consistently provide separate financials for its Uber Eats subsidiary.

Table 3. Revenues and Net Income of GrubHub and Doordash (2018-Q3 2022, USD millions)

Platform/Year	Revenues	Net Income	Net Operating Margin
<i>GrubHub</i>			
2018	\$1,007	\$78	7.8%
2019	\$1,312	(\$19)	(1.4%)
2020	\$1,819	(\$156)	(8.7%)
2021	\$1,107	(\$135)	(12.2%)
<i>DoorDash</i>			
2018	\$291	(\$204)	(70.1%)
2019	\$885	(\$667)	(75.4%)
2020	\$2,886	(\$461)	(15.9%)
2021	\$4,888	(\$468)	(9.6%)
Q3 2022	\$4,765	(\$726)	(15.2%)

Note: Parentheses indicate negative values. Figures for Q3 2022 reflect year-to-date amounts.

Sources: SEC filings. For GrubHub 2021 results: JustEatTakeaway Annual Report (2021), with euro figures converted into dollars at exchange rate as of Dec. 31, 2021.

It could be objected that competitors in an emergent platform market might operate at a loss to acquire the user base that is necessary to generate network effects. This argument suffers from three vulnerabilities. First, policymakers who have called for regulatory intervention have made the claim that FDS providers are *currently* exercising market power in the form of purportedly excessive fees. Second, even if we assume that there are concerns about the future acquisition of pricing power through a two-step predation strategy, the characteristics of the food-delivery market—in particular, consumers’ and vendors’ low switching costs—do not show how a prevailing platform could feasibly block entry if it were later to raise prices. Third, and relatedly, the FDS market has already been in operation for almost two decades. Grubhub, the industry pioneer, was founded in 2004, Postmates was founded in 2011, Doordash was founded in 2013, and Uber Eats was founded in 2014. The passage of considerable time since each of these companies’ founding dates disfavors the view that FDS platforms’ long record of net losses is best interpreted as the first stage of a deferred recoupment strategy. Even assuming any particular FDS platform had initially pursued such a strategy, it is apparently unsuccessful, which again favors the view that even the leading platforms have been unable to secure pricing power as would have been expected to materialize following the standard understanding of platform markets.

The continuing failure to earn profits, coupled with investors’ expectations of a large and expanding user base, provide FDS platforms with incentives to attract new customers and deter attrition by existing customers, who can migrate to other FDS platforms or IDS, RTC, or specialized FDS providers (or can choose to dine at a physical restaurant). FDS platforms also face the risk that perceived high fees may discourage adoption by new vendors or may induce attrition by existing vendors that can establish an RTC service or, as is widely discussed in trade commentary, can choose to focus on dine-in services (which has no commission fee). The same is true for users, who exhibit low retention rates across various geographic markets.⁶⁷ Consequently, even if a platform already has significant share in a metropolitan FDS market, it has strong incentives to offer “reasonable” fees to vendors and

⁶⁷ James Haslam, *Meals on mobile: The state of Food Delivery apps in 2019*, ADJUST, Nov. 18, 2019, <https://www.adjust.com/blog/the-state-of-food-delivery-apps-in-2019/>

users, all of which can switch to competing FDS platforms (or IDS, RTC, or specialized FDS providers) at little cost. Consistent with these expectations, several FDS platforms have recently announced fee reductions for vendors or offered “tiered” pricing (based on service types) for vendors as the pandemic has subsided (and consumer demand for FDS providers has slowed).⁶⁸ A platform that fails to take these types of measures is likely to lose, or fail to attract, users and vendors, leading to reduced transaction volume and a smaller user base that may place its viability at risk.

Merger Review in the FDS Market

The inability of even leading FDS platforms consistently to earn profits implies that these platforms are operating below the minimum efficient scale at which the platform can at least cover its variable costs in the short term and, depending on the patience of its investors, fixed costs over the long term. Some politicians and much of the press have asserted that FDS platforms assess “exorbitant” fees and enjoy outsized profits⁶⁹, which led to caps being imposed on fees charged by platforms to vendors in as many as 68 US municipalities (as of March 2021).⁷⁰ These assertions are difficult to reconcile with the economic reality of the FDS business model: a low-margin environment in which profits are a rare occurrence.

To move toward profitability, platforms must increase transactional volume, whether internally or by acquisitions, to “scale up” in pursuit of net positive returns. Robust acquisition activity in the food delivery market reflects this drive toward scale in an effort to achieve at least a break-even business model. Since the industry’s inception, this pattern of consolidation through acquisition can be observed across FDS markets in the US, Europe, and Asia.⁷¹ As shown in the Table below, all three platform leaders and other entities in the US FDS markets have engaged actively in acquisitions. In 2021, Grubhub itself was acquired by Just Eat Takeaway, the largest European FDS platform.

⁶⁸ Julie Littman, *Delivery firms are offering more flexibility to retain partners. Will it work?*, RESTAURANT DIVE, Jan. 19, 2022, <https://www.restaurantdive.com/news/delivery-firms-are-offering-more-flexibility-to-retain-restaurant-partners-will-it-wo/617300/>

⁶⁹ See, e.g., *supra* note 63.

⁷⁰ Cyrus Farivar, *DoorDash pushes back against fee delivery commissions with new charges*, NBCNEWS, Mar. 28, 2021.

⁷¹ Jael Goldfine, *Delivery Wars 2.0: How Just Eat Takeaway, Uber Eats, Deliveroo, Zomato and others match up in the multi-billion dollar market*, BUSINESS OF BUSINESS, Aug. 5, 2021, <https://www.businessofbusiness.com/articles/delivery-wars-20-just-eat-takeaway-uber-eats-deliveroo-zomato-and-other-empires-fight-for-territory-billion-market/>

Table 4. Major Acquisitions in the US FDS Market (2013-Present)

Year	Acquiror	Target	Deal Value	Status
2021	JustEat Takeaway.com	GrubHub	\$7.3B	Closed
2021	UberEats	Drizly	\$1.1B	Closed
2020	Uber Eats	Postmates	\$2.65B	Closed
2020	DoorDash	Caviar	\$411M	Closed
2019	Uber Eats	GrubHub	\$4.5B (reported)	Withdrawn
2018	GrubHub	LevelUp	\$390M	Closed
2018	GrubHub	Tapingo	\$150M	Closed
2017	GrubHub	Eat24	\$287.5M	Closed
2015	Yelp	Eat24	\$134M	Closed
2014	Square	Caviar	\$90M (reported)	Closed
2013	GrubHub	Seamless	\$50M	Closed

Note: “Year” denotes the year in which the relevant transaction was consummated or withdrawn.

Sources: Press reports.

The link between the imperative to scale up and repeated acquisitions in the FDS market is critical because it suggests that, absent growth internally or externally by a necessarily small number of delivery platforms, the industry lacks a viable business model. The persistence of negative profit margins even under highly concentrated conditions indicates that there is no feasible market structure that is characterized by both a large number of delivery platforms and maximal transaction-cost savings (or even economic viability) for the FDS ecosystem. Very simply, the industry must consolidate to achieve viability. Regulatory actions based on a simplistic “big is bad” principle would therefore compel the market to operate under a less efficient structure or place at risk its ability to survive at all.

This point has not been appreciated by regulators and other policymakers in jurisdictions that have intervened, or advocated intervention, in FDS acquisition transactions based on the presumption that these represent anticompetitive attempts to acquire increased market share and pricing power. The structure and performance of the FDS market since its inception strongly favor the alternative view that these acquisitions represent attempts to survive through increased economies of scale, rather than attempts to monopolize the market and acquire pricing power. The latter would be an almost implausible strategy in a market in which providers typically cannot even cover their operating costs.

The weak factual grounds behind policymakers’ approach can be illustrated by the regulatory response to three transactions in the FDS market.

Uber Eats/Grubhub

In May 2020, Uber (the parent of Uber Eats) made an offer to purchase Grubhub, reportedly for \$4.5 billion.⁷² Presumptively, the transaction raised antitrust concerns based on revenue shares in the FDS market held by the largest providers in certain metropolitan areas. Based on data current as of April 2020, the combined entity would have had an estimated share in

⁷² Mike Isaac and Kate Conger, *Uber Said To Be in Talks to Acquire Grubhub*, N.Y. TIMES, May 12, 2020.

excess of 50 percent of FDS revenues in five of the 12 largest metropolitan markets.⁷³ Assuming a market definition that excludes IDS, RTC, and specialized FDS providers, these revenue shares indicate that the transaction would have triggered a rebuttable presumption of competitive harm under agency guidelines, based on (1) post-merger HHI levels and (2) the difference between pre-merger and post-merger HHI levels.⁷⁴ As applied by the courts (and as used in internal agency deliberations), the presumption can be rebutted by sufficient evidence “that the merger is unlikely to enhance market power” (which encompasses analysis of entry conditions and efficiencies specifically attributable to the transaction).⁷⁵ Within this analytical framework, antitrust concerns based on increased concentration levels may have been mitigated since DoorDash would have continued to hold significant market share in all these cities and the combined entity may have achieved efficiencies that would have been passed on to vendors and consumers. Note that these HHI calculations exclude entities principally active in the RTC, IDS, and specialized FDS markets, which would have reduced the combined entity’s share of the relevant market considerably (and, as discussed previously, possibly below levels that would raise any plausible antitrust concern in some or all geographic regions).

Focusing on the anticipated increase in market share of the combined FDS providers, some policymakers and sympathetic commentators called for regulators to block the transaction. Representative David Cicilline accused Uber of “pandemic profiteering” and, along with Senator Amy Klobuchar and other legislators, called on regulators to take action to stop the transaction.⁷⁶ This heated rhetoric overlooked several critical points.

First, advocates for regulatory action did not consider whether the FDS market is the most appropriate market definition for purposes of determining anticipated effects on market power. For the reasons discussed previously, restricting the market to FDS providers is most likely excessively narrow and therefore overstated any pricing power reasonably attributable to the combined entity. Second, they did not take into account the fact that even the largest FDS platforms have almost never been profitable, suggesting that high shares in any metropolitan FDS market are best interpreted as reflecting the drive to achieve profitability through scale, rather than an imminent threat of pricing power. While it is commonly argued that the absence of profits among platform incumbents reflects a two-stage predation strategy in which losses will be recouped through increased prices once market dominance is secured, this has not yet occurred in the FDS market and there is no reason to believe that it is even a reasonably achievable prospect. Regulatory intervention to preempt what appears to be a merely conjectural risk of predation is empirically and legally unsound absent specific evidence to the contrary.

In any event, intervention turned out to be unnecessary since negotiations between Uber and Grubhub collapsed, reportedly due to a high break-up fee demanded by Grubhub given the

⁷³ Calculations made by author based on publicly available Bloomberg Second Measure data. Calculations exclude competitors other than DoorDash, Grubhub, Uber Eats, and Postmates. Those competitors have much smaller market shares and the omission is unlikely to impact materially these calculations.

⁷⁴ Under the Horizontal Merger Guidelines, merger transactions that “increase the HHI by more than 200 points in highly concentrated markets are presumed likely to enhance market power.” “Highly concentrated” markets are defined as markets in which the HHI is above 2500. See HORIZONTAL MERGER GUIDELINES, *supra* note 11, at § 5.3.

⁷⁵ *Id.*, at §§ 5.3, 9, 10.

⁷⁶ Bobby Allyn, “Uber Woos Grubhub, In a Move Lawmaker Calls ‘Pandemic Profiteering,’” National Public Radio, May 13, 2020; Lauren Hirsch, “Klobuchar and Democrats push antitrust regulators to scrutinize Uber’s potential deal for Grubhub,” CNBC, May 20, 2020.

increasing obstacles to deal closure posed by antitrust scrutiny.⁷⁷ In June 2020, as noted previously, Grubhub was acquired for \$7.3 billion by JustEat Takeaway, a platform without any US presence that had been formed through the combination of two leading European FDS platforms.⁷⁸ This regulatory outcome might be defended on the ground that it bolstered an existing competitor in the US food delivery market without causing any increase in market concentration since Grubhub's share was left unchanged. However, there is reason to doubt that a fuller factual inquiry would have determined that the Uber/Grubhub transaction posed a material risk of net incremental competitive harm, especially under a broader definition of the relevant service market. At the very least, the transaction did not merit the reflexive condemnation that spelled its early demise.

Uber Eats/Postmates

Shortly after the termination of the Grubhub acquisition, Uber agreed in July 2020 to purchase Postmates, the FDS market's lagging provider, for \$2.65 billion. This acquisition elicited a "second request" from DOJ Antitrust that delayed closing⁷⁹ while advocacy groups such as the Open Markets Institute urged regulators to block the transaction on the basis of allegations that delivery apps exert "predatory power", "monopolize an essential service", and "line their pockets at the expense of struggling businesses."⁸⁰ (The last allegation is implausible since FDS platforms operate at a considerable loss.)

Ultimately the agency took no action by the time the applicable "waiting period" expired in November 2020, effectively allowing the transaction to move forward. Regulators' decision not to contest the transaction may have reflected the perception that, given Postmates' smaller market share, the combined entity was expected to have a smaller increased share in most major metropolitan markets as compared to a hypothetical UberEats/Grubhub entity. Based on data as of April 2020, this was only true of six of the 12 largest metropolitan markets. In three of the 12 largest metropolitan markets (Los Angeles, Miami and Phoenix), UberEats/Postmates constituted a larger market share than UberEats/Grubhub and in three more of those markets (Dallas-Fort Worth, Houston, and Atlanta), the differences in market share held by the hypothetically combined entities were not significant.⁸¹ In any event, it is unlikely that either merger transaction would have conferred market power on the combined entity (due to the limitations on market power described previously) while it is certain that both combinations would have produced (and, in the case of the UberEats/Postmates transaction, did produce) a stronger competitor to DoorDash. In short, there was no clear case on antitrust grounds against either transaction (and even without taking into account potential competition from providers in adjacent local delivery services markets).

⁷⁷ Shakeel Hashim, *Why Uber's big deal for Grubhub fell out—and a European suitor stepped in*, PROTOCOL, June 10, 2020, [Why Uber's big deal for Grubhub fell out — and a European suitor stepped in - Protocol](#)

⁷⁸ Ingrid Lunden, *Takeaway and Just Eat to merge in \$10B deal to take on Deliveroo and Uber Eats in Europe*, TECHCRUNCH, July 29, 2019.

⁷⁹ Tyler Sonnemaker, *DOJ Antitrust Division reviewing Uber's Plans to Buy Postmates*, BUSINESS INSIDER, Sept. 30, 2020.

⁸⁰ OPEN MARKETS INSTITUTE, *Authorities Must Block Uber's Anti-Competitive Acquisition of Postmates*, July 6, 2020, <https://www.openmarketsinstitute.org/publications/authorities-must-block-ubers-anti-competitive-acquisition-of-postmates>

⁸¹ Based on author's calculations, using publicly available Bloomberg Second Measure data. Calculations exclude competitors other than DoorDash, Grubhub, Uber Eats, and Postmates.

Amazon/Deliveroo

US commentators and policymakers who called to block the Uber Eats/Grubhub merger could have found a precedent in actions previously taken in the same industry by the Competition and Markets Authority (CMA), the British competition regulator. In May 2019, Amazon announced that it had entered into an agreement to acquire a 16% minority stake for approximately \$565 million in Deliveroo, one of three major competitors in the UK FDS market (the others being Uber Eats and Just Eat). Consistent with industry trends, Deliveroo was unprofitable, reporting a loss of approximately \$300 million in 2018.⁸² As of late December 2019, JustEat represented almost 60% of the UK FDS market, Uber Eats represented 18%, and Deliveroo represented 19%, in each case as measured by weekly consumer spend.⁸³ Hence it would appear that Amazon's non-controlling investment could only have been procompetitive since it would have bolstered a lagging competitor in an economically challenging environment. Note that Amazon was not active in the UK FDS market since having exited in 2018 due to lack of profitability.⁸⁴

The CMA felt otherwise and ordered Amazon and Deliveroo in July 2019 not to consummate the transaction and commenced a full investigation. Based on an initial "Phase 1" investigation, the CMA announced in December 2019 that it would undertake a full "Phase 2" investigation⁸⁵, which ultimately resulted in approval of the transaction in early August 2020 (more than 12 months after the deal announcement). However, the CMA indicated that it may revisit its finding that the transaction did not pose a risk of "a substantial lessening of competition" if Amazon moved beyond its 16% ownership stake.⁸⁶ About six months after the transaction, competitive conditions as measured by market share had *improved*. As of late February 2021, JustEat reportedly had fallen to 45% of the UK FDS market, while Uber Eats and Deliveroo had increased to 27% and 26%, respectively, in each case based on weekly consumer spend.⁸⁷ Hence, it appears that Amazon's acquisition of an equity stake in Deliveroo may in fact have enhanced competition by financially strengthening a smaller competitor.

This level of regulatory scrutiny and resulting transactional delay seem inappropriate in the case of a non-controlling investment in an apparently failing company that did not have a significant share of the relevant market (even when defined narrowly to exclude adjacent local delivery services markets). This case of regulatory overkill illustrates the extent to which reflexive attributions of market power to apparently dominant platforms can place at risk transactions that are not only innocuous but, in this case, potentially necessary to save a competitor from demise.

⁸² Jasper Jolly, *Amazon's deal with Deliveroo faces in-depth inquiry*, GUARDIAN, Dec. 27, 2019.

⁸³ EDISON TRENDS, *In UK Food Delivery Battleground, JustEat Takes #1 Spot with 45% Market Share*, Apr. 2, 2021, <https://medium.com/edison-discovers/in-uk-food-delivery-battleground-just-eat-takes-1-spot-with-45-market-share-e81f79f7133b>. "Consumer spend" excludes taxes, tips, and fees.

⁸⁴ Sarah Perez, *Amazon closes its restaurant delivery service in London*, TECHCRUNCH, Nov. 26, 2018.

⁸⁵ COMPETITION MARKETS AUTHORITY, *Anticipated acquisition by Amazon of a minority shareholding and certain rights in Deliveroo, Decision on relevant merger situation and substantial lessening of competition*, Dec. 11, 2019. In the UK merger review process, phase 1 is a preliminary review that assesses whether the transaction raises "prima facie competition concerns" and phase 2 is an in-depth review to determine whether the transaction is expected to result in "a substantial lessening of competition," see ASHURST, *UK merger control: Phase 2 references*, Dec. 2, 2021.

⁸⁶ *UK competition watchdog approves Amazon's stake in Deliveroo*, AP NEWS, Aug. 4, 2020, <https://apnews.com/45c6a975b492c61fe14454648f5233e0>

⁸⁷ EDISON TRENDS, *supra* note 83.

Broader Lessons for Platform Antitrust

It has long been recognized (but, in some contemporary policy and popular commentary, is overlooked) that high market share is only a *possible* indication of pricing power and other indications of anticompetitive risk are generally necessary to justify intervention. Missing this point can lead to the misdiagnosis of competitive conditions in platform markets that paradoxically exhibit both high concentration levels and declining prices. This is not accidental; rather, the former characteristic is sometimes a precondition for the latter in platform environments.

Like any matching technology, an FDS platform yields transactional efficiencies by enabling consumers to access a large number of vendors through a single application while enabling vendors to reach a large number of consumers, in each case at a cost that is lower than the cost that would be incurred if those same transactions were executed on a bilateral basis. The key observation is that any digital platform yields cost-savings relative to non-platform-mediated transactions precisely because it sustains a large transactional volume, which in turn is associated with substantial market share. Competition concerns only arise if the platform enjoys not only large market share but significant market power, in which case it may have incentives to raise prices or degrade quality to users' detriment. Yet this risk does not plausibly arise unless the platform operates behind a "moat" that impedes competitive threats. In the FDS market, the moat could take the form of a proprietary technology (protected by intellectual property or secrecy), a difficult-to-replicate suite of bundled services, contractual exclusivity with significant vendors, or switching costs on the part of vendors and customers. If one or more of those elements are not meaningfully present, even high market share cannot plausibly translate into market power.

Based on the economics and performance of the FDS market, it appears that no platform is likely to enjoy any such moat against actual or potential competitors. There are several reasons.

First, the technology for matching vendors with customers is well-known. In fact, third parties now offer "clone" delivery apps for vendors that seek to independently assemble a food-delivery infrastructure (and, as a result, bypass the commission fee paid to FDS platforms).⁸⁸ Second, as discussed previously, competitive boundaries within any relevant geographic region among adjacent local delivery services markets are porous: IDS providers have infrastructure in place that can be repurposed to provide FDS providers, while specialized FDS providers pose a competitive threat in certain cuisine markets. Third, consumers incur nominal switching costs in moving from one delivery app to another on a smartphone, as shown by evidence showing that users often use multiple FDS platforms.⁸⁹ In many cases, vendors' websites encourage multi-homing by providing information on the delivery fees charged by all major FDS providers (plus direct links to each provider). Fourth, a vendor can sometimes credibly threaten to bypass the platform altogether by acquiring in-house RTC delivery capacities. While platforms have entered into exclusivity deals with

⁸⁸ There are multiple examples available online. See, e.g., <https://www.oddappsclone.com>; <https://www.apurple.co/food-delivery-app-clone>.

⁸⁹ As of November 2021, Bloomberg Second Measure reported that 52% of GrubHub customers, 51% of DoorDash customers, and 54% of UberEats used at least one other FDS provider in addition to each such service, see Tom Kaiser, *Half of U.S. Consumers Now Using Meal Delivery as Sales Grow*, FOODONDEMAND, Jan. 6, 2022, <https://www.foodondemand.com/01062022/half-of-u-s-consumers-now-using-meal-delivery-as-sales-grow/>

certain large vendors, this is unlikely to cause a foreclosure effect given the high level of fragmentation in the vendor market. If Grubhub enters into an exclusivity deal with McDonald's, DoorDash would then be free to negotiate an exclusivity deal with Burger King, Wendy's, Taco Bell or many other similarly-sized vendors.

Closer analysis of the FDS market shows that it is prone to exhibit a market structure in which leading firms have large market shares but lack pricing power and cannot even secure profits over substantial periods of time. This consumer-friendly state of affairs reflects users' low switching costs, competitors' reasonable entry costs, the absence of any proprietary technology, and platforms' significant costs in connection with physical delivery. Proposed and implemented legal interventions in the FDS market (encompassing fee caps at the local level and blocked or delayed acquisitions at the national level) lack sound evidence of competitive harm. This form of overenforcement is far from costless. Intervention in a platform market based on factually unsupported assumptions of market power may compel firms to operate under market structures that fail to maximize transaction-cost savings or, over a longer period of time, may endanger firms' economic viability. In both cases, consumers would be worse off.

Part III. Cloud Computing

The advent of cloud computing technologies has revolutionized industries ranging from financial services to health care to television to governmental services. Cloud computing constitutes a “general-purpose technology” that can be applied broadly to generate transformative efficiency gains across a wide array of industries.⁹⁰ The commercial success of the market pioneer, AWS (a subsidiary of Amazon), has elicited assertions from regulators and some commentators that this rapidly growing market will converge on a monopoly outcome, with adverse effects on pricing or quality. In September 2022, the UK's Office of Communications (which has the authority to bring competition enforcement actions) announced an investigation into the “market positions” of the cloud services provided by Amazon, Microsoft, and Google.⁹¹ AWS is currently under investigation by US, European, and British competition regulators.⁹² Microsoft, which provides the Azure cloud computing platform, has been under investigation by European competition regulators⁹³ and has been sued under competition law in a French court.⁹⁴ The Majority Staff Report released in 2020 stated that Google was investing “heavily” in its cloud computing product, “positioning itself to dominate the ‘internet of things,’ . . .”. Concurring with an “impact assessment report” released in 2020 by the European Commission (the EU Commission Report)⁹⁵, a report commissioned by CISPE, an association of European cloud infrastructure providers (and authored by Prof. Frédéric Jenny, the Chairman of the OECD Competition Committee) (the

⁹⁰ On the concept of a general-purpose technology, see Timothy Bresnahan & Manuel Trajtenberg, *General Purpose Technologies: Engines of Growth?*, 65 J. ECONOMETRICS 83 (1995).

⁹¹ Joe Hoppe and Sam Schechner, *Amazon, Microsoft, Google Face Cloud-Services Examination in U.K.*, WALL ST. J., Sept. 22, 2022.

⁹² COMPETITION MARKETS AUTHORITY, *CMA investigates Amazon over suspected anti-competitive practices*, July 6, 2022; EUROPEAN COMMISSION, *Antitrust: Commission opens investigation into possible anti-competitive conduct of Amazon*, 17 July 2019; David McLaughlin, Dina Bass, and Naomi Nix, *Amazon Cloud Unit Draws Antitrust Scrutiny from Khan's FTC*, BLOOMBERG, Dec. 22, 2021.

⁹³ Paresh Dave, *Microsoft's cloud business targeted by EU antitrust regulators*, REUTERS, Apr. 2, 2022.

⁹⁴ Aaron Tilley and Kim Mackrael, *Microsoft Faces Antitrust Complaint in Europe About Its Cloud Services*, WALL ST. J., Mar. 16, 2022.

⁹⁵ EUROPEAN COMMISSION DIGITAL MARKETS ACT – IMPACT ASSESSMENT SUPPORT STUDY – ANNEXES (2020) [hereinafter COMMISSION REPORT], <https://op.europa.eu/en/publication-detail/-/publication/2a69fd2a-3e8a-11eb-b27b-01aa75ed71a1/language-en>.

CISPE Report), claims that cloud computing providers are engaging in practices that “are already affecting the cloud computing market . . . threatening its contestability and distorting competition.”⁹⁶

This high level of regulatory interest implies a high level of concern about concentration levels and potentially or allegedly anticompetitive practices in the cloud-computing market. Those concerns ultimately rest on the presumption that cloud platforms enjoy (or, in some variations, are inherently likely to secure) market power.

In this Part, I assess whether this market power assumption is correct. The facts are not supportive. AWS faces vigorous competition from two significant competitors (Microsoft and Google) and potential competition from entrants with extensive technical expertise in closely related markets (IBM and Oracle). All these firms have ample capital resources to make the large investments required to compete in this market. Moreover, even the largest cloud providers operate in a growing market that is far from saturation and therefore have incentives to take actions to *reduce* users’ concerns about lock-in. There is no entity in the cloud computing market that can reasonably be characterized as a “monopoly” and the market in general does not exhibit the conditions under which a monopoly outcome is likely to be realized.

Background: Cloud Computing

As shown in the Table below, the cloud computing industry is generally understood as comprising three segments: (i) infrastructure-as-a-service (IaaS), (ii) platform-as-a-service (PaaS), and (iii) software-as-a-service (SaaS). The IaaS segment comprises the supply and management of cloud-based computing, storage, and networking resources, encompassing servers and other hardware; the PaaS segment comprises the supply of an integrated environment where users can develop, deploy, run, and manage cloud-based applications; and the SaaS segment refers to a myriad of cloud-based software applications for business and individual users.⁹⁷ In each case, “as-a-Service” means that customers can obtain these resources on a fee-for-use basis, which avoids having to purchase equipment and software as is the case for on-premises systems. The cloud computing market is also serviced by third-party providers that supply software tools and related services that assist users in managing data stored in the cloud. As will be discussed, the economically relevant boundaries between these various segments are often unclear upon closer scrutiny. Unless otherwise specified, “users” or “customers” as used in the following discussion refer to businesses or other entities, rather than individual consumers.

⁹⁶ FRÉDÉRIC JENNY, CLOUD INFRASTRUCTURE SERVICES: AN ANALYSIS OF POTENTIALLY ANTI-COMPETITIVE PRACTICES (Oct. 2021) [hereinafter CISPE REPORT], <https://cispe.cloud/studies/fairsoftware>.

⁹⁷ For the most commonly referenced definition, see Peter Mell and Timothy Grance, *The NIST Definition of Cloud Computing* (National Institute of Standards & Technology, 2011). For further explanation, see Jalal Kiswani, Sergiu Dascalu, and Frederick Harris, *Cloud Computing and Its Applications: A Comprehensive Survey*, 28 INTL. J. COMPUTERS & THEIR APPLICATIONS 3 (2021).

Table 5. Cloud Computing Ecosystem

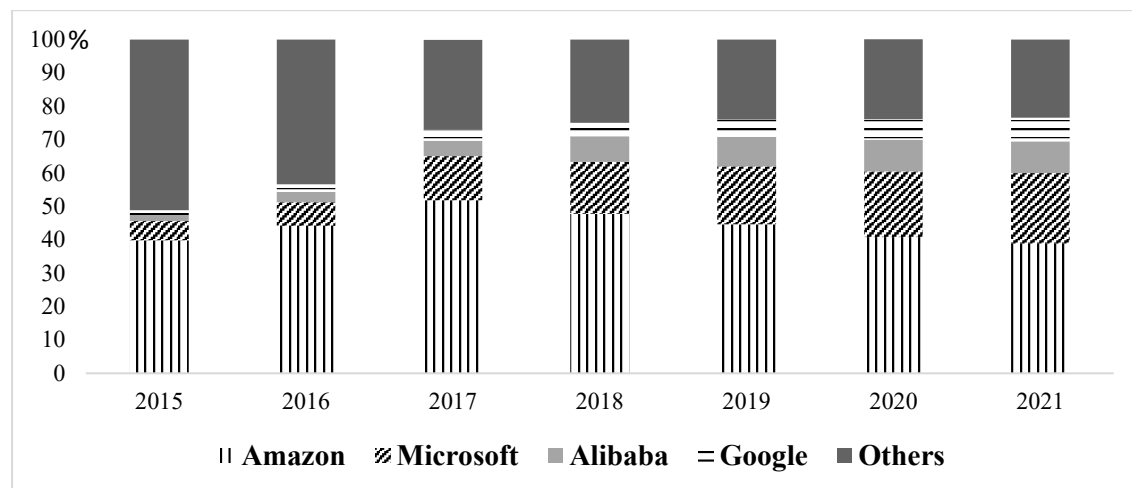
Service segment	Type of service	Leading or representative firms or products
Infrastructure-as-a-Service (IaaS)	Enterprise compute, storage, and networking resources	AWS (Amazon), Azure (Microsoft), Google Cloud
Platform-as-a-Service (PaaS)	Integrated environment to support app/system development, deployment, execution, and management	AWS Elastic Beanstalk, Google App Engine, IBM Red Hat OpenShift on IBM Cloud, VMWare Cloud Foundry, Salesforce Platform
Software-as-a-Service (SaaS)	Cloud-enabled software applications for business and individual users	Salesforce, Shutterfly, Outlook, Netflix, DropBox, Zoom

In the aggregate, each segment of the cloud ecosystem forms part of a larger technological infrastructure that yields transformative competitive efficiencies by lowering entry barriers for startups (who can lease cost-intensive computing services), facilitating the emergence of new cloud-enabled products and services, and lowering the costs of data storage and management. End-users ultimately benefit from all these effects in the form of reduced prices, improved quality, and new cloud-enabled products and services.

Regulators have nonetheless raised competition concerns concerning the cloud computing market and, in particular the IaaS and PaaS segments, so this discussion will focus on these segments. The IaaS segment was pioneered by Amazon when it launched AWS in 2006. The two other leading competitors, Microsoft Azure (Azure) and Google Cloud (GC), entered the market in 2010 and 2013, respectively.⁹⁸ The Table below shows annual estimated revenue shares during 2015-2021 for the worldwide IaaS market, which indicates a mostly stable share for AWS but rapidly increasing share for Azure and moderately increasing share for GC. As would be expected in a platform environment, smaller providers (designated as “Others”) have lost share as the market has matured. Generally, it should be noted that revenue share estimates in the cloud ecosystem are subject to some level of uncertainty because different providers use different methodologies to report cloud revenues and there is no settled definition of different segments of the cloud ecosystem; nonetheless, available estimates do not appear to diverge significantly.

⁹⁸ CBINSIGHTS, CLOUD WARS (2021), <https://www.cbinsights.com/research/briefing/cloud-wars-google-microsoft-amazon/>.

Table 6. Global Revenue Shares in Public Cloud IaaS Segment (2015-2021)



Source: Statista, “Vendor share of the public cloud infrastructure as a service (IaaS) market worldwide from 2015 to 2021” (based on data from Gartner), <https://www.statista.com/statistics/754837/worldwide-public-cloud-infrastructure-services-vendor-revenues/>

These revenue share figures are restricted to “public cloud” IaaS services. “Public cloud” refers to an enterprise computing infrastructure consisting of compute, storage, networking, and associated services that a specialized provider supplies and manages for multiple subscribers. A “private cloud” service refers to a data storage infrastructure that is used by a single entity (which typically retains third-party firms to assemble and manage that infrastructure). A private cloud offers a higher level of data security but requires significant capital investment and is therefore generally only a realistic option for the largest business and governmental entities. As I will discuss subsequently, the largest cloud-computing users often adopt hybrid strategies consisting of public and private cloud-computing services as well as conventional on-premises data storage and management.

Is Cloud Computing Prone to Monopoly?

Competition regulators, legislators, and commentators have identified the cloud computing market as a platform market that is prone to converge on a winner-take-all or winner-take-most outcome in which one or two providers capture the bulk of the market and can therefore “impose” adverse pricing and other terms on users.⁹⁹ Multiple characteristics of the cloud computing ecosystem fail to support this assertion.

Scale Economies, Market Share, and Market Power

Concerns over market power in the cloud computing market are purportedly supported by the large revenue share held by AWS, or the large revenue share held collectively by AWS, Azure, and GC, and the high costs incurred by cloud users when migrating from one service provider to the other. For example, the influential Majority Staff Report stated that “Amazon . . . is dominant in the cloud market due to the concentration of the IaaS market,” adding that it “is the unquestioned leader in the cloud computing infrastructure market.”¹⁰⁰ This unqualified assertion of market dominance, whether applied to Amazon or other leading IaaS providers, is unpersuasive for three reasons.

⁹⁹ CISPE REPORT, *supra* note 96, at 7; MAJORITY STAFF REPORT, *supra* note 8, at 109-120. See also *supra* notes 91-96 and accompanying discussion.

¹⁰⁰ MAJORITY STAFF REPORT, *supra* note 8, at 113.

First, based on estimates by Gartner, the revenue share held by AWS in the IaaS public cloud segment was about 39% on a worldwide basis as of 2021 (see Table 6 above), which falls well below the 50% share which US courts and antitrust agencies generally recognize as being the minimum level necessary to potentially show monopoly power.¹⁰¹ A leading antitrust treatise states that “it would be rare indeed to find that a firm with half of a market could individually control price over any significant period.”¹⁰² Based on estimates by the Canalis consulting service, AWS’s revenue share falls lower if the relevant market is expanded to encompass IaaS, PaaS and “hosted” private cloud services, in which case it held an estimated 33% total revenue share in 2021.¹⁰³ Moreover, as noted above, AWS’s revenue share has failed to grow for several years while revenue share has increased substantially for Azure and GC.

Second, contrary to some policymakers’ assertions¹⁰⁴, there is no compelling evidence of user lock-in on a systematic basis. Users do incur substantial costs when migrating from one provider to another, which involves moving data, porting code, and other nontrivial tasks. However, industry surveys repeatedly show that users—practically speaking, chief information officers (CIOs) or similarly sophisticated personnel at entities ranging from emerging firms to Fortune 500 corporations—anticipate lock-in and take steps to mitigate it by using multiple cloud providers. In surveys conducted in 2020 and 2021 by Flexera (the Flexera Surveys), a consulting firm, 92 percent of large organizations (1000 or more employees) and 89 percent of all organizations (a broader sample populated mostly by large organizations), respectively, reported using multiple cloud services.¹⁰⁵ In a 2021 survey of executives at 819 firms (with a more heterogenous mix of entity sizes based on number of employees) by Turbonomics (the Turbonomics Survey), an IBM consulting affiliate, 30% of respondents reported using at least two cloud services.¹⁰⁶ In a 2022 survey of executives at US information technology companies with at least \$500 million in annual revenues, it was reported that each firm used 2.7 cloud services on average and intended to use 3.1 services on average in the next 12 months.¹⁰⁷ The Turbonomics Survey, which was conducted in 2019, 2020, and 2021, found in each case that respondents reported avoiding user lock-in as the most important motivation.¹⁰⁸

User demand for multi-cloud strategies is reflected in the emergence of a rich secondary market of firms, brokers and other intermediaries that have developed tools and provide

¹⁰¹ See, e.g., *Blue Cross & Blue Shield United of Wisconsin v. Marshfield Clinic*, 65 F.3d 1406, 1411 (7th Cir. 1995), *accord* *Rebel Oil Co. v. Atlantic Richfield Co.*, 51 F.3d 1421, 1438 (9th Cir. 1995) (stating that “numerous cases hold that a market share of less than 50% is presumptively inefficient to establish market power”).

¹⁰² PHILLIP E. AREEDA AND HERBERT HOVENKAMP, *FUNDAMENTALS OF ANTITRUST LAW*, Vol. 1, 5-26 (2020-21 Supplement).

¹⁰³ Ron Miller, *Cloud infrastructure market soared to \$178B in 2021, growing \$49B in one year*, TECHCRUNCH, Feb. 4, 2022.

¹⁰⁴ See, e.g., MAJORITY STAFF REPORT, *supra* note 8, at 113. See also *supra* notes 91-96 and accompanying discussion.

¹⁰⁵ FLEXERA, 2022 STATE OF THE CLOUD REPORT 16 (2022) [hereinafter FLEXERA 2022]; FLEXERA, 2021 STATE OF THE CLOUD REPORT 10 (2021) [hereinafter FLEXERA 2021].

¹⁰⁶ TURBONOMICS, 2021 STATE OF MULTICLOUD 26 (2021), <https://www.ibm.com/downloads/cas/VKW3RNDP>. Among respondents, 40% were firms with over 5000 employees, 22% were firms with 1,000-4,999 employees, 19% were firms with 200-999 employees, and the remainder were smaller entities.

¹⁰⁷ OSTERMAN RESEARCH, STATE OF MULTI-CLOUD IDENTITY REPORT 5 (2022) (commissioned by Strata), https://www.strata.io/wp-content/uploads/2022/05/Strata-Identity_State-Multi-Cloud-Identity-Report-2022-Osterman-Research.pdf

¹⁰⁸ TURBONOMICS, *supra* note 106, at 7.

services to manage cloud data storage across multiple providers.¹⁰⁹ In particular, various firms (for example, VMWare and Nutanix) provide application software on a cross-platform basis that enables clients to allocate and manage different applications across different cloud platforms.¹¹⁰ Given the technical challenges involved in shifting data across providers¹¹¹, users tend to mitigate lock-in risk by allocating different applications to different providers, rather than using multiple providers for a single application.¹¹² However, trade commentary leaves no doubt that users have anticipated lock-in risk and actively seek mechanisms to mitigate it, which in turn has elicited technological and business-model innovations from third-party firms who compete to meet that demand. More generally, these market responses conform to Oliver Williamson’s classic statement of the hold-up problem (which logically encompasses lock-in risk in the cloud context), which postulated that firms would anticipate hold-up risk and undertake strategies to mitigate it. As Williamson suggested, this has a key implication for antitrust policy: hold-up risk is typically not a case of market failure necessitating regulatory intervention, but rather an anticipated contingency that elicits market solutions.¹¹³

Third, precisely because users cannot eliminate switching costs, any repeat-play cloud provider should have incentives *not* to act opportunistically in light of that anticipated constraint on data mobility. A repeat-play provider has incentives to act “reasonably” and accrue a stock of reputational goodwill that can be deployed to deter user migration, to encourage increased usage, and to recruit new users. A provider that extracted immediate gains by degrading the quality of service for existing clients—an observable signal of provider opportunism—would be short-sighted since it would likely sacrifice a far larger stream of future gains as a result of decreased usage by existing clients or lost usage from potential clients. Given that the cloud market is still in its relatively early stages, the number of potential clients that have not yet migrated to cloud-based data services is almost certainly far greater than the number of existing clients. The same is true of applications and associated data flows that existing clients have not yet moved from on-premises infrastructure to cloud-based services as well as other applications that those clients may develop in the future.¹¹⁴

Given these anticipated future revenue streams from a largely untapped market, a counterintuitive conclusion follows. Repeat-play cloud providers may have incentives not only to avoid acting opportunistically toward existing “locked-in” users but to provide

¹⁰⁹ Pieter-Jan Maenhaut, Bruno Volckaert, Veerle Ongenaë, and Filip De Turek, *Resource Management in a Containerized Cloud: Status and Challenges*, 28 J. NETWORK & SYSTEMS MGMT. 197 (2020); Adam Zeck and Jack Bouroudjian, *Real-World Exchange with a Multicloud Exchange*, IEEE CLOUD COMPUTING (July/August 2017).

¹¹⁰ PHILIP TRAUTMAN, HYBRID AND MULTICLOUD MANAGEMENT 2-6 (O’Reilly 2021); Ion Stoica and Scott Shenker, *From Cloud Computing to Sky Computing*, in PROCEEDINGS OF THE WORKSHOP ON HOT TOPICS IN OPERATING SYSTEMS 26-32 (2021).

¹¹¹ TRAUTMAN, *supra* note 110, at 20-21.

¹¹² The Flexera Survey conducted in 2021 found that multi-cloud strategies are most often implemented by allocating different applications to different providers, although a significant percentage of large-firm users reported allocating data flows across multiple providers for purposes of disaster recovery and data integration, see FLEXERA 2022, *supra* note 105, at 18.

¹¹³ OLIVER E. WILLIAMSON, *MARKETS AND HIERARCHIES: ANALYSIS AND ANTITRUST IMPLICATIONS* (1983). Specifically, Williamson argued that antitrust enforcers had intervened mistakenly to impede various forms of vertical integration, reflecting a failure to appreciate that these structures were efficient responses to anticipated hold-up, rather than a source of market power.

¹¹⁴ MCKINSEY DIGITAL, *Cloud’s trillion-dollar prize is up for grabs*, February 2021, <https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/clouds-trillion-dollar-prize-is-up-for-grabs>

prospective users with assurance *against* lock-in risk. These “fair play” incentives are consistent with theoretical models of reputational effects in repeat-play environments¹¹⁵ as well as previous research in which I found that technology platforms in pre-digital environments often took costly actions (including relinquishing control over “crown jewel” technologies) to provide users with a credible commitment against lock-in risk.¹¹⁶

Continuing this pattern in the cloud computing market, some providers in the IaaS public cloud segment now offer tools to execute multi-cloud strategies that lower users’ expected switching costs. In particular, Google developed and, in 2014, released under an open-source license the Kubernetes platform, a “containerization” software application that acts as a provider-agnostic “abstraction layer” that facilitates allocating and managing data and applications across different cloud platforms.¹¹⁷ This has in turn spawned the emergence of software platforms and related containerization tools that facilitate (among other purposes) multi-cloud data-management and data-storage strategies.¹¹⁸ There are several examples. Red Hat (a subsidiary of IBM, a late entrant into the IaaS segment) describes how its software enables clients to use “a provider-agnostic Kubernetes platform on top of multicloud infrastructure” and further explains how this “multi-cloud strategy . . . frees them [customers] from cloud-provider lock-in . . .”¹¹⁹ Similarly, Google offers the Anthos platform, which it describes as a tool for enabling data storage concurrently through GC, AWS, and Azure and on-premises systems.¹²⁰ While this marketing language may overestimate these services’ effectiveness in facilitating multi-cloud data management, the emergence of these tools reflects a market dynamic in which users anticipate lock-in risk and firms compete to develop services to mitigate that risk.

Pricing, Output, and Quality

If it is true that the cloud computing ecosystem is converging toward an entrenched monopoly outcome, it would be expected that it would exhibit symptoms of market failure in the form of some combination of increasing prices, declining growth, or faltering innovation. Available evidence does not favor this thesis. The Majority Staff Report observes that per-usage prices for IaaS services have *decreased* since the inception of the industry, declining in the case of AWS—the cloud provider to which market power is typically attributed—by almost 50% from October 2013 to March 2018.¹²¹ Detailed analysis by industry analysts

¹¹⁵ Benjamin Klein and Keith B. Leffler, *The Role of Market Forces in Assuring Contractual Performance*, 89 J. POL. ECON. 615 (1981).

¹¹⁶ This form of rational altruism is repeatedly observed in platform markets. For discussion, see Jonathan M. Barnett, *The Host’s Dilemma: Strategic Forfeiture in Platform Markets*, 124 HARV. L. REV. 1861 (2011).

¹¹⁷ KUBERNETES, *What is Kubernetes?*, <https://kubernetes.io/docs/concepts/overview/what-is-kubernetes/>; *Cloud Controller Manager*, <https://kubernetes.io/docs/concepts/architecture/cloud-controller/>. A leading software provider defines containerization as “the packaging together of software code with all its necessary components like libraries, frameworks, and other dependencies so that they are isolated in their own ‘container,’” see RED HAT, *What is containerization?*, <https://www.redhat.com/en/topics/cloud-native-apps/what-is-containerization>.

¹¹⁸ TRAUTMAN, *supra* note 110. For data on large and small firms’ use of various container tools, see FLEXERA 2022, *supra* note 105, at 53-54; TURBONOMICS, *supra* note 108, at 12-13.

¹¹⁹ Alex Handy, *Customer realize Multi-Cloud benefits of Open Shift*, RED HAT BLOG, March 19, 2020, <https://www.redhat.com/blog/customers-realize-multi-cloud-benefits-of-openshift>

¹²⁰ Arun Ananthampalayam, *Three ways Google Cloud delivers on hybrid and multicloud, today*, GOOGLE CLOUD, Dec. 16, 2020, <https://cloud.google.com/blog/topics/hybrid-cloud/three-ways-google-cloud-delivers-hybrid-and-multicloud-today>. For similar observations, see Yifat Perry, *Google Anthos: The First True Multi Cloud Platform?*, NETAPP, Mar. 18, 2021, https://cloud.netapp.com/blog/gcp-cvo-blg-google-anthos-the-first-true-multi-cloud-platform#h_h7.

¹²¹ MAJORITY STAFF REPORT, *supra* note 8, at 115-116.

covering more recent years make similar observations.¹²² Note that, in relatively new technology markets such as cloud computing, nominal declines in prices inherently *understate* quality-adjusted price declines given concurrent improvements in functionality.

This price decline took place concurrently with the emergence of Azure, GC and other providers as effective challengers in the IaaS public cloud segment. Contrary to the attribution of “unquestioned leadership” to AWS in the 2020 Majority Staff Report¹²³, the 2021 Turbonomics Survey found that Azure had overtaken AWS as the leading provider in the public IaaS segment, having been adopted by 67% of respondents (encompassing large and small firms), as compared to 57% for AWS.¹²⁴ The Flexera Survey conducted in 2021 found that AWS and Azure had secured approximately comparable adoption rates among large firms (more than 1000 employees): 77% for AWS and 80% for Azure.¹²⁵ Additionally, Oracle Cloud and IBM Cloud had secured adoption among 27% and 25% of large-firm users, respectively. Among small to medium-size entities (less than 1000 employees), the 2021 Flexera Survey found that AWS had been adopted by 69% of users, as compared to 59% for Azure, 43% for GC, 28% for Oracle Cloud, and 24% for IBM Cloud.¹²⁶ (In all surveys, the total exceeds 100% because many firms use both services concurrently.) These figures suggest a real-world market composition that departs substantially from the winner-take-all scenario reflexively assumed by some policymakers and commentators.

During this same period, the worldwide public cloud segment as a whole has grown rapidly, increasing according to one estimate from \$66 billion in total expenditures on IaaS and PaaS services as of 2018 to an estimated \$153 billion as of 2022.¹²⁷ For 2021, Gartner reported a 41.4% increase in revenues for the worldwide public IaaS market.¹²⁸ Additionally, quality has improved due both to technological innovations and substantial investment by major cloud providers in data centers, network edge locations, and fiber optic and subsea transmission networks, resulting in reduced latency times and increased network bandwidth.¹²⁹ The combination of declining prices, expanding output, increasing quality, and the entry of well-resourced competitors does not favor the view that the cloud ecosystem is characterized by an entrenched monopoly in which dominant providers exercise market power over “locked-in” users.

¹²² Rachel Stephens, *IaaS Pricing Patterns and Trends 2021*, REDMONK, Dec. 17, 2021, <https://redmonk.com/rstephens/2021/12/17/iaas-pricing-2021/> (observing that “variability in pricing patterns for a given resource (disk, compute, memory) has largely converged across the industry” during 2012-2022); Caroline Donnelly, *Public cloud competition prompts 66% drop in prices since 2013, research reveals*, COMPUTERWEEKLY.COM, Jan. 12, 2016, <https://www.computerweekly.com/news/4500270463/Public-cloud-competition-results-in-66-drop-in-prices> (observing a 66% decline in prices for “entry-level” cloud computing services during 2013-2015).

¹²³ See *supra* note 100.

¹²⁴ TURBONOMICS, *supra* note 108, at 26.

¹²⁵ FLEXERA 2022, *supra* note 105, at 64.

¹²⁶ *Id.*, at 66.

¹²⁷ T4, CLOUD COMPUTING MARKET SHARE, <https://www.t4.ai/industry/cloud-computing-market-share>

¹²⁸ GARTNER, *Gartner Says Worldwide IaaS Cloud Services Market Grew 41.4% in 2021*, June 2, 2022.

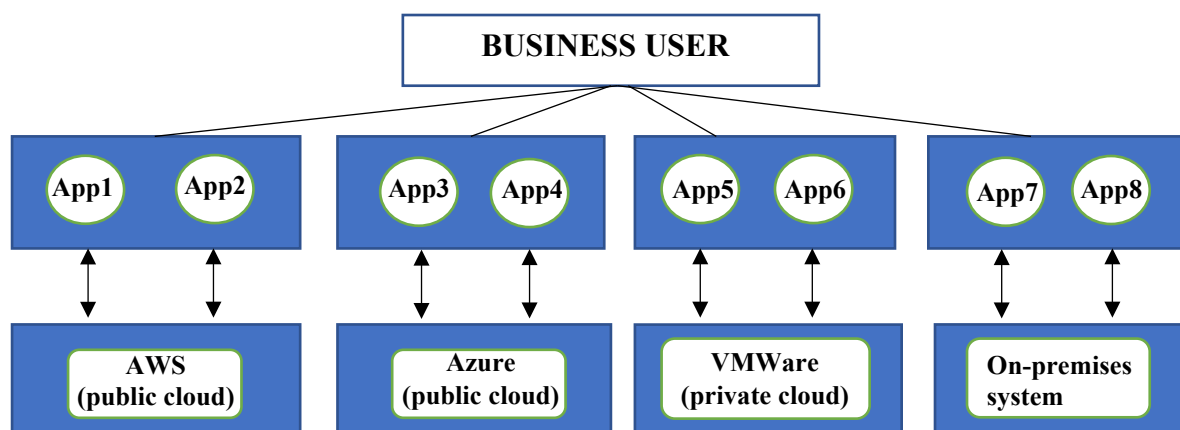
¹²⁹ Jeffrey Burt, *Google Muscles Its Way Into Datacenters, Attacks from the Edge*, THENEXTPLATFORM, Oct. 14, 2021, <https://www.nextplatform.com/2021/10/14/google-cloud-muscles-its-way-into-datacenters-attacks-from-the-edge/>; Robert Hult, *Top 12 Technology Trends: Rise of the Data Center to Cloud and Edge Computing*, CONNECTORSUPPLIER, Oct. 20, 2020, <https://www.connectorsupplier.com/top-12-trends-rise-of-the-data-center-to-cloud-and-edge-computing/>

Hybrid Cloud Environments

The ability to allocate cloud service consumption across multiple cloud providers challenges the unqualified assumption that the cloud computing market is prone to a winner-take-all monopoly outcome. This assumption falters even further if we take into account the full “option set” from which CIOs may select when seeking to optimize the mix of storage, computing, and networking services across an entity’s suite of software applications and associated data flows. That option set includes not only public cloud services but also, private cloud services and traditional on-premises computing and storage infrastructure.¹³⁰ Based on responses in the Flexera Surveys (which principally surveyed large organizations) concerning the reported use of private cloud providers, concentration levels appear to be substantially lower in this segment as compared to public cloud services. Leading providers, as indicated by user adoption, include AWS, Microsoft Azure, VMWare, RedHat (owned by IBM), and Google.¹³¹ The Flexera Survey conducted in 2021 found that 80% of respondents reported using at least one public and one private cloud services while all respondents still made substantial use of on-premises infrastructure.¹³²

These findings suggest a real-world cloud environment that departs significantly from the stylized model of user lock-in and cloud monopoly that seems to drive concerns about purported risks to competition in this industry. As depicted in the Figure below, it appears that users (and in particular, larger users) typically operate in a hybrid data-storage and management ecosystem in which CIOs select from competing providers to construct combinations of public cloud, private cloud, and on-premises services, all of which is facilitated by third parties (not shown in the Figure) that provide software tools to manage applications and data flows across this complex portfolio. It is hard to see how any single provider can reasonably exert pricing power in this environment.

Figure 3. Structure of a Hybrid Cloud Services Portfolio (Representative)



Notes: Solid lines denote data-management decisions by business user. Arrows denote data flows. Specific providers are selected for representative purposes only.

¹³⁰ TRAUTMAN, *supra* note 110, at x.

¹³¹ FLEXERA 2022, *supra* note 105, at 76; FLEXERA 2021, *supra* note 105, at 64.

¹³² FLEXERA 2022, *supra* note 105, at 21, 28.

Product Differentiation

Cloud services are not a homogeneous good. Different services have different technological strengths and weaknesses, offer different packages of PaaS and SaaS services and other complementary applications, or offer different levels of technical support or data security. For example, Azure can offer integration with Microsoft’s Office and Teams applications and may therefore be preferred for office productivity applications, GC may be preferred for applications that exploit Google’s recognized lead in machine learning and artificial intelligence technologies, and AWS is well-suited to gaming or video-intensive applications.¹³³ Intense competition over pricing and quality in the IaaS market compels cloud service providers to capture market share through a differentiation strategy consisting of PaaS and other complementary “add-on” services. Providers can tailor packages of IaaS, PaaS and other complementary services to certain types of industries (for example, certain cloud providers focus on healthcare, retail, or financial “verticals”).¹³⁴ Additionally, cloud providers differ in the number of physical data centers that they maintain, the locations of those centers, and the transmission network among data centers¹³⁵, which can impact latency in data transmission for end-users of clients’ websites.

The fact that firms can offer different types of cloud services, as well as different combinations of cloud and complementary non-cloud services, has three important implications for evaluating competitive conditions in this market.

First, it suggests that the relevant market extends beyond the IaaS segment of the cloud ecosystem (or specifically, the IaaS public cloud segment), on the basis of which regulators and commentators have expressed concerns that the cloud services market exhibits high levels of concentration and therefore high levels of antitrust risk. Rather, the relevant market may encompass some combination of IaaS, PaaS, and certain SaaS services, in which case concentration levels may fall to levels that are unlikely to raise competition concerns. Note that these bundles are sometimes composed not only of services offered by a single firm (for example, Microsoft Azure, Teams and Office) but can be offered through partnerships formed between firms that specialize in different levels of the cloud market. For example, VMWare, a leading provider in the private cloud and PaaS segments, has a partnership with AWS known as “VMWare on AWS Services”, while its competitor, RedHat (owned by IBM) has a partnership with Azure known as “Red Hat OpenShift on Azure.” In short: nominal boundaries between different segments of the cloud computing “stack”—a broad and fluid mix of products and services ranging from IaaS public cloud services to on-premises infrastructure—are porous as a practical matter and therefore confining the relevant services market to the IaaS public cloud segment (the focus of antitrust policy discussions) is unlikely to track competitive realities.

Second, when services are not homogeneous, that tends to reduce the likelihood of a winner-take-all outcome since the user population will disperse across providers based on the distribution of user preferences for different services bundles. That is: even if scale economies enable a single provider to offer a particular type of cloud service at the lowest cost, this does not foreclose entry by other firms who can offer alternative types of cloud services, or different combinations of cloud and non-cloud services, tailored to the preferences of different user populations. The product differentiation observed in cloud

¹³³ I thank Lew Zaretzki for this observation.

¹³⁴ FLEXERA 2021, *supra* note 105, at 61-63. On search “verticals,” see Larry Dignan, *Top cloud providers: AWS, Microsoft Azure, and Google Cloud, hybrid, SaaS players*, ZDNET, Dec. 22, 2021,

<https://www.zdnet.com/article/the-top-cloud-providers-of-2021-aws-microsoft-azure-google-cloud-hybrid-saas/>

¹³⁵ FLEXERA 2021, *supra* note 105, at 30.

services, and service providers' ability to provide different combinations of IaaS, PaaS and certain SaaS services, casts doubt on views that these providers compete in a market that inherently converges on a single firm and therefore poses a high level of antitrust risk.

Third, high levels of concentration in IaaS and PaaS public cloud segments may not be a cause for concern as a matter of competition policy if this is a precondition for efficiently providing a technological infrastructure that promotes the development of an expanding pool of complementary services in the SaaS segment of the cloud ecosystem. In contrast to the IaaS and PaaS segments, where AWS, Azure and, to a lesser extent, GC each have significant revenue share, the SaaS segment exhibits a high level of fragmentation across services offered by thousands of providers worldwide.¹³⁶ Rather than representing a competitive danger, consolidation in the infrastructural segments of the cloud computing ecosystem promotes the emergence of a handful of standardized hubs that support a dynamic population of differently sized providers in specialized software segments. Contrary to the concerns raised by some regulators and commentators, the high concentration levels in the IaaS and PaaS segments of the cloud services ecosystem generate economies of scale that lower entry costs for specialized SaaS providers, which supply a rich inventory of tailored cloud-enabled applications. Any attempt to impose an alternative market structure would counterproductively undermine this efficient division of labor that has emerged organically within the cloud-based ecosystem in response to the free play of competitive forces.

Summary

Upon closer inquiry, the cloud computing ecosystem lacks the characteristics that are necessary to support the now-standard expectation that a platform market is inherently prone to a monopoly outcome in which one or two providers can dictate pricing and other terms at will. Contrary to the theoretical model of user lock-in and monopoly entrenchment adopted uncritically by some policymakers and commentators, the IaaS and PaaS segments of the cloud ecosystem are led by repeat-play providers that face users who can migrate partially or entirely to competing services (or retain on-premises substitutes), which in turn incentivizes providers to offer attractive combinations of price and non-price terms and associated functionalities that induce usage of cloud services. This can explain the otherwise paradoxical outcome in which the public cloud ecosystem is characterized concurrently both by high concentration levels and vigorous competition among leading providers. (Note that this is the same “paradoxical” structure that was observed in the FDS ecosystem.)

False-Positive Enforcement Costs in Cloud Computing

Given the stark discrepancy between regulatory diagnosis and real-world facts in assessing the cloud computing market, it appears that some policymakers and commentators have reverted to a once-defunct mode of antitrust analysis in which market power is inferred from market share with minimal inquiry into offsetting factors that may preserve competitive discipline.¹³⁷ At the same time, some of those same regulators and commentators have argued that excessive attention has been paid to the error costs of “false positives” in antitrust enforcement. The cloud computing shows why both positions are misguided.

Cloud computing illustrates the importance of examining *actual* competitive conditions and, in particular, whether the relevant real-world market meets the criteria necessary to support a

¹³⁶ One estimate found that no single provider had greater than a 9% revenue share of the SaaS segment, as of 2019. T4, *infra* note 127.

¹³⁷ On this point, see Elyse Dorsey, *Anything You Can Do, I Can Better—Except in Big Tech? Antitrust's New Inhospitability Tradition*, 68 KANSAS L. REV. 975 (2021).

plausible claim of market power—in the absence of which any monopolization claim is *implausible*. Moreover, even if market power has been established, it is necessary to take into account offsetting efficiencies to assess whether a contested practice may on balance nonetheless have a net positive effect on competitive conditions. In the cloud computing ecosystem, failure to undertake a balancing analysis (as implemented in US law through the various forms of the rule of reason¹³⁸) can yield false-positive interventions that place at risk two significant categories of efficiency gains that this market has conferred on tens of thousands of firms and billions of end-users across an impressively broad range of industries.

First, cloud computing has enabled firms to make more efficient “make/buy” choices by providing a technology that permits firms to outsource data storage and management when this can be done more efficiently by a third-party provider. To the extent there is sufficient competition in the relevant end-user market, this expansion of transactional choice translates into lower prices for consumers, reflecting firms’ lower operational costs. Hence, it may be the case that Netflix can charge subscribers lower prices since it can store and transmit data more efficiently by employing the services of cloud providers. Second, the emergence of cloud computing has lowered entry costs for smaller firms in downstream product and services markets. Otherwise those firms would have had to incur the significant capital expenditures that are necessary to assemble and maintain an on-premises data-storage infrastructure. At the startup stage, firms such as DoorDash and Grubhub would have faced far higher entry barriers absent the ability to lease data storage and management services from external providers that could execute those tasks more efficiently by spreading costs across a large pool of clients.

Any unnecessary intervention in cloud computing services on antitrust grounds risks reversing these efficiency gains, which extend well beyond the cloud computing ecosystem to encompass a wide range of applications that are enabled by cloud-based data storage and management services. The error costs of antitrust enforcement on the basis of conjectural assertions can be illustrated by two practices in the cloud computing market, each of which has been identified by some regulators and commentators as posing a high risk of competitive harm. Closer scrutiny shows that these views overlook several countervailing factors that cast significant doubt on this assessment.

Bundling

Both the CISPE Report and the EU Commission Report claim that cloud providers are impeding competition by bundling cloud services with providers’ existing software services, which are purportedly being used as “leverage” in negotiations with prospective and existing customers.¹³⁹ Additionally, both reports suggest that bundling can raise entry costs by compelling entrants to match the multi-component package being offered by incumbents.¹⁴⁰ When confronted with real-world market conditions, these claims have several vulnerabilities.

Since the IaaS segment currently supports multiple providers and users can multi-home (and therefore, as discussed, no single firm plausibly wields monopoly power), it appears unlikely that bundling strategies could be used for anticompetitive purposes. Any user is free to compare bundling options offered by the three leading firms (AWS, Azure, GC) along with additional well-resourced and well-expertised entrants (Oracle and IBM). Moreover, firms

¹³⁸ For a classic discussion of the various forms of the rule of reason, see *California Dental Ass’n v. FTC*, 526 U.S. 756 (1999).

¹³⁹ CISPE REPORT, *supra* note 96, at 5-6, 24-25, 32; COMMISSION REPORT, *supra* note 95, at 15, 22.

¹⁴⁰ CISPE REPORT, *supra* note 96, at 7, 24; COMMISSION REPORT, *supra* note 95, at 15.

can “hedge against” provider opportunism through a multi-cloud strategy that comprises different bundles of public cloud, private cloud, and on-premises services.

Bundling may raise entry costs for firms that offer a “stand-alone” service in a particular segment of the cloud computing stack and cannot use intellectual property rights, secrecy, or some other strategy to impede imitation.¹⁴¹ Yet this potential impediment to entry in this particular context must be balanced against three countervailing effects. First, bundling can provide users with enhanced functionalities to the extent that a provider can integrate its cloud and non-cloud services in a single service package, accompanied by technical support and warranty coverage. Second, entrants can sometimes construct service bundles through partnerships with other firms, as illustrated by the previously discussed alliances between, on the one hand, PaaS and private cloud providers such as VMWare and RedHat, and, on the other hand, IaaS providers such as AWS and Azure. Third, bundling may enable entrants to challenge incumbents by offering a differentiated combination of cloud and non-cloud services. Puzzlingly, the CISPE Report expresses concern over the entry into the cloud-computing services industry of large firms such as Cisco and Oracle because they may “try to leverage their presence in adjacent software segments.”¹⁴² It would appear to be a welcome, not a lamentable, development that well-resourced and technically sophisticated firms have entered the cloud computing ecosystem and can potentially compete with incumbents by offering a differentiated suite of integrated cloud and non-cloud services.

Egress Fees

Regulators and some commentators have asserted that the “egress fees” assessed by cloud providers when a customer withdraws stored data impede users from switching to other providers and are therefore a means to deter entry.¹⁴³ To evaluate this interpretation, it should be clarified that transferring data is not costless, which explains why IaaS cloud providers typically assess egress fees not only on data withdrawals at the end of service but on data transfers across geographic regions within the same provider. There are two reasons why the widespread use of egress fees most likely does not raise antitrust concerns.

First, for the reasons discussed throughout, it does not appear that any individual cloud provider has the ability to raise fees without being exposed to competitive discipline. Hence, any provider that assesses an egress fee must take into account that doing so may dissuade existing users from expanding usage, may dissuade new users from adopting its service, or may lead users to avoid egress fees by retaining data on-premises. Consistent with this explanation, industry analysts note that cloud providers compete on egress fees (with some providers removing fees on smaller amounts of data and others eliminating them altogether)¹⁴⁴—an observation that cannot be reconciled with the view that providers “impose” egress fees on allegedly locked-in users. Relatedly, if egress fees are viewed as part of a total lifetime fee package (comprising per-use fees assessed continuously and egress and other fees assessed for particular transactions), providers that impose an apparently

¹⁴¹ On the function played by intellectual property rights in facilitating entry by innovators of stand-alone technologies in markets populated by vertically or systems-integrated firms, see JONATHAN M. BARNETT, *INNOVATORS, FIRMS, AND MARKETS: THE ORGANIZATIONAL LOGIC OF INTELLECTUAL PROPERTY* (2021). For the classic treatment of strategies firms can use to protect innovations through a portfolio of IP and non-IP-based strategies, see David J. Teece, *Profiting from technological innovation: Implications for integration, collaboration, licensing, and public policy*, 15 RES. POL’Y 285 (1986).

¹⁴² CISPE REPORT, *supra* note 96, at 51.

¹⁴³ MAJORITY STAFF REPORT, *supra* note 6, at 117-118. For related discussion, see Belle Lin, *Amazon’s Next Cloud Battleground is Over Egress Fees*, BUSINESS INSIDER, Oct. 5, 2021.

¹⁴⁴ Stephens, *supra* note 122 (noting “an emerging battle around egress costs, both between direct cloud competitors (like Oracle) and adjacent categories (like Cloudflare)”).

higher egress fee might impose a lower fee on other elements of the package of cloud and non-cloud services (and *vice versa*). That is: any potential entry-deterrent effect attributable specifically to egress fees cannot be evaluated without assessing the remainder of the total lifetime fee package (and must also take into account users' ability to construct a portfolio of cloud providers, each of which offers different service bundles and associated fee packages).

Second, egress fees may operate as a cost-recovery device. Cloud providers must incur costs to recruit a new customer and then assist the customer in migrating its data to the cloud and familiarizing the customer with the provider's services. This may explain why cloud providers report that a new client relationship typically only results in profitability after the ninth or tenth month.¹⁴⁵ Egress fees may be a necessary mechanism to protect the provider against anticipated losses in the event a client reduces or terminates usage prior to the recovery of the provider's acquisition costs. This is not a costless solution, however, since egress fees may discourage users from adopting or expanding use of the provider's services. Hence, a provider will select a fee that trades off the reduced revenues it potentially suffers from assessing the fee and the customer acquisition costs that it would be unable to recover without it (attenuated as described above by reductions it can offer on other elements of the total lifetime fee package associated with the relevant service bundle).

Conclusion

There is a large and overlooked gap between prevailing views among some policymakers, scholars, and commentators, on the one hand, and "facts on the ground" in real-world platform markets, on the other hand. Based on theoretical analysis, empirical tendencies in various platform markets, and detailed examination of competitive conditions in the food-delivery and cloud-computing ecosystems, there does not appear to be persuasive support for the common view that platform markets inherently converge on entrenched monopoly outcomes. Rather, it appears more likely to be the case that a digital "monopoly"—understood properly as a market in which a single firm or a handful of leading firms exert durable pricing power—is an exceptional (but certainly not excludable) case in platform environments. Given these considerations, a preemptive approach based on rigid bright-line rules—the approach currently favored by most competition regulators and some legislators in commercially significant jurisdictions—rests on weak grounds and poses a high risk of false-positive errors. Rather, theory and evidence support the case-specific and fact-intensive approach long employed by regulators and courts in competition law, especially US federal antitrust law. Contrary to increasingly conventional wisdom that platform markets necessarily converge on monopoly outcomes, which would justify regulatory action to preclude that eventuality, both theory and empirics favor the conventional approach that limits intervention to specific cases in which there is compelling evidence, rather than a mere assumption, of actual or likely competitive harm.

¹⁴⁵ Michael Heric, Dianne Ledingham, Stephen Bertrand, and Mark Brinda, *Selling the cloud* (Bain & Company 2012), https://media.bain.com/Images/BAIN_BRIEF_Selling-the-cloud.pdf