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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 assumed. 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 (US), European Union (EU), China, the United Kingdom (UK) and other jurisdictions have adopted, or have advocated, some of the most significant changes to antitrust and competition law in several decades.¹ 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 EU, 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 substantial portions of the digital economy—including the platforms² that often act as the coordinating hub of digital technology and content ecosystems—under a standing regime of regulatory investigation, enforcement, or waiver.

These dramatic interventions rest on the assertion—what I will call the “platform monopoly” thesis—that leading digital platforms typically enjoy market power and regularly exercise that power to harm competition. 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. Absent competitive discipline, incumbents are therefore free to increase prices or reduce quality at will. If those assumptions are 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, some regulators and scholars argue that digital 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 draw on the existing antitrust and economics literature to identify clearly the conditions under which a leading digital platform would plausibly be in a position to exercise pricing power.⁴ Contrary to increasingly common tendencies among regulators, legislators,

¹ “Antitrust law” and “competition law” are used interchangeably in this paper.

² As used in this article, “platforms” refers to entities that play a coordinating role that facilitates transactions between two or more user populations in a digital ecosystem, typically by matching buyers with sellers (for example, Amazon or eBay in the e-commerce market) or matching users of “free” services with suppliers of complementary paid services (for example, ad-supported search or social networking services). For a similar definition, see DAVID S. EVANS AND RICHARD SCHMALANSEE, *MATCHMAKERS: THE NEW ECONOMICS OF MULTISIDED PLATFORMS* 10, 15, 21-22(2016).

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 For classic economic analyses of competitive conditions in platform markets, see Joseph Farrell and Paul Klemperer, *Coordination and lock-in: Competition with switching costs and network effects*, IN *HANDBOOK OF INDUSTRIAL ORGANIZATION* Vol. 3, 1967-2072 (eds. Mark Armstrong and Robert Porter 2007); Michael Armstrong, *Competition in two-sided markets*, 37 RAND J. ECON. 668 (2006); Jean-Charles Rochet and Jean Tirole, *Platform competition in two-sided markets*, 1 J. EUR. ECON. ASSOC. 990 (2003). For a recent review of

and some scholars to reflexively attribute market power to leading digital platforms⁵, the economics literature identifies specific circumstances in which a platform is likely to exercise market power for an appreciable period of time. Moreover, even when market power can be attributed to a particular platform, a net welfare analysis requires balancing any adverse competitive effects arising from the platform’s exercise of market power against the transaction-cost savings and other efficiencies arising from the platform’s economies of scale and scope. I also review evidence concerning market power in the mobile communications and social networking markets, which suggests that dominant platforms often face competitive threats and can rapidly lose market leadership to innovative entrants.

In the aggregate, theoretical and empirical considerations disfavor the view that a leading platform inherently enjoys durable market power, although it may enjoy high market share for certain periods of time.⁶ To be clear, this does not exclude the possibility that in particular cases a platform can secure market power and it is therefore necessary to inquire whether any apparently dominant platform exercises market power and is using anticompetitive means to maintain it. In other cases, it may be appropriate to inquire whether a platform is employing anticompetitive practices in an attempt to secure market power and has a sufficient likelihood of achieving that outcome.⁷

In Parts II and III, I examine the extent to which the platform monopoly thesis provides a reliable account of competitive conditions in the food-delivery and cloud computing markets. Following theoretical presumptions and anecdotal observations, both markets have been characterized as platform monopolies that require preemptive intervention by competition regulators or other authorities, resulting in caps being imposed by certain US cities on commissions paid by restaurants to delivery platforms, challenges by EU and UK competition regulators to acquisitions in the food delivery market, and investigations by US, EU and UK competition regulators in the cloud computing market. In both cases, I find that real-world markets exhibit characteristics that challenge the widespread attribution of market power to leading platforms.

In food delivery, any market-power assertion is challenged by two inconvenient facts: consumers and vendors can easily switch among providers and every major platform remains

the literature, see Joost Rietveld and Melissa A. Schilling, *Platform Competition: A Systematic and Interdisciplinary Review of the Literature*, 47 J. MGMT. 1528 (2021).

⁵ Other scholars have expressed different levels of concern over the rush to condemn platform markets without specific evidence of market power and anticompetitive practices, see e.g., Carl Shapiro, *Regulating Big Tech: Factual Foundations and Policy Goals*, NETWORK L. REV. (Feb. 15, 2023), <https://www.networklawreview.org/shapiro-big-tech/> [hereinafter Shapiro 2023]; Pinar Akman, *A Web of Paradoxes: Empirical Evidence on Online Platform Users and Implications for Competition and Regulation in Digital Markets*, 16 VA. L. & BUS. REV. 217 (2022); Herbert Hovenkamp, *Antitrust and Platform Monopoly*, 130 YALE L. J. 1952 (2021); Carl Shapiro, *Antitrust in a Time of Populism*, 61 INT’L J. IND. ORG. 714 (2018) [hereinafter Shapiro 2018]. Relatedly, David Teece and Nicolas Petit argue that large tech platforms often lack durable market power and are engaged in oligopolistic competition with each other across industries, see NICOLAS PETIT, *BIG TECH AND THE DIGITAL ECONOMY: THE MOLIGOPOLY SCENARIO* (2020); Nicolas Petit and David Teece, *Innovating Big Tech Firms and Competition Policy: Favoring Dynamic over Static Competition*, IND. & CORP. CHANGE 1 (2021).

⁶ This argument is hardly novel. The economics literature has long recognized that high concentration levels do not necessarily reflect entry barriers that confer monopoly power but rather, may reflect incumbents’ superior 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).

⁷ Under Section 2 of the Sherman Act (as interpreted by federal case law), a cause of action for attempted monopolization requires showing anticompetitive conduct, a “specific intent” to monopolize, and a “dangerous probability” of achieving monopolization of the relevant market, see *Spectrum Sports v. McQuillan*, 506 U.S. 447, 459 (1993).

unprofitable since the market’s inception almost two decades ago. In cloud computing, standard assertions that leading providers exert market power due to user lock-in are difficult to reconcile with the fact that users widely adopt multiple cloud services and much of the potential user population has not yet adopted (or fully adopted) cloud services, leaving much of the market open to competition. Contrary to common assertions, neither market persuasively 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. While restricted to two markets, these findings cast doubt on the assumption that platform markets are inherently prone to entrenched winner-take-all outcomes that necessitate preemptive intervention by regulatory authorities.

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, as illustrated by several prominent expert reports. The “Furman Report,” presented in 2019 to the UK Competition and Markets Authority (CMA), states that “[t]he barriers to entry that exist in established digital platform markets mean that they cannot generally be considered freely contestable.”⁸ The “Stigler Report,” released in 2019 by the Stigler Center for the Study of the Economy and the State at the University of Chicago, states 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”⁹ The Majority Staff Report issued in 2020 by the Committee on the Judiciary of the US House of Representatives (Majority Staff Report) states 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.”¹⁰ A report released by the European Commission’s Joint Research Center in 2021 asserts that digital platform markets “have the tendency . . . to assume natural monopoly or near-natural monopoly features . . . [which] makes actual competition difficult to sustain.”¹¹ 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 dynamics,” although it more modestly counsels against “dramatic reform of competition law and policy.”¹²

Mere repetition does not make a proposition true. As Pinar Akman observes, scholarship and commentary on antitrust issues in platform markets still tends to lack “robust, first-hand and systematic empirical evidence.”¹³ The platform monopoly thesis is an intellectual and rhetorical shortcut that can lead to unsupported claims of market failure. Antitrust scholarship and commentary are filled with premature assertions that certain platform leaders were shielded from competition, including Yahoo! (internet search), eBay (e-commerce), AOL (internet service portal), Blackberry (mobile communications device), Sony (mobile MP3 player), and Atari (video games). Determining at a reasonable level of confidence whether a leading platform likely exercises durable market power requires detailed analysis of a particular market, rather than making sweeping assertions that platform markets in general converge on durable monopoly outcomes. This methodological point is substantively critical since it has often been overlooked or rejected in current enthusiasm for proposed and

⁸ UNLOCKING DIGITAL COMPETITION: REPORT OF THE DIGITAL COMPETITION EXPERT PANEL 39 (2019).

⁹ STIGLER REPORT, *supra* note 3, at 8.

¹⁰ MAJORITY STAFF REPORT, COMMITTEE ON THE JUDICIARY, U.S. HOUSE OF REPRESENTATIVES 37 (2020) [hereinafter MAJORITY STAFF REPORT].

¹¹ 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).

¹² OECD, OECD HANDBOOK ON COMPETITION POLICY IN THE DIGITAL AGE 17, 21 (2022).

¹³ Akman, *supra* note 5, at 220.

enacted reforms that would discard the market power predicate for finding antitrust liability in the case of large digital platforms. That dramatic departure from antitrust law and practice has little reasonable grounding in theory or empirics.

A. 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. When a firm has a large market share and enjoys a shield against entry, it can exercise market power by raising price, reducing output or diminishing quality (or failing to reduce cost or improve quality through innovation).¹⁴ Under competitive conditions, firms are deterred from taking such actions. The reason is straightforward: any firm that increases price, degrades quality, or underinvests in innovation will induce consumers to shift demand to competitors that offer lower-priced, higher-quality, or more innovative products (or will induce entry by competitors who can do so).¹⁵ The platform monopoly thesis therefore implies that leading firms in digital markets typically operate behind entry barriers that largely suppress those competitive threats. This argument relies in turn on the view that digital platform markets exhibit four characteristics that inherently drive these markets toward durable monopoly outcomes that result in consumer harm. Closer examination shows that only one of these four characteristics is typically or necessarily satisfied in this context.

1. *Characteristic #1: Network Effects*

It is widely and correctly 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, suppose a new operating system (OS) is released to the market. The value of the OS increases as the total number of users increases (direct network effects) and as the number of applications released by developers for the OS increases (indirect network effects). Network effects drive the economic value generated by the OS but constitute a barrier to entry insofar as, once a particular OS secures sufficient adoption, users are reluctant to migrate to a competing OS that has not yet acquired a comparable population of users and applications. Any firm that develops a new OS faces an entry barrier since, absent a substantial price savings or quality improvement, no user is inclined to adopt a new OS unless it can replicate the number of users and apps associated with the prevailing OS. This is reinforced by the fact that developers are disinclined to write applications for a new OS since it inherently lacks a significant user base upon entry.

This line of argument drove the Supreme Court’s reasoning in *U.S. v. Microsoft*¹⁶, is contemplated by the Horizontal Merger Guidelines¹⁷, and has been developed in various permutations by a rich economic literature.¹⁸ However, much of the academic literature and policy commentary has been hasty in asserting that, as a general matter, network effects can

¹⁴ U.S. DEPARTMENT OF JUSTICE AND FEDERAL TRADE COMMISSION, HORIZONTAL MERGER GUIDELINES § 1 (Aug. 9, 2010) [hereinafter HORIZONTAL MERGER GUIDELINES].

¹⁵ *Id.*, at §§ 4 (discussion of demand substitution), 5.1, 5.2 (discussion of rapid entry or readily available capacity as source of competitive discipline); 9 (identifying conditions under which entry can be expected to constrain a merged entity).

¹⁶ 253 F.3d 34 (D.C. Cir. 2001).

¹⁷ HORIZONTAL MERGER GUIDELINES, *supra* note 14, at 6 (Example 2).

¹⁸ See, e.g., Joseph Farrell and Paul Klemperer, *Coordination and Lock-In: Competition with Switching Costs and Network Effects*, in HANDBOOK OF INDUSTRIAL ORGANIZATION Vol. 3, 1967-2072 (2007); Michael Katz and Carl Shapiro, *Network Externalities, Competition and Compatibility*, 75 AMER. ECON. REV. 424 (1985).

indefinitely protect incumbents and impede competitive entry¹⁹, although this may be the case in particular markets for certain periods of time. The changes in leadership in the wireless computing and communications markets from the early 1990s through the mid-2000s can illustrate the overlooked fragility of network effects.

In the early 2000s, the established GSM standard for wireless communications was challenged by the CDMA (code-division multiple access) technology pioneered by a startup, Qualcomm, which faced resistance from telecom carriers and equipment manufacturers that had invested in the GSM standard (based on TDMA or time-division multiple access technology) since the mass deployment of wireless communications in the early 1990s.²⁰ Yet Qualcomm's technology delivered substantially improved performance and the market adopted CDMA-based standards in the shift from 2G to more data-intensive 3G (and subsequently 4G/LTE) wireless communications.²¹ Concurrently, commentators writing in 1999 had identified the popular Palm Pilot device (released in 1997) as an example of a device that was purportedly protected by network effects that would dissuade user migration and discourage entry by potential competitors.²² The contention might have seemed reasonable when Palm, the maker of Palm Pilot, was valued in its IPO in 2000 at an amount greater than General Motors.²³ Yet the launch of 3G wireless communications devices in the early 2000s drove demand away from Palm Pilot and toward the ubiquitous Blackberry device that provided superior communications functionalities. After the release of Apple's iPhone in 2007, the Blackberry device in turn lost market share, rapidly falling from leader to laggard in the wireless device market.

As this historical sequence illustrates, network effects can discourage entry but, in the face of a sufficiently large quality improvement, cannot prevent it. The challenge to the TDMA-based GSM standard by CDMA technology, the demise of the Palm Pilot device, and the rise and fall of the Blackberry device all took place within the space of approximately a decade. As will be illustrated subsequently, these are not "one-off" examples: network effects can pose a significant barrier but have often been surmounted by competitors with sufficient technical expertise, business acumen, and innovative capacity.

2. 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.²⁴ Consider MS Word and the larger MS Office applications suite in the office productivity software market. Both MS

¹⁹ For similar thoughts, see Catherine Tucker, *Network Effects and Market Power: What Have We Learned in the Past Decade?*, ANTITRUST (Spring 2018); David S. Evans and Richard Schmalensee, *Network Effects: March to the Evidence, Not to the Slogans*, ANTITRUST CHRONICLE (Sept. 2017).

²⁰ DAVE MOCK, THE QUALCOMM EQUATION (2005); Peter S. Goodman, *In Touch With a Wireless World*, WASH. POST, Feb. 20, 2000.

²¹ On the transition from GSM to CDMA in connection with the shift from 2G to 3G wireless communications, see HARALD GRUBER, THE ECONOMICS OF MOBILE TELECOMMUNICATIONS 23, 243-44 (2005); Rudi Bekkers & Joel West, *The Limits to IPR Standardization Policies as Evidenced by Strategic Patenting in UMTS*, 33 TELECOMM. POL'Y 80, 81-82, 85, 90-91 (2009).

²² Steven C. Salop and R. Craig Romaine, *Preserving Monopoly: Economic Analysis, Legal Standards, and Microsoft*, 7 GEO. MASON L. REV. 617, 621 (1999).

²³ Harry McCracken, *Palm's progress: The rise, fall—and rebirth—of a legendary brand*, FAST COMPANY, Oct. 15, 2018; Floyd Norris and Lawrence M. Fisher, *Offspring Outweighs Parent As Offering Hits Market*, N.Y. TIMES, Mar. 3, 2000.

²⁴ On this point, see Aaron S. Edlin and Robert G. Harris, *The Role of Switching Costs in Antitrust Analysis: A Comparison of Microsoft and Google*, 15 YALE J. L. & TECH. 169 (2013) (noting that certain widely-used applications, such as Microsoft Windows, have high switching costs, while others, such as Google search, have low switching costs, which in turn suggest different levels of exposure to competitive discipline).

Word and the MS Office suite are widely 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, even to a superior competitor.²⁵ Yet closer examination finds that a more complex state of affairs has arisen as the market has evolved. Whereas long-time users of MS Word incur high costs in adopting a rival program such as Google Docs, this is not the case for new users that have not yet made any learning investments. Data on the office productivity software market indicates that Google’s G office application suite (which includes Google Docs) has succeeded in taking significant market share away from MS Office (which encompasses MS Word), apparently by appealing to younger users who have not yet committed to a particular technology and therefore do not incur switching costs. As of 2022, a user survey showed that Google and Microsoft enjoyed virtually identical shares (48% for MS Office and 46% for Google’s G suite) of the worldwide market for office productivity software.²⁶ For word-processing in particular, students and younger users tend to prefer Google Docs due to its zero price and integrated cloud connectivity features that facilitate storage and collaboration.²⁷ Contrary to the standard characterization of MS Office as a virtually perpetual monopoly safe from competitive threats, it appears to have lost substantial market share to Google’s competing service.

In certain environments, users on one or both sides of a platform can use multiple platforms concurrently—a practice known as “multi-homing.” In those cases, a platform cannot exercise market power since adverse changes in price, quality or other competitive parameters will induce users to substitute toward alternative providers for the same or similar services. Several large consumer surveys indicate that multi-homing is widespread across platform markets. Data from a survey of over 11,000 users in ten countries from different geographic regions finds that, in 10 different digital platform markets (with limited exceptions), users on average reported using between two and three platforms within a twelve-month period.²⁸ Data from multiple consumer surveys, including a survey in 2000 of 27,000 Amazon consumers in five European countries and a survey in 2017 by KPMG of 18,430 online consumers in 51 countries, shows that consumers who make a purchase through an online marketplace widely report having previously checked offers from “non-marketplace” channels, including brand-specific websites and physical vendors.²⁹ A survey in 2021 by Deloitte of 8,000 US retail consumers finds that consumers who make in-store purchases typically compare offers available online, while the reverse is also typically the case when consumers make online purchases.³⁰

²⁵ See, e.g., DON E. WALDMAN AND ELIZABETH J. JENSEN, *INDUSTRIAL ORGANIZATION: THEORY AND PRACTICE* 205-206 (2019); G. Piccolo and B. Ives, *Sustaining Competitive Advantage—IT-Dependent Strategic Initiatives and Sustained Competitive Advantage: A Review and Synthesis of the Literature*, in *CHALLENGES AND STRATEGIES IN MANAGING INFORMATION SYSTEM* 4TH ED. 53-54 (eds. Robert D. Galliers and Dorothy E. Leidner 2009).

²⁶ 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/>

²⁷ 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. MS Office now offers comparable cloud connectivity features.

²⁸ Akman, *supra* note 5. The exceptions were ride hailing, music streaming, and app platforms in the UK, and ride hailing, music streaming, travel booking, and app stores platforms in China.

²⁹ John Davies, Sergey Khodjamirian, Felix Giallombardo and Pietro Aletti, *Survey evidence on user multi-homing in online retail businesses*, COMPASS LEXECON, July 28, 2022, at 9-11, <https://www.compasslexecon.com/survey-evidence-on-user-multi-homing-in-online-retail-businesses/>.

³⁰ *Id.*, at 11.

The prevalence of multi-homing challenges the view that dominant platforms in general are inherently protected from competition by high switching costs, although this could be the case in particular environments depending on technological characteristics, contractual arrangements³¹, or strategic efforts to impede user migration³² (which, in each case, may give rise to offsetting efficiency effects).

3. Characteristic #3: Homogeneous Goods and Preferences

Commentators who adhere to the platform monopoly thesis often do not address how competitive conditions may be impacted by differentiation strategies undertaken by actual or potential competitors to an apparently dominant platform.³³ In general, product differentiation can counteract market concentration and restrain pricing power exerted by incumbents.³⁴ Even a market in which a single provider has a large market share may nonetheless be open to entry by competitors that develop differentiated services that address the preferences of certain segments of the consumer population.³⁵ Consider Google, which is commonly assumed to face little competition in the search market. Yet real-world conditions are more nuanced. While Google has an overwhelming share of the *general* search market, it often trails providers of specialized search services, such as Amazon for shopping-related services, Expedia and Booking.com for travel searches, Zillow and Redfin for home price searches, and subscription database providers such as Bloomberg and Lexis-Nexis that provide searches for specialized professional purposes. Even in general search, some users now access social media platforms such as TikTok or Instagram to locate certain types of information through those sites' visually-oriented search functionalities, illustrating how entrants have identified product features that can be used to differentiate from the incumbent.³⁶ Released in late 2022, OpenAI's ChatGPT, an artificial-intelligence "chatbot" that provides tailored responses to user queries in a conversation format, reportedly outperforms Google search for certain purposes.³⁷ While these examples do not exclude the possibility that Google exercises market power within an appropriately defined antitrust market, they do suggest that even an apparently entrenched platform sometimes remains vulnerable to losing market share to competitively differentiated services.

³¹ Commentators have discussed whether the use of most-favored nations (MFN, also known as "price parity") clauses by platforms have net-adverse effects on consumer welfare by limiting price competition. In general, commentators have tended to view "narrow" MFNs (which require price parity across the platform and participating sellers' own websites) as an efficient mechanism to prevent free-riding on the platform's marketing efforts, while tending to view "wide" MFNs (which require price parity across all platforms and sales channels) as an excessive constraint on price competition. For discussion, see Pinar Akman and Daniel Sokol, *Online RPM and MFN under Antitrust Law and Economics*, 50 REV. IND. ORG. 133 (2017).

³² On strategies for increasing switching costs (using the example of Microsoft Windows and Office applications), see Edlin and Harris, *supra* note 24, at 186-88.

³³ For an exception to this tendency, see Hovenkamp, *supra* note 5, at 1996-2011.

³⁴ On this point, see Avinash K. Dixit and Joseph E. Stiglitz, *Monopolistic Competition and Optimum Product Diversity*, 67 AMER. ECON. REV. 297 (1977).

³⁵ On the circumstances in which entry into a platform market remains feasible when user subgroups are sufficiently differentiated, even if the incumbent has a large installed user base, see Yong Chao and Timothy Derdenger, *Mixed bundling in two-sided markets in the presence of installed base effects*, 59 MGMT. SCI. 1904 (2013); Fernando F. Suarez and Jacqueline Kirtley, *Dethroning an established platform*, 53 MIT SLOAN MGMT. REV. 35 (2012).

³⁶ 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.

³⁷ Steve Mollman, *ChatGPT gained 1 million users in under a week*, FORTUNE, Dec. 10, 2022; Parmy Olson, *Google Faces a Serious Threat from ChatGPT*, BLOOMBERG, Dec. 7, 2022.

4. Characteristic #4: Economies of Scale

It is often asserted that platform markets exhibit economies of scale that compel all but the most efficient platforms to exit, which then results in the deadweight losses and other inefficiencies associated with a secure monopoly.³⁸ The first part of this cause-and-effect proposition is often correct but the second part does not necessarily follow.

Assuming high fixed costs and low marginal costs, a platform will enjoy declining per-unit costs as it coordinates a growing volume of transactions and market concentration will increase as demand flows to the most efficient platforms. Yet the consumer-welfare implications of increasing concentration in the context of digital platform markets are ambiguous without further information in each particular case. If there is substantial pass-through of cost-efficiencies to intermediate and end-users, then economies of scale translate into lower prices and higher output. This favorable outcome can arise in at least two cases. First, as is still sometimes overlooked in legal and policy analysis, a platform cannot realize the cost-savings from economies of scale without expanding production and, as a result, even a monopolist will always “involuntarily” pass on at least some of those cost-savings to consumers as it “moves down” the demand curve.³⁹ Second, to the extent competitive discipline persists (which will depend, among other factors, on users’ switching costs and challengers’ differentiation costs), the incumbent will have incentives to “voluntarily” pass on to users an additional portion of the cost-savings generated by economies of scale.

Given these considerations, there is little ground to assume that high concentration levels arising from economies of scale inherently cause consumer harm and therefore necessarily provide the basis for antitrust intervention. Under certain circumstances, economies of scale yield high concentration levels but deliver to consumers substantial cost-savings as market leaders amortize fixed costs over an increasing volume of transactions. Consistent with this scenario, the longevity of zero-price strategies in social media markets (for example, Google, Facebook, Instagram and many other services) and low-price strategies in online consumer retail markets (for example, Amazon and Walmart) suggests that substantial pass-through arises even in highly concentrated platform markets. 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.⁴⁰ This trend has apparently persisted. During 2020, 2021, and 2022, Amazon’s prices were on average 16%, 14%, and 13% lower than the goods sold at other leading U.S. retailers in 15 different product categories.⁴¹ Contrary to assertions made in the Majority Staff Report that Amazon’s pricing strategy reflects predatory intent⁴², a review of the scholarly literature as of 2020

³⁸ See, e.g., MAJORITY STAFF REPORT, *supra* note 8, 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”); Jan Eeckhout, *Market Power is Eating the Economy*, PROJECT SYNDICATE, June 25, 2021 (stating that “increasingly powerful cost-saving technologies are helping incumbents keep competitors out, by enabling enormous economies of scale . . .”).

³⁹ For further discussion, see Jerry A. Hausman and Gregory K. Leonard, *Efficiencies from the Consumer Viewpoint*, 7 GEORGE MASON L. REV. 707, 708 (1999) (stating that “we have been continually surprised over the years that many lawyers at the antitrust agencies . . . claim that a monopolist will ‘pocket the cost-savings’ and not pass an of them on to consumers . . . profit maximization by the firm causes it to pass along at least some of the cost savings in terms of a lower price, even if the firm is a monopolist”).

⁴⁰ Imke Reimers and Joel Waldfogel, *Throwing the Books at Them: Amazon’s Puzzling Long Run Pricing Strategy*, 83 SOUTHERN ECON. J. 869 (2017).

⁴¹ Tom Ryan, *Is being the low price leader critical to Amazon’s ongoing success?*, RETAILWIRE, Nov. 28, 2022 (describing principal findings of the Profetiro annual pricing report), <https://www.retailwire.com/discussion/is-being-the-low-price-leader-critical-to-amazons-ongoing-success/>

⁴² MAJORITY STAFF REPORT, *supra* note 10, at 297-302.

found no empirical evidence that Amazon’s pricing conforms to a two-stage recoupment strategy.⁴³ These findings run counter to common arguments that economies of scale promote concentrated markets in which entrenched incumbents face no pricing discipline, resulting in the deadweight losses that are the classic target of antitrust enforcement. Rather, it appears that digital platforms sometimes operate under competitive pressures that lead them to pass on to consumers a significant portion of the cost-savings arising from economies of scale.

5. Summary

Regulators, policy advocates, and an increasingly large number of scholarly commentators—as well as much of the business and general press that impact the antitrust policy climate—have adopted the proposition that digital platform markets are doomed to converge toward monopoly conditions in which any potential rival faces nearly insurmountable entry barriers and users are therefore “locked in” to the prevailing platform, which faces little 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 increase prices, constrain output, 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, (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 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. This is not intended to suggest that digital platform markets are immune to durable monopoly outcomes and therefore do not merit close antitrust scrutiny and, when appropriate, intervention. Nor is it intended to exclude the possibility that leading platforms may employ anticompetitive practices in an attempt to secure a monopoly position. Rather, these theoretical and empirical considerations cast doubt on the view that digital platform markets systematically pose a substantially higher level of antitrust risk as compared to any other market.

B. LESSONS FROM FACEBOOK: THE SURPRISING FRAGILITY OF INCUMBENT PLATFORMS

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 specific real-world markets that can determine whether a particular theoretical model provides a reliable guide for competition policy. While regulators, policy advocates, some legislators, and much of the business press and scholarly community have adopted the view that digital platform markets are prone to converge on monopoly outcomes, this proposition often finds at best mixed, and often little to no, support when applied to actual platform markets.⁴⁴

The historical evolution of the social networking market can illustrate the surprising fragility of incumbent platforms in digital markets.

⁴³ Timothy J. Muris and Joseph Coniglio, *What Brooke Group Joined Let None Put Asunder: The Need for the Price-Cost and Recoupment Prongs in Analyzing Digital Predation*, in GLOBAL ANTITRUST INSTITUTE REPORT ON THE DIGITAL ECONOMY (2020).

⁴⁴ For similar thoughts, see Rietveld & Schilling, *supra* note 4, at 1538 (observing that theoretical models of platform monopolies often fail to track real-world conditions in which platforms regularly face competitive threats); Hovenkamp, *supra* note 5, at 1952 (“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”).

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.”⁴⁵ The same assertion was made in *The Guardian*, a prominent British newspaper⁴⁶, and *TechCrunch*, a widely-read online news site in the US tech business community.⁴⁷ These assertions of impending market failure were soon proved wrong.⁴⁸ In 2006, Facebook was made available to the general public and diverted market share from MySpace by offering a differentiated service that (unlike MySpace) required users to use their real identities, which facilitated the formation of “family and friends” groups.⁴⁹ By 2008, Facebook had overtaken MySpace, which was sold in 2011 for \$35 million, a fraction of the \$580 million for which it had been acquired by News Corporation in 2005 (a price that had apparently reflected the assumption that MySpace would enjoy a durable monopoly).⁵⁰

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 Division⁵¹), business commentators (see a 2019 piece in the *Harvard Business Review*, which asserts that Facebook should be regulated as a public utility⁵²), and regulators (see the ongoing antitrust suit brought by the Federal Trade Commission (FTC) in 2021).⁵³ Given this consensus view, it may be surprising that FTC was initially unable to survive a dismissal motion in its antitrust suit against Facebook because the court found that it had not brought sufficient evidence that Facebook had pricing power in an adequately defined market.⁵⁴ While legislators and much of the press attacked the court’s decision⁵⁵, there is substantial lack of clarity concerning the appropriate definition of the relevant antitrust market and Facebook’s share of that market. Estimates of Facebook’s market share vary based on market definition (social networking, social media, and social advertising, among others), the “side” of the market (users or advertisers), geographic region, and the metric used to measure usage (visits, daily active users, or monthly active users). As measured by monthly active users as of January 2023, Facebook’s share of the worldwide social networking market was estimated at 16.8% (or 44.8%, when including its Instagram, Messenger, and WhatsApp services), compared to 14.9% for YouTube, 5.8% for TikTok, 4% for Telegram, 3.2% for

⁴⁵ John Barrett, *My Space is a Natural Monopoly*, TECHNEWSWORLD, Jan. 17, 2007.

⁴⁶ Victor Keegan, *Will MySpace ever lose its monopoly?*, THE GUARDIAN, Feb. 8, 2007.

⁴⁷ Brian Solis, *Is MySpace a Monopoly?*, TECHCRUNCH, Mar. 14, 2007; Duncan Riley, *Does MySpace Have Too Much Power?*, TECHCRUNCH, Nov. 19, 2006.

⁴⁸ In a scholarly publication, it may seem that views expressed by the press concerning antitrust policy are irrelevant. Yet such commentary may play an important role in reflecting public sentiment, which can influence policymakers who are sensitive to such sentiment. On the influence of the press on antitrust policy, see Shapiro 2018, *supra* note 5, at 717-718; on the strategic use of the press by certain antitrust advocates and commentators, see PETIT, *supra* note 5, at 18 n.74. As Shapiro notes elsewhere, the influential Majority Staff Report “finds” that the Amazon Prime program is anticompetitive in part on the basis of an article in the Wall Street Journal, see Shapiro 2023, *supra* note 5.

⁴⁹ I thank a referee for this observation.

⁵⁰ Jennifer Saba, *News Corp sells Myspace, ending six-year saga*, REUTERS, June 29, 2011.

⁵¹ Fiona M. Scott-Morton and David C. Dinielli, *Roadmap for an Antitrust Case Against Facebook*, 27 STANFORD J. L. BUS. & FIN. 267 (2022).

⁵² Dipayan Ghosh, *Don’t Break Up Facebook—Treat It Like a Utility*, HARVARD BUS. REV., May 30, 2019.

⁵³ Federal Trade Commission, First Amended Complaint for Injunctive Relief and Other Equitable Relief, *Federal Trade Commission v. Facebook, Inc.* (D. D.C., filed Aug. 19, 2021).

⁵⁴ Cecilia Kang, *Judge Throws Out 2 Antitrust Cases Against Facebook*, N.Y. TIMES, June 28, 2021.

⁵⁵ Leah Nylen, *Federal court tosses antitrust suits against Facebook, in huge blow to D.C.’s fight with tech*, POLITICO, June 28, 2021.

Snapchat, 2.6% for Pinterest, and 2.5% for Twitter.⁵⁶ An estimate of “active users” of seven prominent social media networks report the following worldwide market shares as of June 2022: 31% for Facebook (46% when combined with Instagram), 20.1% for TikTok, 13.3% for WeChat, 8.5% for LinkedIn, 6.5% for Snapchat, and 4.8% for Twitter.⁵⁷ As measured by monthly active users for the 12-month period from March 2022 to March 2023, Facebook held on average 61.2% of the US “desktop, mobile and tablet social media” market (and 72% when combined with Instagram); however, this estimate is based on a market definition that excludes TikTok (which would diminish Facebook’s market share) and WhatsApp and Messenger (which would increase the combined market share of Meta-owned services).⁵⁸

In short: there is no settled definition of the relevant market in which Facebook operates or the appropriate methodology to calculate market share. In its amended court filing in its suit against Facebook, the FTC alleged that, since 2011, Facebook has represented 65% to 80% of what the agency called the US “personal social networking” market (based on several metrics, including monthly active users, daily active users, and other metrics).⁵⁹ However, this market definition implausibly excludes its primary rival, TikTok, as well as Twitter and YouTube, all of which would depress Facebook’s share of the relevant market. While the court allowed the FTC’s suit to proceed based on the amended complaint, the government will likely have difficulty establishing that Facebook enjoys market power if the court ultimately rejects the omission of TikTok from the relevant market. As has been widely observed, Facebook has suffered a substantial loss of users (especially younger users) to TikTok, resulting in a fall in its advertising revenue.⁶⁰ 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%.⁶¹ There are also indications that users regularly multi-home across competing platforms, which implies that users face little to no switching costs. As of approximately April 2022, it was estimated that 37% of monthly Facebook users and 51% of monthly Instagram users also used TikTok.⁶² While Meta Platforms is still the largest provider of social networking services (primarily encompassing Facebook and Instagram) in the US and worldwide market, its increased exposure to multi-homing across, or outright user departures to, rival services illustrates the extent to which even an apparently entrenched monopoly can be challenged by innovative entrants.

⁵⁶ 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 the number of users attributed to networks for which the source provides information. The specific global market share percentages for China-based services (which have insignificant presence in the US and European markets) are as follows: WeChat (6%); Douyin (4.1%); Kuaishou (3.6%), Sina Weibo (3.3%), and QQ (3.3%).

⁵⁷ Author’s calculations, based on: Statista, *Advertising & Media Outlook*, Oct. 7, 2022, <https://www.statista.com/chart/28412/social-media-users-by-network-amo/>

⁵⁸ Author’s calculations, based on: 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>

⁵⁹ *Federal Trade Commission v. Facebook Inc.*, Substitute Amended Complaint for Injunctive and Other Equitable Relief, Case no. 1:20-cv-03590-JEB (D.D.C., filed Sept. 8, 2021), at 65-66.

⁶⁰ Patience Haggin, *Google and Meta’s Advertising Dominance Fades as TikTok, Streamers Emerge*, WALL ST. J., Jan. 3, 2023.

⁶¹ 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/>

⁶² Gina Chon, *TikTok is eating Facebook from the inside*, REUTERS, Apr. 27, 2022.

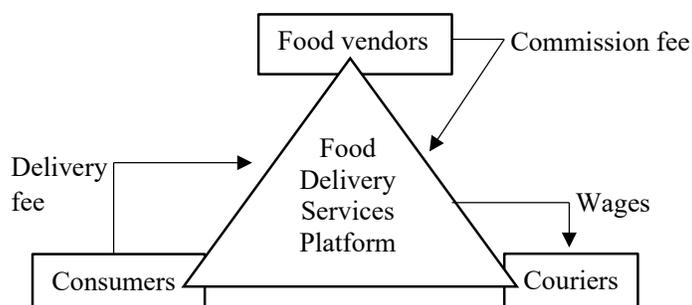
II. FOOD DELIVERY SERVICES

In this Part, I assess the extent to which the ready-to-eat food delivery services (FDS) market conforms to the platform monopoly thesis. 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 compelling support for these concerns. Providers in FDS markets operate in a low-margin environment and cannot expect to secure economic viability without achieving sufficient scale to support high transaction volume. However, the resulting high levels of concentration do not appear to translate into pricing power or even profitability, even though some providers have operated in the market for a substantial time. Moreover, adjacent delivery-services markets may impose some competitive discipline on FDS providers. Proposed and implemented interventions on preemptive grounds to foreclose a monopoly outcome lack a compelling basis in the economics of the FDS market.

A. 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 initial and ongoing expenditures by the platform, which must assemble and operate a delivery infrastructure, including managing couriers and other personnel. In both the two-way and three-way versions, vendors pay a commission fee and customers pay delivery fees to the platform when a transaction is executed.⁶³

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. It would be infeasible for any individual user to secure information on the hundreds of vendors from which a user can select through a FDS platform, while it is similarly infeasible for most vendors to assemble

⁶³ Kabir Ahuja, Vishwa Chandra, Victoria Lord, and Curtis Peens, *Ordering in: The rapid evolution of food delivery*, MCKINSEY, Sept. 22, 2021. Note that the Figure does not reflect the payment of tips from consumers to couriers.

independently an online platform that could match the user base that can be reached through the FDS platform. Hence, for both users and most vendors, the availability of the FDS platform enables value-enhancing transactions that would otherwise be technologically or economically infeasible. Critically, these efficiencies can only be achieved so long as the platform can attract and retain a substantial population of vendors, couriers, and customers.

B. 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 both high fixed costs associated with assembling the matching infrastructure and significant variable costs of executing each individual transaction on the platform.⁶⁴ Fixed costs encompass the costs involved in assembling the complex ordering and delivery infrastructure required to match vendors, couriers, and customers, including research and development costs. Variable costs encompass the costs associated with operating the ordering and delivery infrastructure, vendor and customer acquisition (including marketing expenditures), and courier compensation. Both cost categories (which I describe in greater detail subsequently⁶⁵) drive the market toward high concentration levels. High fixed costs favor larger firms that can achieve economies of scale by spreading those costs over increasing units of output. Significant variable costs as a percentage of revenues mean that a platform earns low profit margins on each sale⁶⁶, which requires that it achieve large transaction volumes to generate substantial profits in the aggregate.⁶⁷ Hence, a successful FDS market would be expected to converge on a handful of large platforms, while smaller platforms would exit or be acquired.

Second, users on all three sides of an FDS platform 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 and delivery speed, consumers will prefer platforms that have the most vendors to maximize product variety. Subject to differences in pay, couriers will prefer platforms that have the most vendors and customers within the relevant geographic area. The interaction between the preferences of customers, vendors, and couriers concerning fees, wages, product variety, and delivery speed generates a positive feedback loop that tends to reward a handful of the largest and most efficient platforms.

Scale economies, low profit margins, and network effects together imply 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). Smaller competitors have been acquired (such as Postmates, acquired by Uber in 2020) or failed to scale and exited the market. As of March 2023, DoorDash held the

⁶⁴ Contrary to idealized models of digital platforms, this is not unusual: real-world platforms often involve significant variable operational costs. On this overlooked point, see Stan J. Liebowitz & Stephen E. Margolis, *Are Network Externalities a New Source of Market Failure?*, 17 RES. L. & ECON. 1 (1995).

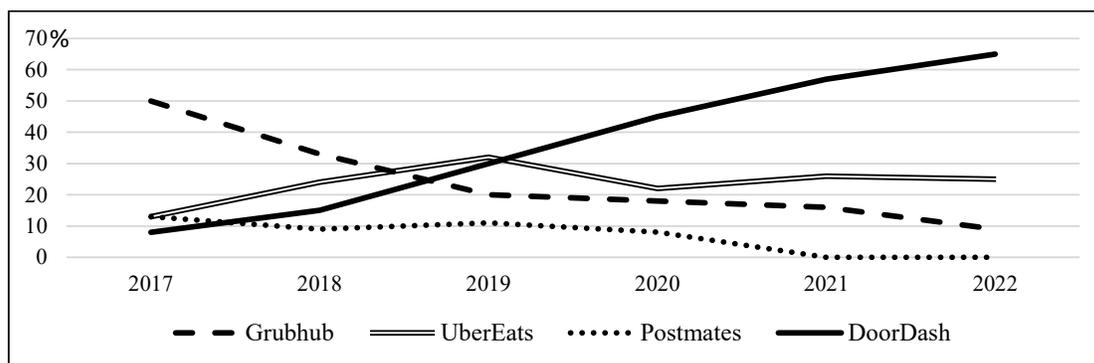
⁶⁵ See *infra* note 83 and accompanying discussion.

⁶⁶ For further discussion, see Table 3 and accompanying discussion.

⁶⁷ Additionally, larger platforms may be able to reduce variable delivery costs by “stacking” multiple orders, see Ahuja et al., *supra* note 63, at 8.

largest market share on a national basis (65%), trailed by Uber Eats (23%), and GrubHub (11%, when consolidated with Postmates following its acquisition).⁶⁸ Subsequently, I will assess whether these high concentration levels persist when the potentially relevant antitrust 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, 2016-2022)



Note: Postmates was acquired by Uber Eats in 2020.

Source: Business of Apps, Food Delivery App Revenue and Usage Statistics (updated Apr. 28, 2023) (based on Bloomberg Second Measure, McKinsey data), <https://www.businessofapps.com/data/food-delivery-app-market/>

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.⁶⁹ In the case of platform markets, it is important to observe that concentrated markets dominated by platforms with large transaction volume can confer benefits on consumers through increased variety, lower fees, and faster delivery. If the FDS market had not converged upon a small number of providers, this would suggest 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 as compared to a disaggregated market of individually negotiated transactions, but the resulting expansion of output and variety and, given consumers' reduced search costs, an increase in price competition among vendors. A complete welfare analysis must then offset those efficiency gains against any pricing power that a platform may acquire in a relevant geographic market following the withdrawal of rival platforms. Whether or not increasing concentration results in a net welfare gain therefore demands a case-specific analysis of the relevant market, rather than simply assuming a high likelihood of market failure based on the purported "special characteristics" of digital environments.

C. DO FDS PLATFORMS HAVE MARKET POWER?

The FDS market's high concentration levels at the national level raises antitrust concerns to the extent that high concentration *may* imply market power that translates into unfavorable

⁶⁸ Janine Perri, *Which company is winning the restaurant food delivery war?*, BLOOMBERG SECOND MEASURE, Apr. 14, 2023, <https://secondmeasure.com/datapoints/food-delivery-services-grubhub-uber-eats-doordash-postmates/>

⁶⁹ HORIZONTAL MERGER GUIDELINES, *supra* note 14, at §§ 2.1.3; 10.

effects on price, output, quality, or other competitive parameters. However, inferences of market power based on concentration levels 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, a more precise definition of the potentially relevant antitrust market, together with other economic factors, suggests that the high market shares enjoyed by leading FDS platforms in major metropolitan markets do not persuasively support an inference of market power.

1. 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 relatively narrow 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).⁷⁰ 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.

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%	26%	4101
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

Notes: HHI figures ignore providers with small market shares and may therefore slightly overestimate concentration levels in certain metropolitan markets. Some rows may not add up to exactly 100% due to rounding. Uber Eats acquired Postmates in 2020.

Source: Publicly available data from Second Measure. HHI calculations by author.

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

⁷⁰ U.S. antitrust agencies generally deem a market to be “highly concentrated” if it exhibits a HHI measure in excess of 2500 points, *see id.*, at §§ 1.51, 5.3.

geographic market can be “hyperlocal” such that certain platforms may lead in only certain neighborhoods of a metropolitan area.⁷¹ Consistent with this assertion, 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.⁷² 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.

2. 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. All of these types of services are identified in securities filings by FDS providers as sources of actual or potential competition.⁷³ 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.

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 platforms	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; Panda Express
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) may operate in competition to some extent with the FDS market. First, the most immediate but more limited threat is posed from smaller FDS services that specialize in a particular type of cuisine in the same geographic area. Second, IDS providers such as Instacart and GoPuff are attempting to enter the meal delivery market⁷⁴ while FDS platforms are entering the IDS market through “last mile” delivery services for pet food, department

⁷¹ Geoffrey Manne, *Don’t listen to the naysayers, Uber’s acquisition of Postmates should be welcomed*, THE HILL, July 13, 2020.

⁷² Laura Forman, *DoorDash Loves the ‘Burbs as Much as You Do*, WALL ST. J., Nov. 17, 2020.

⁷³ See, e.g., DoorDash, Inc., Form 10-K, Dec. 7, 2020, at 24-25; GrubHub, Inc. Form 10-K, Feb. 28, 2017, at 5; Uber, Inc., Form 10-K, Feb. 24, 2022, at 6.

⁷⁴ Michael Waters, *Why Gopuff and Instacart are testing out meal delivery*, MODERNRETAIL, Oct. 27, 2021, <https://www.modernretail.co/retailers/why-gopuff-and-instacart-are-testing-out-meal-delivery/>

stores, and “big box” stores.⁷⁵ To the extent that IDS services have infrastructure that can be adapted for FDS purposes at a reasonable cost, this suggests that putative boundaries drawn between FDS and IDS markets should be discounted for purposes of competition analysis. Third, while RTC delivery services lack the “one-stop-shopping” convenience of a single platform, they may exert competitive pressure on an FDS provider to the extent that they deliver certain overlapping products within a similar geographic area.⁷⁶ The competitive threat posed by RTC services appears to have led DoorDash, the largest current FDS provider, to offer vendors “debundled” service options, including a service that enables vendors to use the platform for ordering only or delivery only.⁷⁷ 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. Domino’s Pizza maintains an extensive delivery infrastructure and, when ranked by the number of active users, was the fourth largest food-delivery app as of April 2021.⁷⁸

D. 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. As discussed previously, FDS platforms must achieve high transactional volumes to achieve positive net returns, given the low profit margins earned on each transaction. 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” profits⁷⁹, even the largest FDS platforms earn a modest net return on each sale. Analysis by McKinsey found that a platform earns on average a margin of approximately 3% on each order.⁸⁰ Analysis by Deutsche Bank similarly found that DoorDash (the largest FDS platform) earned on average a margin of approximately 2.5% on each order.⁸¹ Even these estimates may be optimistic in the case of some platforms. In 2020, Uber management stated in a quarterly earnings release that “[c]umulative payments to drivers for UberEats Deliveries

⁷⁵ Ahuja et al., *supra* note 63, at 9; 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.

⁷⁶ 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 in gross merchandise value, as compared to an estimated \$32 billion in revenues for the US FDS market. 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.”

⁷⁷ See, e.g., *On-demand delivery with DoorDash Drive*, DoorDash, <https://get.doordash.com/en-us/products/drive> (vendors use DoorDash for ordering and then execute delivery independently); *Have your own drivers?*, DoorDash, <https://get.doordash.com/en-us/products/self-delivery>

⁷⁸ DAVID CURRY, *FOOD DELIVERY APP REPORT 79* (BusinessofApps 2022).

⁷⁹ See *infra* note 96.

⁸⁰ Ahuja et al., *supra* note 63, at 8. This is calculated by subtracting from the amount paid by the customer (1) the share retained by the restaurant, (2) the courier’s wages, (3) variable marketing and IT costs, and (4) allocated fixed costs.

⁸¹ Preetika Rana and Heather Haddon, *DoorDash and UberEats Are Hot. They’re Still Not Making Money*, WALL ST. J., May 28, 2021.

historically have exceeded the cumulative delivery fees paid by consumers.”⁸² In short: for at least a certain period, UberEats was apparently a failing business, even though it is one of three leading FDS platforms in the US market.

UberEats is not alone. In 2021, a review of food and grocery delivery services in all major international jurisdictions found that that every service was unprofitable once research and development (R&D) and general and administrative (G&A) expenses are taken into account.⁸³ The Table below shows the audited financial results of the leading FDS platforms in the US market (in each case, as disclosed in the companies’ securities filings): GrubHub and UberEats, during 2018-2021 and, for DoorDash, 2018-2022. All companies incurred net losses and negative operating margins during almost the entire period. FDS platforms’ poor performance is especially remarkable given that much of this period coincided with the COVID-19 pandemic (approximately early 2020 through early 2022), an exceptional event that greatly increased demand for food-delivery service due to closures of workplaces, schools, and other facilities. This dismal business record does not favor the platform monopoly thesis in the FDS market.

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

Platform/Year	Revenues	Net Income	Net Operating Margin
<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%)
2022	\$6,583	(\$1,368)	(21.8%)
<i>GrubHub</i>			
2018	\$1,007	\$78	7.8%
2019	\$1,312	(\$19)	(1.4%)
2020	\$1,819	(\$156)	(8.7%)
2021	\$1107	(\$135)	(12.2%)
<i>UberEats</i>			
2018	\$1,500	(\$890)	(59.4%)
2019	\$1,900	(\$1,372)	(72.2%)
2020	\$4,800	(\$873)	(18.2%)
2021	\$8,300	(\$348)	(4.2%)

Notes: Parentheses indicate negative values. For UberEats, “net income” values are adjusted EBITDA values.

⁸² 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/>

⁸³ CURRY, supra note 78, at 38. DoorDash has asserted that, in 2020 and 2021, it earned a positive “contribution margin,” an alternative accounting measure defined as revenues net of direct expenses, of 23% and 22% respectively (see DoorDash Form 10-K, Feb. 24, 2023, at 70, and DoorDash, Form 10-K, Mar. 1, 2022, at 66). However, this positive net value does not account for R&D and G&A expenses, which constitute a significant portion of DoorDash’s expenses. For example, in 2022, DoorDash disclosed a combined \$678 million in R&D and G&A expenses, which represents 26% of its total expenses (DoorDash, Form 10-K, Feb. 24, 2023, at 86); in 2021, DoorDash disclosed a combined \$1.28 billion in R&D and G&A expenses, which represented 23% of its total expenses (DoorDash, Form 10-K, Feb. 24, 2023, at 69). Once R&D and G&A expenses are included, DoorDash’s net income is substantially negative as shown in the Table above. Hence DoorDash explains in its securities disclosure that contribution margin “is not a financial measure of profitability,” see, e.g., DoorDash, Form 10-K, Dec. 7, 2020, at 108.

Sources: For GrubHub and DoorDash: SEC filings (except for GrubHub 2021 results, which were sourced from JustEatTakeaway Annual Report (2021, euro figures converted into US dollars at exchange rate as of Dec. 31, 2021)). For UberEats: DAVID CURRY, FOOD DELIVERY APP REPORT 9, 39 (BusinessofApps 2022).

It could be reasonably 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, which may ultimately deliver sufficient scale to earn substantial positive returns. In a variant on the standard logic for predatory pricing strategies, it is commonly asserted that early competitors in platform markets rationally “burn cash” to acquire a large installed base of users, reflecting the expectation that this may yield a winner-take-most outcome in which the prevailing provider enjoys pricing power and can earn returns on the investment made to capture the market.⁸⁴ In the FDS context, 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 that must therefore be capped by regulatory intervention. Yet it is clear that, even under current fee structures, FDS providers are barely breaking even and, in some cases, fail to even meet that threshold. Second, even assuming 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 and widespread multi-homing capacities—suggest that a prevailing platform could not feasibly block entry or escape punishment from competing FDS platforms if it were later to raise prices, slow delivery, or otherwise degrade quality. Third, every currently leading FDS platform has been in operation for at least a decade and has yet to achieve profitability. Grubhub, the industry pioneer, was founded in 2004, Postmates (acquired by Uber in 2020) was founded in 2011, Doordash was founded in 2013, and Uber Eats was founded in 2014. The passage of considerable time since these companies’ founding dates and the ongoing failure to secure market rents 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 that an FDS platform had initially pursued such a strategy, it is apparently unsuccessful, which suggests that leading platforms have been unable to secure pricing power even after having acquired substantial market shares in specific metropolitan markets. In a letter to shareholders from GrubHub’s CEO and CFO in October 2019, management recognized this grim reality: “[We] . . . still don’t believe . . . that a company can generate significant profits on just the logistics component of the [FDS] business. It is a commodity and there are significant variable costs that are hard to leverage even with technology and scale.”⁸⁵

Investors’ expectations that acquiring a large and expanding user base will ultimately generate sufficient volume to earn substantial profits (or may ultimately cross-subsidize other services that generate substantial profits) provide FDS platforms with strong incentives to attract and deter attrition by customers, vendors, and couriers, all of whom can migrate at little cost to other FDS platforms. Vendors can also choose to avoid the fees payable to FDS platforms by establishing an independent RTC service or focusing on dine-in service (which may yield restaurants higher profit margins given the absence of a commission fee⁸⁶). Users can achieve the same result by picking up orders from vendors directly. Consequently, even

⁸⁴ Rietveld & Schilling, *supra* note 4, at 1538.

⁸⁵ Jamie Powell, *Deliveroo and the profitability problem*, FIN. TIMES, Nov. 12, 2019.

⁸⁶ Ahuja et al., *supra* note 63, at 6. Some vendors adopt a hybrid strategy by offering only dine-in services during certain times of the day, see 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/>

if a platform already has significant share in a metropolitan FDS market, it has strong incentives to offer “reasonable” fees to attract and retain vendors and users. Consistent with these expectations, several FDS platforms have recently announced fee reductions for vendors, or enabled vendors to manage delivery fees by switching between self-delivery and platform delivery, as the pandemic has subsided and consumer demand has slowed.⁸⁷ This behavior suggests caution in inferring that the large market shares enjoyed by major FDS providers provide a reliable proxy for pricing power⁸⁸—to the contrary, there is evidence that some providers are struggling to maintain economic viability.

E. 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 a platform can 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 profits⁸⁹, which led to caps being imposed on fees charged by platforms to vendors in as many as 68 US municipalities (as of March 2021).⁹⁰ 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 and no firm has succeeded in achieving a sustainable business model.

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 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.⁹¹ 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.

⁸⁷ Littman, *supra* note 86; Preetika Rana, *DoorDash Allows Restaurants to Choose Commissions in Post-Pandemic Future*, WALL ST. J., Apr. 27, 2021.

⁸⁸ Caution is also merited in assessing the competitive effects of contractual commitments that obligate vendors to offer dine-in customers prices equivalent to the prices charged to delivery customers on the FDS platform, and *vice versa*. This clause may be an efficient mechanism to prevent vendors from free-riding off the marketing services that are provided by the FDS platform (by reducing prices for dine-in business promoted indirectly by the platform). Federal courts have largely rejected antitrust challenges to the vertical use of MFN clauses (see, e.g., *Blue Cross & Blue Shield United of Wisconsin v. Marshfield Clinic*, 65 F.3d 1406 (7th Cir.), *as amended on denial of reh’g* (Oct. 13, 1995)).

⁸⁹ See, e.g., *supra* note 79.

⁹⁰ Cyrus Farivar, *DoorDash pushes back against fee delivery commissions with new charges*, NBCNEWS, Mar. 28, 2021.

⁹¹ 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 (2013-2021)

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

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 (and, even in that circumstance, may ultimately fail to earn profits consistently). The persistence of operating losses 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 have any prospect of survival. Regulatory actions based on a simplistic “big is bad” principle not only compel the market to operate under a less efficient structure but place at risk its ability to continue operating.

This point has apparently not been appreciated by regulators and other policymakers in jurisdictions that have intervened, or advocated intervention, in acquisitions based on the presumption that these transactions represent attempts to acquire increased market share and pricing power using practices that lack any sufficient efficiency rationale. The structure and performance of the FDS market since its inception favor the alternative view that these acquisitions primarily represent attempts to avoid economic demise through increased economies of scale, rather than attempts to monopolize the market and acquire pricing power. The weak factual grounds behind policymakers’ eagerness to intervene can be illustrated by the regulatory response to three transactions in the FDS market.

1. *Uber Eats/Grubhub*

In May 2020, Uber (the parent of Uber Eats) made an offer to purchase Grubhub, reportedly for \$4.5 billion.⁹² 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 as of April 2020, the combined entity would have had an estimated share in excess of 50 percent of FDS revenues in five of the 12 largest metropolitan markets.⁹³ These revenue shares would have triggered a rebuttable presumption of competitive harm under agency guidelines, based on (1) post-merger HHI levels and (2) the

⁹² Mike Isaac and Kate Conger, *Uber Said To Be in Talks to Acquire Grubhub*, N.Y. TIMES, May 12, 2020.

⁹³ Calculations made by author based on publicly available 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.

difference between pre-merger and post-merger HHI levels.⁹⁴ 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).⁹⁵ 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.

Focusing on the anticipated increase in market share of the combined FDS providers, some policymakers and 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.⁹⁶ This rhetoric overlooked several critical points.

First, advocates for regulatory action did not consider whether the FDS market is the appropriate market definition for antitrust purposes. For reasons discussed previously, restricting the market to FDS providers is most likely excessively narrow and therefore overstates any pricing power reasonably attributable to the combined entity. Second, they did not take into account that even the largest FDS platforms have almost never been profitable over a considerable period of time (ranging from one to two decades, depending on the provider), suggesting that high shares in any metropolitan FDS market may be best understood as indicative of attempts to achieve profitability through scale, rather than an imminent threat of pricing power. As noted above⁹⁷, there is meager evidence to support the view that the current absence of profits reflects a two-stage predation strategy ending in recoupment through a stream of monopoly rents. Regulatory intervention to preempt what appears to be a merely conjectural and increasingly implausible 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 expected obstacles to deal closure posed by the transaction’s high HHI levels and the general climate of strict antitrust scrutiny.⁹⁸ 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.⁹⁹ (The combined company was worth only \$3.96 billion by market capitalization as of May 7, 2023.) This regulatory outcome might be defended on the ground that it bolstered an existing

⁹⁴ 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 14, at § 5.3.

⁹⁵ *Id.*, at §§ 5.3, 9, 10.

⁹⁶ Bobby Allyn, “Uber Woos Grubhub, in a Move Lawmaker Calls ‘Pandemic Profiteering,’” NAT’L 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.

⁹⁷ See note 85 and accompanying text.

⁹⁸ Shakeel Hashim, *Why Uber’s big deal for Grubhub fell out—and a European suitor stepped in*, PROTOCOL, June 10, 2020.

⁹⁹ Ingrid Lunden, *Takeaway and Just Eat to merge in \$10B deal to take on Deliveroo and Uber Eats in Europe*, TECHCRUNCH, July 29, 2019.

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 if any such inquiry had adopted a broader definition of the relevant service market that encompassed more fully sources of actual and potential competition. At the very least, the transaction did not merit the reflexive condemnation that spelled its early demise.

2. *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 closing¹⁰⁰ while advocacy groups urged regulators to block the transaction on the ground that delivery apps exert "predatory power," "monopolize an essential service," and "line their pockets at the expense of struggling businesses."¹⁰¹ (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 in 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.¹⁰² In any event, it is doubtful 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.

3. *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 CMA, the UK 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

¹⁰⁰ Tyler Sonnemaker, *DOJ Antitrust Division reviewing Uber's Plans to Buy Postmates*, BUSINESS INSIDER, Sept. 30, 2020.

¹⁰¹ 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>

¹⁰² Based on author's calculations, using publicly available Bloomberg Second Measure data. Calculations exclude competitors other than DoorDash, Grubhub, Uber Eats, and Postmates.

approximately \$300 million in 2018.¹⁰³ 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.¹⁰⁴ Hence it would appear that Amazon's non-controlling investment could only have been procompetitive since it would have provided an equity investment that bolstered a lagging competitor in an economically challenging environment. (In fact, the CMA provisionally approved the transaction based on a failing firm defense but later withdrew this position once Deliveroo's financial circumstances were deemed to have improved sufficiently.¹⁰⁵) Although the CMA expressed concern that Amazon's equity investment would discourage it from independently entering the UK market, it is somewhat improbable to believe that Amazon would have contemplated doing so since it had just exited the UK market in 2018 due to lack of profitability.¹⁰⁶

The CMA felt otherwise and, in July 2019, ordered Amazon and Deliveroo 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" investigation¹⁰⁷, 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.¹⁰⁸ About six months after the transaction, competitive conditions in the UK food delivery market, as measured by concentration, 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, based on weekly consumer spend.¹⁰⁹ 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 national FDS market. 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.

¹⁰³ Jasper Jolly, *Amazon's deal with Deliveroo faces in-depth inquiry*, THE GUARDIAN, Dec. 27, 2019.

¹⁰⁴ 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.

¹⁰⁵ *CMA Revises Provisional Findings in Amazon/Deliveroo Case*, CONCURRENCES, June 24, 2020, <https://www.concurrences.com/en/bulletin/news-issues/june-2020/the-uk-competition-authority-revises-its-original-findings-of-failing-firm>

¹⁰⁶ Sarah Perez, *Amazon closes its restaurant delivery service in London*, TECHCRUNCH, Nov. 26, 2018.

¹⁰⁷ UK 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, <https://www.ashurst.com/en/news-and-insights/legal-updates/quickguide-uk-merger-control-phase-2-references/>

¹⁰⁸ *UK competition watchdog approves Amazon's stake in Deliveroo*, AP NEWS, Aug. 4, 2020, <https://apnews.com/45c6a975b492c61fe14454648f5233e0>

¹⁰⁹ EDISON TRENDS, *supra* note 104.

F. BROADER LESSONS FOR PLATFORM ANTITRUST

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. Any digital platform yields cost-savings relative to non-platform-mediated transactions precisely because it sustains a large transactional volume that expands substantially the feasible universe of buy/sale transactions. Hence, it is expected that any mature platform market will be populated by a small number of scale-efficient enterprises, each of which enjoys significant market share. Competition concerns only arise if a platform enjoys not only large market share but significant market power, in which case it may have incentives to raise prices, constrain output, or degrade quality. Yet this risk can not plausibly materialize unless the platform operates behind a “moat” that impedes competitive threats. The moat could take the form of a proprietary technology (protected by intellectual property or secrecy), a difficult-to-replicate suite of bundled services, 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 (and even if market power were shown, it would still be necessary to assess any countervailing efficiencies).

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. Third parties now offer “clone” delivery apps for vendors that seek to implement a food-delivery infrastructure through their own website (and bypass the commission fee paid to FDS platforms).¹¹⁰ 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 potentially 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, as shown by evidence showing that users often use multiple FDS platforms.¹¹¹ 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). While platforms have entered into exclusivity deals with 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 is free to negotiate an exclusivity deal with Burger King, Wendy’s, or other national chains. Fourth, a vendor can sometimes credibly threaten to bypass the platform altogether by acquiring in-house RTC delivery capacities.

¹¹⁰ There are multiple examples available online. See, e.g., <https://www.oddappsclone.com>; <https://www.apurple.co/food-delivery-app-clone>.

¹¹¹ 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/>

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 to capture market rents even over substantial periods of time. This consumer-friendly state of affairs reflects users' and vendors' low switching costs, the absence of any proprietary technology, and platforms' significant variable costs in connection with 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) not only lack sound evidence of competitive harm but may cause injury to competitive conditions. Intervention in a platform market based on factually unsupported assumptions of antitrust risk may compel firms to operate under 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.

III. CLOUD COMPUTING

Cloud computing constitutes a “general-purpose technology”¹¹² that can be applied broadly to generate efficiency gains across a wide array of industries, in the process delivering dramatic economic gains by expanding access to data-storage and processing infrastructure, increasing convenience for users, and reducing entry barriers for smaller firms. The commercial success of the market pioneer, Amazon Web Services (AWS, a subsidiary of Amazon), in deploying this technological innovation has elicited repeated assertions from regulators and some commentators that the cloud-services market will necessarily converge on a monopoly outcome, with adverse effects on pricing, quality, and innovation. These regulatory concerns (which, as described below, have yielded multiple investigations) ultimately rest on the presumption that cloud-services platforms enjoy (or, in some variations, are inherently likely to secure) market power and can therefore exploit locked-in users who cannot easily shift data to other cloud-services providers.

In this Part, I assess whether this variation on the platform monopoly thesis is persuasive. The facts are not supportive. AWS faces vigorous competition from two significant rivals (Microsoft and Google) and potential competition from more recent entrants, which have deep financial resources and extensive technical expertise (IBM and Oracle). There is ample evidence that users anticipate lock-in risk and deploy strategies to hedge against that risk by spreading applications and databases across multiple providers. Moreover, cloud providers are repeat players in a growing market that is far from saturation and therefore have rational incentives to attract and retain users by maintaining competitive levels of pricing and quality. Based on available evidence, the cloud computing market does not conform to the conditions under which a monopoly outcome is likely to be realized.

A. BACKGROUND: REGULATORY SCRUTINY OF CLOUD COMPUTING

The success of the cloud-computing services industry, pioneered by AWS, has elicited scrutiny from competition regulators in major jurisdictions, which have expressed concern that dominant cloud-services providers will necessarily have incentives and capacities to inflate pricing or degrade quality. Some of these statements and actions are listed below.

- March 2023: The FTC releases a “Request for Information,” seeking public comment on the business practices of cloud computing providers, including issues related to market power,” in connection with an investigation into competitive conditions in the

¹¹² On the concept of a general-purpose technology, see Timothy Bresnahan & Manuel Trajtenberg, *General Purpose Technologies: Engines of Growth?*, 65 J. ECONOMETRICS 83 (1995).

cloud market.¹¹³ The FTC notes that similar inquiries are being undertaken by regulators in the UK, France, Japan, the Netherlands and South Korea.¹¹⁴

- September 2022: The UK’s Office of Communications (known as “Ofcom”), which has the authority to bring competition enforcement actions in communications industries, announces an investigation into the “market positions” of the cloud services provided by Amazon, Microsoft, and Google.¹¹⁵ In April 2023, Ofcom states that it would “refer the cloud infrastructure market” to the CMA for investigation.¹¹⁶
- April 2022: EU competition regulators open an investigation into Microsoft’s business practices concerning the Azure cloud computing platform (in response to complaints brought by certain European cloud providers concerning Microsoft’s bundling practices in particular).¹¹⁷
- December 2021: Press reports indicate that the FTC is investigating AWS’s practices in the cloud-computing market.¹¹⁸
- October 2020: The Majority Staff Report (initial version) states that Google is investing “heavily” in its cloud computing product, “positioning itself to dominate the ‘internet of things,’ . . .”.
- July 2019: EU competition regulators open an investigation into certain of AWS’s business practices in the cloud computing market.¹¹⁹

B. BACKGROUND: ECONOMICS OF CLOUD COMPUTING

The cloud computing industry is generally understood to comprise three segments: (i) infrastructure-as-a-service (IaaS), (ii) platform-as-a-service (PaaS), and (iii) software-as-a-service (SaaS). As shown in Table 5, 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, and manage cloud-based applications; and the SaaS segment refers to a myriad of cloud-based software applications for business and individual users.¹²⁰ In each case, “as-a-service” means that customers can obtain these resources on a continuous fee-for-use basis, which avoids having to purchase equipment and software as is the case for on-premises systems that require ongoing maintenance and

¹¹³ FEDERAL TRADE COMMISSION, *An Inquiry into Cloud Computing Business Practices: The Federal Trade Commission is seeking public comments*, Mar. 22, 2023.

¹¹⁴ Id.

¹¹⁵ Joe Hoppe and Sam Schechner, *Amazon, Microsoft, Google Face Cloud-Services Examination in U.K.*, WALL ST. J., Sept. 22, 2022.

¹¹⁶ Katherine Gemmill, *Ofcom Warns of Potential Amazon, Microsoft Dominance in Cloud Services*, BLOOMBERG, Apr. 5, 2023.

¹¹⁷ Paresh Dave, *Microsoft’s cloud business targeted by EU antitrust regulators*, REUTERS, Apr. 2, 2022. As of March 2023, it was reported that some firms may withdraw the complaints in a settlement with Microsoft, see Jillian Deutsch et al., *Microsoft, OVH Prepare to Settle Cloud Complaint to EU*, BLOOMBERG, Mar. 23, 2023.

¹¹⁸ David McLaughlin, Dina Bass, and Naomi Nix, *Amazon Cloud Unit Draws Antitrust Scrutiny from Khan’s FTC*, BLOOMBERG, Dec. 22, 2021.

¹¹⁹ EUROPEAN COMMISSION, *Antitrust: Commission opens investigation into possible anti-competitive conduct of Amazon*, 17 July 2019.

¹²⁰ For a commonly referenced definition, see Peter Mell and Timothy Grance, *The NIST Definition of Cloud Computing* (National Institute of Standards & Technology 2011).

updating.¹²¹ As will be discussed, the economically relevant boundaries between these various segments are fluid and sometimes unclear. Unless otherwise specified, “users” or “customers” refer to businesses or other entities, rather than individual consumers.

Table 5. Cloud Computing Ecosystem (US and Europe)

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 enhances competitive conditions 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 in the US and European markets, Microsoft Azure (Azure) and Google Cloud (GC), launched in 2010 and 2013, respectively.¹²² (On a worldwide basis, Alibaba typically ranks as the third or fourth leading provider but is mostly active in Asian markets.¹²³) Each of these providers has invested (and continues to invest) billions of dollars in R&D and physical infrastructure to deliver cloud services that are competitive on price, latency, reliability, and other features.¹²⁴

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

¹²¹ Abhi Bhatnagar et al., *Cloud economics and the six most damaging mistakes to avoid*, MCKINSEY DIGITAL, May 3, 2022, <https://www.mckinsey.com/capabilites/mckinsey-digital/our-insights/cloud-economics-and-the-six-most-damages-mistakes-to-avoid>

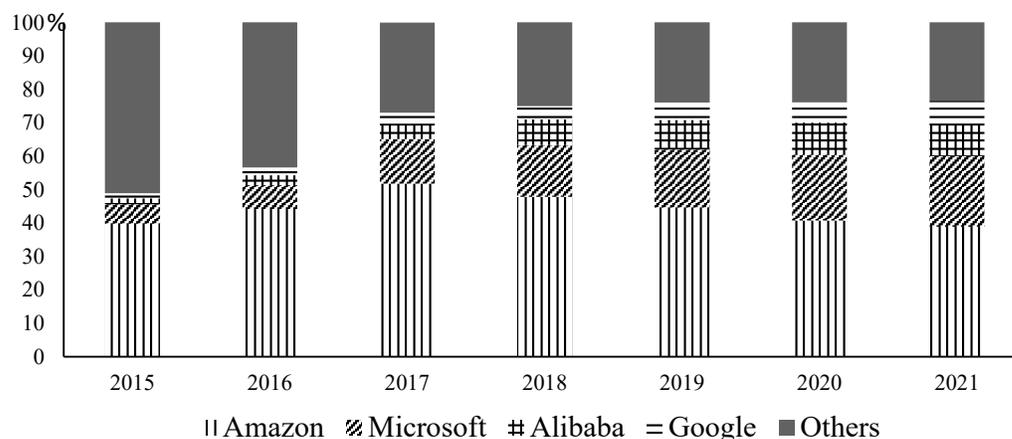
¹²² CBINSIGHTS, CLOUD WARS (2021), <https://www.cbinsights.com/research/briefing/cloud-wars-google-microsoft-amazon/>.

¹²³ See, e.g., Jacek Zmudzinski, *Cloud services comparison—market share, main differences*, FUTURE PROCESSING, Feb. 7, 2022, <https://www.future-processing.com/blog/cloud-services-comparison-market-share-main-differences/>; Marcus Law, *Top 10 biggest cloud providers in the world in 2023*, TECHNOLOGY, Feb. 15, 2023, <https://www.technologymagazine.com/top10/top-10-biggest-cloud-providers-in-the-world-in-2023>

¹²⁴ Aaron Bawcom et al., *Getting the most from cloud services and containers*, MCKINSEY DIGITAL, July 19, 2022, at 2, <https://www.mckinsey.com/capabilites/mckinsey-digital/our-insights/getting-the-most-from-cloud-services-and-containers#/>

environment characterized by network effects and economies of scale that drive the market to converge toward a small number of scale-efficient providers, 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.

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 larger business and governmental entities. As I will discuss subsequently, larger 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.

C. IS CLOUD COMPUTING PRONE TO MONOPOLY?

Some regulators, legislators, and commentators have identified the cloud computing market as a platform market that is prone to converge on a winner-take-most outcome in which a few providers capture the bulk of the market and can therefore “impose” adverse pricing and other terms on users.¹²⁵ Multiple characteristics of the cloud computing ecosystem fail to support this assertion.

¹²⁵ MAJORITY STAFF REPORT, *supra* note 10, at 109-120. See also notes 175-176 and accompanying discussion.

1. *Market Share and Market Power*

Concerns over market power in the cloud computing industry 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.”¹²⁶ This conclusory assertion of market dominance on the basis of concentration levels, whether applied to Amazon or other leading IaaS providers, is unpersuasive once the cloud market is examined in detail.

a. *Declining Concentration*

Concentration levels have been declining since Amazon launched the industry in 2006 with its AWS service. Based on estimates by Gartner, the revenue share held by AWS in the IaaS public cloud segment was almost 39% on a worldwide basis as of 2021 (see Table 6 above), which falls well below the 50% share that US courts and antitrust agencies generally recognize as being the minimum level necessary to potentially show monopoly power.¹²⁷ 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.”¹²⁸ Based on estimates by the Canalys consulting service, AWS’s revenue share declines if the relevant market is expanded to encompass IaaS, PaaS and “hosted” private cloud services, in which case AWS held an estimated 33% total revenue share in 2021.¹²⁹ Moreover, AWS’s revenue share has failed to grow for several years while revenue share has increased substantially for Azure since it entered the market in 2010 and GC since it launched in 2013. IBM and Oracle hold growing but still small percentages of the IaaS market.

b. *Preempting User Lock-In*

Contrary to some policymakers’ and scholars’ assertions¹³⁰, 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.¹³¹ 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 (but not eliminate) it by using multiple cloud providers.

¹²⁶ MAJORITY STAFF REPORT, *supra* note 10, at 113.

¹²⁷ 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”).

¹²⁸ PHILLIP E. AREEDA AND HERBERT HOVENKAMP, *FUNDAMENTALS OF ANTITRUST LAW*, Vol. 1, 5-26 (2020-21 Supplement).

¹²⁹ Ron Miller, *Cloud infrastructure market soared to \$178B in 2021, growing \$49B in one year*, TECHCRUNCH, Feb. 4, 2022.

¹³⁰ See, e.g., MAJORITY STAFF REPORT, *supra* note 10, at 113; see also *supra* notes 175-176 and accompanying discussion.

¹³¹ For extensive discussion, see MARKET STUDY CLOUD SERVICES, NETHERLANDS AUTHORITY FOR CONSUMERS AND MARKETS (Case no. ACM/21/050317/ Document no. ACM/INT/440323), at 55-57, 59-60 (2022), <https://www.acm.nl/system/files/documents/market-study-def-public.pdf>; Justice Opara-Martins, Reza Sahandi and Feng Tian, *Critical analysis of vendor lock-in and its impact on cloud computing migration: a business perspective*, 5 J. CLOUD COMPUTING 1 (2016).

The practice is widespread. 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.¹³² 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.¹³³ The Turbonomics Survey, which was conducted in 2019, 2020, and 2021, found that respondents reported avoiding user lock-in as the most important motivation behind the adoption of multi-cloud strategies.¹³⁴ A survey of 500 US-based firms conducted by Deloitte in 2022 found that between 75% and 86% of firms (the range depended on a firm’s “level of cloud maturity”) used at least two cloud service providers.¹³⁵ 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-service providers (public or private) on average and intended to use 3.1 cloud-service providers (public or private) on average in the next 12 months.¹³⁶

The regulatory consensus portrays the cloud market as the almost helpless victim of platform lock-in. Yet industry surveys and trade commentary show that users widely anticipate lock-in risk and actively seek mechanisms to mitigate it, which in turn has elicited technological innovations from firms that provide tools and services to manage cloud data storage across multiple providers.¹³⁷ These market responses conform to Oliver Williamson’s articulation of the hold-up problem (which logically encompasses lock-in risk in the cloud context¹³⁸), which posited that firms would foresee hold-up risk and undertake strategies to mitigate it.¹³⁹ As Williamson and other scholars observed, 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.¹⁴⁰ Or put

¹³² FLEXERA, 2022 STATE OF THE CLOUD REPORT 16 (2022) [hereinafter FLEXERA 2022]; FLEXERA, 2021 STATE OF THE CLOUD REPORT 10 (2021) [hereinafter FLEXERA 2021].

¹³³ 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.

¹³⁴ TURBONOMICS, *supra* note 133, at 7.

¹³⁵ DELOITTE CENTER FOR INTEGRATED RESEARCH, CLOSING THE CLOUD STRATEGY, TECHNOLOGY AND INNOVATION GAP 34 (2022).

¹³⁶ 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

¹³⁷ For similar observations, see Georgios Chatzithanasis et al., *Exploring Cost-Efficient Bundling in a Multi-Cloud Environment*, 111 SIMULATION MODELING PRACTICE & THEORY 102338 (2021); Pieter-Jan Maenhaut et al., *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).

¹³⁸ Hold-up risk arises in any relationship in which one party has made “asset-specific” investments that have no or a lower value in any other use, while the other party has made no such comparable asset-specific investment. The latter party is then in a position to renegotiate the terms of exchange to its advantage. For further explanation, see George S. Geis, *The Space Between Markets and Hierarchies*, 95 VA. L. REV. 99 (2009). Lock-in risk in the cloud-computing environment is a species of hold-up risk insofar as users make specific investments by uploading data to the cloud provider, which places the provider in a position to change the terms of use to its advantage.

¹³⁹ OLIVER E. WILLIAMSON, *MARKETS AND HIERARCHIES: ANALYSIS AND ANTITRUST IMPLICATIONS* (1975).

¹⁴⁰ *Id.*; Benjamin Klein, Robert G. Crawford, and Armen A. Alchian, *Vertical Integration, Appropriable Rents and the Competitive Contracting Process*, 21 J. L. & ECON. 297 (1978). Specifically, these scholars argued that antitrust enforcers had intervened mistakenly to impede various forms of vertical integration, failing to

differently: hold-up can only arise in circumstances involving what Williamson described variously as “guile” or other “subtle forms of deceit.”¹⁴¹ There is no indication that these circumstances arise in negotiations between cloud providers and prospective users. Regulators and commentators who have applied the hold-up concept to assert that the cloud computing sector is inherently prone to market failure in the form of user lock-in have only been able to reach this conclusion by implausibly assuming that sophisticated users lack foresight concerning a predictable risk that is widely discussed among industry participants and widely addressed to a substantial extent by software providers and technical consultants.¹⁴² This is not intended to imply that lock-in risk is immaterial in cloud-computing markets; rather, users are aware of this risk and take steps to mitigate (but not eliminate) it.

c. Credible Commitments Against User Lock-In

Regulators assert that cloud providers have natural incentives to “exploit” locked-in users. In a market in which users can multi-home across cloud providers and retain data on-premises, this statement does not withstand scrutiny. A provider that extracts 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 almost certainly exceeds by a large measure the number of existing clients. The same is true of applications and databases that existing users have not yet moved from on-premises infrastructure to cloud-based services as well as other applications and databases that those users may develop in the future.¹⁴³ Even after greater saturation levels have been achieved, cloud service providers would still likely operate under reputational discipline given that business users will continuously develop new cloud-enabled applications and databases, providing another opportunity for cloud providers to deploy reputational capital to elicit additional usage.

Given these anticipated future revenue streams from currently unserved users and a continuous flow of new applications and databases necessitating cloud storage services, a counterintuitive conclusion follows. Repeat-play cloud providers may have incentives not only to avoid acting opportunistically toward existing users but to provide prospective users with assurance up-front against lock-in risk. Absent such a commitment, informed users would demand a discount to reflect that risk or would hedge against it by limiting data storage at any single provider. Given that users can mitigate but not eliminate lock-in risk, a repeat-play provider has incentives to act “reasonably” and accrue a stock of reputational goodwill that can be deployed to commit against lock-in and, as a result, recruit new users and encourage existing users to expand usage.¹⁴⁴ These “fair play” incentives are consistent

appreciate that these structures were efficient responses to anticipated hold-up, rather than a source of market power.

¹⁴¹ OLIVER E. WILLIAMSON, *THE ECONOMIC INSTITUTIONS OF CAPITALISM* 47 (1985) (“By opportunism, I mean self-interest seeking with guile . . . Opportunism more often involves subtle forms of deceit”).

¹⁴² For a more nuanced regulatory discussion, see MARKET STUDY CLOUD SERVICES, *supra* note 131, at 56-57, which recognizes that firms widely use multi-cloud strategies but argues that these strategies are often not effective at reducing lock-in.

¹⁴³ On the future development of the cloud-enabled market, see 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>

¹⁴⁴ For a broader application of this point across platform markets generally, see Jonathan M. Barnett, *The Host’s Dilemma: Strategic Forfeiture in Platform Markets*, 124 HARV. L. REV. 1861 (2011).

with theoretical models of reputational effects in repeat-play environments¹⁴⁵ as well as previous research in which I found that technology platforms often take costly actions (including relinquishing control over “crown jewel” technologies) to commit credibly against adopting opportunistic pricing and other policies after users had invested in adopting the platform’s technology.¹⁴⁶

At least one cloud-services provider has conformed to this pattern in undertaking extensive and costly efforts to mitigate users’ exposure to platform lock-in. In 2014, Google released the Kubernetes platform, a software application that acts as a provider-agnostic “abstraction layer” to facilitate managing “containerized” data and applications that can be more easily moved across cloud services.¹⁴⁷ Google transferred ownership of Kubernetes to a neutral entity, The Cloud Native Computing Foundation, which then released the software under an open-source license.¹⁴⁸ As the laggard in the IaaS public cloud markets, Google’s decision to forfeit ownership over Kubernetes was apparently a strategy to attract users by constraining its ability to exploit user lock-in. The release and widespread adoption of the Kubernetes platform (it is now the most common container management tool¹⁴⁹) has in turn spawned a market of secondary tools and services (including services offered by GC, AWS, and Azure) to manage containers across a portfolio of cloud services and, as a result, mitigate users’ exposure to lock-in risk. Consistent with this interpretation, Red Hat (a subsidiary of IBM) describes how its software enables customers 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 . . .”¹⁵⁰

2. 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. Market performance is not consistent with 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 2018.¹⁵¹ Detailed analysis by

¹⁴⁵ Benjamin Klein and Keith B. Leffler, *The Role of Market Forces in Assuring Contractual Performance*, 89 J. POL. ECON. 615 (1981).

¹⁴⁶ Barnett, *supra* note 144, at 1869-74. This thesis has an important qualification: namely, firms may not always fully conform to long-term profit-maximizing strategies against engaging in opportunistic action if managers have incentives to take actions that maximize short-term profits, *see id.*, at 1883-84.

¹⁴⁷ 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>. Data collected by Gartner shows increasing adoption of container technology in the enterprise market, reporting 20% adoption as of 2017 and rising to 30% as of 2020. As of 2022, a survey by 451 Research (a subsidiary of S&P Global) of “IT decision-makers” at corporate enterprises found that more than 58% of respondents had adopted containers and an additional 31% were planning trials. *See* Emily Mell, *The evolution of containers: Docker, Kubernetes and the future*, TECHTARGET, Jan. 20, 2023.

¹⁴⁸ Sejuti Das, *Did Google Open Sourcing Kubernetes Backfire?*, AIM, Sept. 20, 2022.

¹⁴⁹ *Id.*

¹⁵⁰ 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>

¹⁵¹ MAJORITY STAFF REPORT, *supra* note 10, at 115-116.

industry analysts covering more recent years make similar observations.¹⁵² This is consistent with an industry structure characterized both by economies of scale and pricing competition among leading providers. This yields a virtuous result: as the user base expands, the provider amortizes its fixed costs (which are especially high in the IaaS segment of the cloud market¹⁵³) and, given the presence of actual or potential rivals, operates under competitive discipline to pass on a substantial portion of those cost-savings to consumers.

Consistent with this favorable interpretation, the price decline for cloud services took place concurrently with the emergence of Azure, GC and other providers as effective challengers to Amazon in the IaaS public cloud segment. Contrary to the attribution of “unquestioned leadership” to AWS in the 2020 Majority Staff Report¹⁵⁴, 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.¹⁵⁵ 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.¹⁵⁶ 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.¹⁵⁷ (In all surveys, the total exceeds 100% because many firms use both services concurrently.)

These figures suggest an increasingly competitive cloud services market 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 2022.¹⁵⁸ For 2021, Gartner reported a 41.4% increase in revenues for the worldwide public IaaS market.¹⁵⁹ 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.¹⁶⁰ The combination of declining prices, expanding output, increasing quality, and

¹⁵² 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-since-2013-research-reveals> (observing a 66% decline in prices for “entry-level” cloud computing services during 2013-2015).

¹⁵³ MARKET STUDY CLOUD SERVICES, *supra* note 131, at 43 (noting that data centers’ infrastructural and operating costs are “mostly fixed investments” and substantial economies of scale are achieved as the user base expands) and 47-48 (noting that IaaS providers must incur significant R&D costs, which can be amortized across a large user base).

¹⁵⁴ See *supra* note 126.

¹⁵⁵ TURBONOMICS, *supra* note 134, at 26.

¹⁵⁶ FLEXERA 2022, *supra* note 132, at 64.

¹⁵⁷ *Id.*, at 66.

¹⁵⁸ T4, CLOUD COMPUTING MARKET SHARE, <https://www.t4.ai/industry/cloud-computing-market-share>

¹⁵⁹ GARTNER, *Gartner Says Worldwide IaaS Cloud Services Market Grew 41.4% in 2021*, June 2, 2022, <https://www.gartner.com/en/newsroom/press-releases/2022-06-02-gartner-says-worldwide-iaas-public-cloud-services-market-grew-41-percent-in-2021>

¹⁶⁰ 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*,

the entry of well-resourced competitors runs counter to the view that the cloud ecosystem is characterized by an entrenched monopoly in which dominant providers exercise market power over “locked-in” users. Of course, under sufficiently concentrated conditions, it may be the case that a dominant provider can exert pricing power resulting in deadweight losses that offset these efficiency gains. However, it appears that the cloud market currently operates under competitive conditions in which repeat-play IaaS providers operate under incentives to maintain service quality, to match competitors’ technological innovations, and to pass on to users a substantial portion of the cost-savings achieved through economies of scale.

3. Hybrid Cloud Environments

The ability to allocate cloud service consumption across multiple providers challenges the 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 storage infrastructure.¹⁶¹ 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.¹⁶² The Flexera Survey conducted in 2021 found that 80% of respondents reported using at least one public and one private cloud service while all respondents still made substantial use of on-premises infrastructure.¹⁶³ Consistent with the latter finding, the trade press reports that certain users still view on-premises infrastructure as the potentially lower-cost option for certain uses or industry segments¹⁶⁴, which suggests that on-premises data services should sometimes be included within the relevant market for purposes of assessing a cloud provider’s pricing power.

These findings describe a market environment that departs significantly from the stylized model of user lock-in and cloud-provider 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. A CIO’s selection of providers is facilitated by third parties that provide software tools to manage applications and data flows across the resulting portfolio of cloud-service providers and on-premises hardware. Given the ability of users to hedge against lock-in risk by spreading applications and databases across multiple cloud-services providers, coupled with (in the case of certain users) internal on-premises and private-cloud data-storage capacities, any provider must

CONNECTORSUPPLIER, Oct. 20, 2020, <https://www.connectorsupplier.com/top-12-trends-rise-of-the-data-center-to-cloud-and-edge-computing/>

¹⁶¹ PHILIP TRAUTMAN, HYBRID AND MULTICLOUD MANAGEMENT (2021), at x.

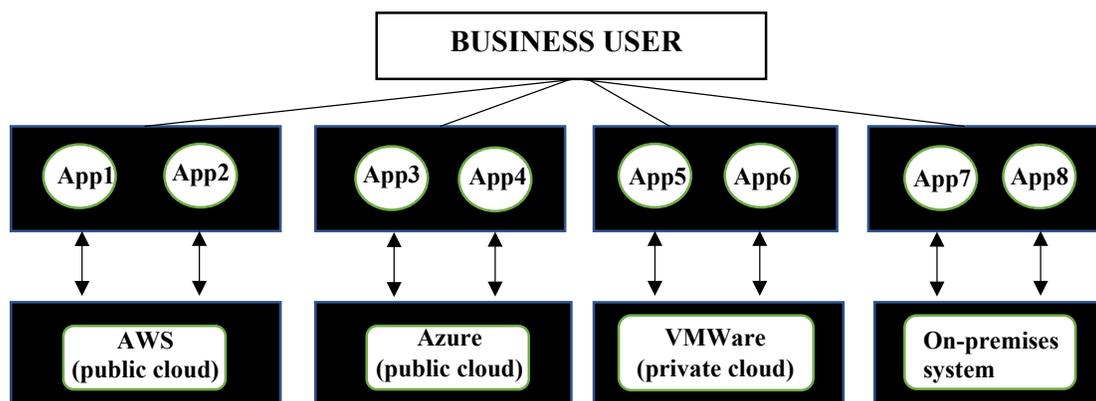
¹⁶² FLEXERA 2022, *supra* note 132, at 76; FLEXERA 2021, *supra* note 132, at 64.

¹⁶³ FLEXERA 2022, *supra* note 132, at 21, 28.

¹⁶⁴ Martin Dale Bolima, *The Economics of the Cloud: It Is Not What You Think It Is*, Data&StorageASEAN, Feb. 16, 2023, <https://datastorageasean.com/daily-news/economics-cloud-it-is-not-what-you-think-it>; David Linthicum, *2023 could be the year of public cloud repatriation*, InfoWorld, Jan. 3, 2023, <https://www.infoworld.com/article/2684369/2023-could-be-the-year-of-public-cloud-repatriation.html>; Bawcom et al., *supra* note 124.

anticipate a reduced number of users and volume of usage (and associated declines in revenue) if it takes actions concerning pricing or quality that take advantage of existing users' investments in adopting the cloud provider's infrastructure. Contrary to the assumptions that appear to drive some regulatory commentary, users' multi-homing capacities render opportunism a costly proposition for even the largest cloud-services providers.

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.

4. Product Differentiation

Cloud services are not a homogeneous good and the users of cloud services do not have homogenous technical requirements and business objectives. 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. Each of those cloud-services bundles appeal to the preferences of different user populations. For example, Azure can offer integration with Microsoft's Office application suite and may therefore be preferred by users who value office productivity applications, GC may be preferred by users who value Google's recognized strengths in machine learning and artificial intelligence technologies¹⁶⁵, and AWS is well-suited to firms that develop and distribute gaming or video-intensive applications.¹⁶⁶ Intense competition over pricing and quality in the IaaS market—what the trade press calls the “commoditization” of the cloud services 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 industry segments (for example, certain cloud providers focus on healthcare, retail, or financial “verticals”).¹⁶⁷ Additionally, cloud providers differ in the number of physical data centers that they maintain, the locations of those centers, and the transmission

¹⁶⁵ On Google's integration of cloud-computing services and artificial-intelligence capacities, see Julia Love, Dina Bass, and Davey Alba, *Google Is Rolling Out More Features for Customers in the Cloud*, BLOOMBERG, Mar. 15, 2023; Julia Love, Dina Bass and Davey Alba, *Google is Rolling Out More AI Features for Customers on the Cloud*, BLOOMBERG, Mar. 14, 2023.

¹⁶⁶ I thank Lew Zaretski for this observation.

¹⁶⁷ FLEXERA 2021, *supra* note 132, 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/>

network among data centers, which can impact latency in data transmission for end-users of clients' websites (and are therefore in turn valued by clients who provide services to those users).¹⁶⁸

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.

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 and Office applications) 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."¹⁶⁹ In short: nominal boundaries between different segments of the cloud computing "stack"—a fluid mix of data-storage 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) may not always 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 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.

¹⁶⁸ FLEXERA 2021, *supra* note 132, at 30. In a geographic area in which a single provider maintains sufficient physical infrastructure to deliver cloud services at high performance levels, it may exert pricing power. This outcome is unlikely to arise in major metropolitan markets that are serviced by multiple providers. Additionally, a cloud provider's pricing power may be constrained by the availability of "edge computing" services, which deliver cloud services through localized data centers and mitigate latency challenges involved in transmitting data to a central server, see Roy Ikin, *25 cloud trends for 2021 and beyond*, ACCENTURE, Mar. 4, 2021, <https://www.accenture.com/nl-en/blogs/insights/cloud-trends>; MCKINSEY, *McKinsey Technology Trends Outlook 2022: Cloud and edge computing* (Aug. 2022), <https://www.mckinsey.com/spContent/bespoke/tech-trends/pdfs/mckinsey-tech-trends-outlook-2022-cloud-edge.pdf>. The same concern could be raised concerning a single provider that provides a specialized bundle of cloud and non-cloud services targeted at a specific market segment. The ability to achieve pricing power in that context would be limited to the extent competing providers can replicate certain elements of the provider's specialized service bundle (for example, Google's Workplace office productivity suite mimics and arguably outperforms certain features of Microsoft's Office suite), either independently or through partnerships with other software providers (on the latter possibility, see *infra* note 169 and accompanying discussion). I thank a referee for raising these points.

¹⁶⁹ Amazon, VMWare Cloud on AWS Partner Initiative, <https://aws.amazon.com/partners/vmware/>; Microsoft, Azure Red Hat OpenShift, <https://azure.microsoft.com/en-us/products/openshift>.

Third, high levels of concentration in IaaS and PaaS public cloud segments may not be a sufficient cause for concern if this is a precondition for efficiently providing a technological infrastructure that promotes the development by other firms 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, which in turn may reflect the prolific opportunities for product differentiation in the SaaS segment.¹⁷⁰ Rather than representing a competitive danger, consolidation in the infrastructural segments of the cloud computing ecosystem promotes the emergence of a handful of standardized and scale-efficient hubs that support a dynamic population of differently sized providers in specialized software segments. Contrary to the concerns raised by some regulators and commentators, 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 in turn supply a rich inventory of tailored cloud-enabled applications for end-users. Proposed interventions on antitrust grounds based largely on concentration levels in the IaaS and PaaS segments must contemplate whether any such intervention would threaten the efficient transactional structures that have yielded dramatic efficiency gains throughout the cloud-based ecosystem as a whole.

5. Summary

Based on available evidence, 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 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 infrastructure), 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.)

D. 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.¹⁷¹ 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 market shows why both positions are misguided.

The cloud-computing market illustrates the importance of examining *actual* competitive conditions and, in particular, whether the relevant market meets the criteria necessary to support a plausible claim of market power—in the absence of which any monopolization

¹⁷⁰ One estimate found that no single provider had greater than a 9% revenue share of the SaaS segment, as of 2019. T4, *infra* note 158.

¹⁷¹ On this point, see Elyse Dorsey, *Anything You Can Do, I Can Better—Except in Big Tech? Antitrust’s New Inhospitality Tradition*, 68 KANSAS L. REV. 975 (2021).

claim is *implausible*. (Attempted monopolization does not require a showing of current market power but does require showing that a firm has a “dangerous probability” of achieving market power and is using anticompetitive practices to achieve that objective.¹⁷²) Moreover, even if market power has been established, it is necessary to take into account offsetting efficiencies to assess whether a contested practice on balance has a net positive effect on competitive conditions. In the cloud computing ecosystem, failure to undertake a balancing analysis (as implemented through the various forms of the rule of reason¹⁷³) 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—probably by dramatic proportions—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 into the FDS market 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.¹⁷⁴

Any unnecessary intervention in cloud computing services on antitrust grounds risks reversing these efficiency gains that promote competitive conditions well beyond the cloud-service market. The error costs of basing antitrust enforcement on conjectural assertions can be illustrated by two business 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 doubt on this assessment.

1. *Bundling*

In an “impact assessment support study,” the European Commission expressed concerns that leading cloud providers may impede competition by bundling cloud services with those providers’ existing complementary software services.¹⁷⁵ A report prepared by Prof. Frédéric Jenny for CISPE, a trade association of European cloud-service providers (and AWS), expresses similar concerns, specifically contending that Microsoft and Oracle discourage

¹⁷² See *supra* note 7.

¹⁷³ 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).

¹⁷⁴ A complete welfare analysis would assess the extent to which comparable efficiencies could be delivered under lower levels of concentration (which may then result in lower prices for users, resulting in a net welfare gain). This is akin to the “least restrictive alternative” prong in a fully extended rule-of-reason analysis of vertical (or, less commonly) horizontal that generate efficiency gains. Absent some reasonable factual support to support this counterfactual analysis, however, it would fall prey to the “Nirvana” fallacy (see Harold Demsetz, *Information and Efficiency: Another Viewpoint*, 12 J. L. & ECON. 1 (1969)).

¹⁷⁵ EUROPEAN COMMISSION DIGITAL MARKETS ACT – IMPACT ASSESSMENT SUPPORT STUDY – ANNEXES 15, 24-25, 45, 171, 179, 244-46, 250-68 (2020). For similar concerns expressed by the Dutch competition regulator, see MARKET STUDY CLOUD SERVICES, *supra* note 131, at 51-52.

unbundled sales through the fees assessed when users license Microsoft’s office productivity software or Oracle’s database software separately.¹⁷⁶ More specifically, both studies suggest that these bundling practices can raise entry costs for providers of “stand-alone” cloud services that cannot match the full suite of complementary applications offered by the incumbent (or cannot do so on a price-competitive basis). CISPE and other European cloud-services providers have filed complaints with the EU Commission concerning Microsoft’s bundling practices.¹⁷⁷ While these are legitimate concerns, it is not clear that barring or limiting bundling practices in the cloud-services market would result in a net improvement of competitive conditions. There are several reasons.

Since the IaaS segment currently supports multiple providers, users can multi-home, and the cloud market is far from being saturated, it appears that no single firm plausibly wields market power. Hence, it appears unlikely that bundling strategies could be used for anticompetitive purposes without eliciting a punitive response from rival providers. Any user is free to compare bundling options offered by the three leading firms (AWS, Azure, GC) along with additional well-resourced entrants (Oracle and IBM), each of which offers users different functionalities that complement the cloud service. Moreover, firms can hedge against the risk of provider opportunism through a multi-cloud strategy that comprises different bundles of public cloud, private cloud, and on-premises services. For example, Uber recently elected to move its data-storage functions from internal servers to cloud providers and specifically selected a combination of Google and Oracle both to hedge against lock-in risk and to take advantage of each provider’s non-cloud complementary services.¹⁷⁸ Lastly, as discussed previously, repeat-play cloud providers have incentives to avoid opportunistic practices given existing users’ ability to shift future databases and uses to other providers and the large population of unserved users that have not yet selected any provider.

It is true that bundling raises entry costs for firms that offer a stand-alone service in a particular segment of the cloud computing stack and cannot match the suite of complementary applications offered by an existing provider. (This would encompass AWS that, unlike GC, lacks an office productivity suite to rival MS Office—which may explain its otherwise anomalous membership in CISPE.) Yet this potential impediment to entry must be balanced against three countervailing positive effects that bundling can exert on competitive conditions in the cloud ecosystem.

First, bundling enables providers to offer users enhanced functionalities to the extent that a provider can integrate its cloud and non-cloud services in a single package. Relatedly, if an integrated suite comprising cloud and non-cloud services provides a more reliable user experience as compared to “mix and match” bundles assembled by users from multiple sources, then a differential pricing strategy to induce users to purchase a bundled package comprising cloud services and a complementary software application may enhance service

¹⁷⁶ FRÉDÉRIC JENNY, CLOUD INFRASTRUCTURE SERVICES: AN ANALYSIS OF POTENTIALLY ANTI-COMPETITIVE PRACTICES 5-7, 32 (prepared for CISPE, Oct. 2021) [hereinafter JENNY REPORT], <https://www.fairsoftwarestudy.com>. On the concerns relating to Oracle’s and Microsoft’s license fees, see *id.*, at 24-25. Microsoft has apparently modified its fee schedule in response to antitrust scrutiny and customer backlash, see Charlotte Trueman, *Microsoft offers to change cloud licensing practices to avoid EU antitrust probe, says report*, COMPUTERWORLD, Mar. 30, 2023.

¹⁷⁷ Peter Sayer, *Microsoft faces new antitrust complaint over cloud software licensing in Europe*, CIO, Nov. 10, 2022, <https://www.cio.com/article/411633/microsoft-faces-new-antitrust-complaint-over-cloud-software-licensing-in-europe.html>

¹⁷⁸ Belle Lin, *Uber Signs Cloud Deals with Google and Oracle*, WALL ST. J., Feb. 13, 2023

quality and strengthen the provider’s reputational goodwill in competing to secure users (and elicit increased usage from existing users) in the cloud-services marketplace.¹⁷⁹

Second, even stand-alone entrants can sometimes construct service bundles through partnerships with other firms, as illustrated by the previously discussed alliance between, on the one hand, private cloud and PaaS providers such as VMWare and RedHat, and, on the other hand, IaaS providers such as AWS and Azure.¹⁸⁰ Alternatively, the same outcome can be achieved on a permanent basis through combination transactions. For example, Slack, a work collaboration tool that had struggled to compete with Microsoft’s Teams application, which is mostly distributed as a bundled component of the MS Office suite, was acquired in 2020 by Salesforce, one of the largest SaaS firms, which then integrated Slack into its customer relationship management platform.¹⁸¹

Third, and most critically, bundling enables certain entrants to challenge incumbents by offering a differentiated combination of cloud and non-cloud services that addresses the requirements of certain user populations. In the cloud market, this is one of the principal strategies used by Azure and other entrants to challenge AWS’s leadership in the market. Microsoft bundles its Azure cloud service with its office productivity software, Google bundles its cloud services with its machine learning and search services, Oracle bundles cloud services with its database management software, and Alibaba bundles its cloud services with its e-payment and digital commerce services.¹⁸² Given the apparently intense competition among major cloud-services firms and the function played by bundling strategies in enabling entrants to challenge incumbents, bundling practices may be best understood as principally an effort to attract customers by offering differentiated bundles of cloud and non-cloud complementary services. Any legal limitation on bundling practices for the purpose of facilitating entry by stand-alone cloud providers—which represents only one particular type of cloud provider—could therefore have adverse effects on competitive conditions in the cloud-services market as a whole.

2. 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 an anticompetitive strategy to deter entry.¹⁸³ Contrary to this now-common understanding of egress fees as an “exit penalty,” the economics of the IaaS cloud segment provide three reasons why the widespread use of egress fees most likely does not raise antitrust concerns.

First, providers should be expected to assess *some* positive fee for data transfers to cover the costs incurred by the provider in executing that transfer, including telecom service fees, usage of the provider’s servers and other infrastructure, and IT personnel costs. This explains why IaaS cloud providers typically assess egress fees not only on data withdrawals at the end

¹⁷⁹ On the offsetting foreclosure and quality-control effects of bundled discounts, see Herbert J. Hovenkamp, *Tying Arrangements and Lawful Alternatives: Transaction Costs Considerations*, UNIV. IOWA LEGAL STUDIES RESEARCH PAPER (2011).

¹⁸⁰ See *supra* note 169; see also JENNY REPORT, *supra* note 176, at 21 (noting that it is common for cloud providers to sub-license software from third parties as part of a package offered to customers).

¹⁸¹ Associated Press, *Salesforce to buy Slack in \$27.7bn deal aimed at competing with Microsoft*, THE GUARDIAN, Dec. 1, 2020.

¹⁸² On Microsoft Azure and Oracle, see Lin, *supra* note 178; on Google and Alibaba, see Raffaele Huang, *Amazon, Microsoft, Google Pressured by Chinese Cloud Rivals in Southeast Asia*, WALL ST. J., Feb. 13, 2023.

¹⁸³ MAJORITY STAFF REPORT, *supra* note 8, at 117-118. For related discussion, see Belle Lin, *Amazon’s Next Cloud Battleground is Over Egress Fees*, BUSINESS INSIDER, Oct. 5, 2021.

of service but on internal data transfers by users across different geographic regions serviced by the same provider (and therefore would be more appropriately called “transit fees”).¹⁸⁴ Moreover, since IaaS cloud providers typically do not charge any “ingress” fee when users upload data, the egress fee also encompasses the resource costs incurred by the provider in connection with the data uploading process. Hence some portion of the egress fee simply reflects the aggregate costs incurred by the provider for data transfers into, within, and out of the system.

Second, for the reasons discussed throughout, it does not appear that any individual cloud provider currently 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 discourage 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 some cloud providers compete on the size of egress fees—for example, by removing fees on smaller amounts of data or eliminating them altogether.¹⁸⁵ Relatedly, if egress fees are viewed as part of a total lifetime fee package (comprising per-use fees assessed continuously and fees assessed periodically for certain data transfers), providers that impose an apparently higher egress fee on data transfers might impose a lower fee on other elements of the package of cloud and non-cloud services. That is: the “burden” imposed by egress fees on users cannot be evaluated without assessing the other components of the total lifetime fee package.

Third, egress fees may operate as an efficient cost-recovery device in light of the costs incurred by providers to acquire customers and users’ ability to shift data usage across cloud-service providers. Aside from the resource costs associated with data transfers as described above, cloud providers incur significant sales and marketing expenses to “acquire” customers¹⁸⁶, including discounts and free usage often provided for an initial period.¹⁸⁷ If a user terminates service or shifts substantial usage to other providers or on-premises infrastructure, then the provider may be unable to recover those costs. Hence egress fees may constitute in part a mechanism to protect the provider against the risk of incurring losses on the recruitment of new users.

V. 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-services 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 firms exert durable pricing power—can only arise in limited circumstances that meet a demanding set of

¹⁸⁴ Benjamin Jenkins, *Why Cloud Data Egress is Expensive*, THE NEW STACK, Nov. 15, 2022, <https://www.thenewstack.io/why-cloud-data-egress-is-expensive/>; Birender Pal et al., *Overview of Data Transfer Costs for Common Architectures*, AWS ARCHITECTURE BLOG, Jun 30, 2021, <https://aws.amazon.com/blogs/architecture/overview-of-data-transfer-costs-for-common-architectures/>

¹⁸⁵ Stephens, *supra* note 152 (noting “an emerging battle around egress costs, both between direct cloud competitors (like Oracle) and adjacent categories (like Cloudflare)”).

¹⁸⁶ Mary D’Onofrio and Ethan Ding, *Scaling to \$100 Million*, BESSEMER VENTURE PARTNERS, Sept. 21, 2021, <https://www.bvp.com/atlas/scaling-to-100-million>

¹⁸⁷ MARKET STUDY CLOUD SERVICES, *supra* note 131, at 5, 27.

qualifying conditions.¹⁸⁸ To be clear, this is not to say that these circumstances cannot arise; however, as is the case for antitrust analysis generally, the point must be demonstrated with sufficient rigor in each specific market. This methodological point has a substantive implication for antitrust policy. If an entrenched monopoly is not the typical outcome in platform environments, then a preemptive approach based on rigid bright-line rules—the approach that appears to be 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. Contrary to increasingly conventional wisdom that platform markets necessarily converge on durable monopoly outcomes, which would justify preemptive regulatory action, 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.

¹⁸⁸ This potentially surprising finding is consistent with other scholars' findings that horizontal mergers between platforms tend not to result in higher prices or other harms to consumer welfare, see Rietveld and Schilling, *supra* note 4, at 1541.