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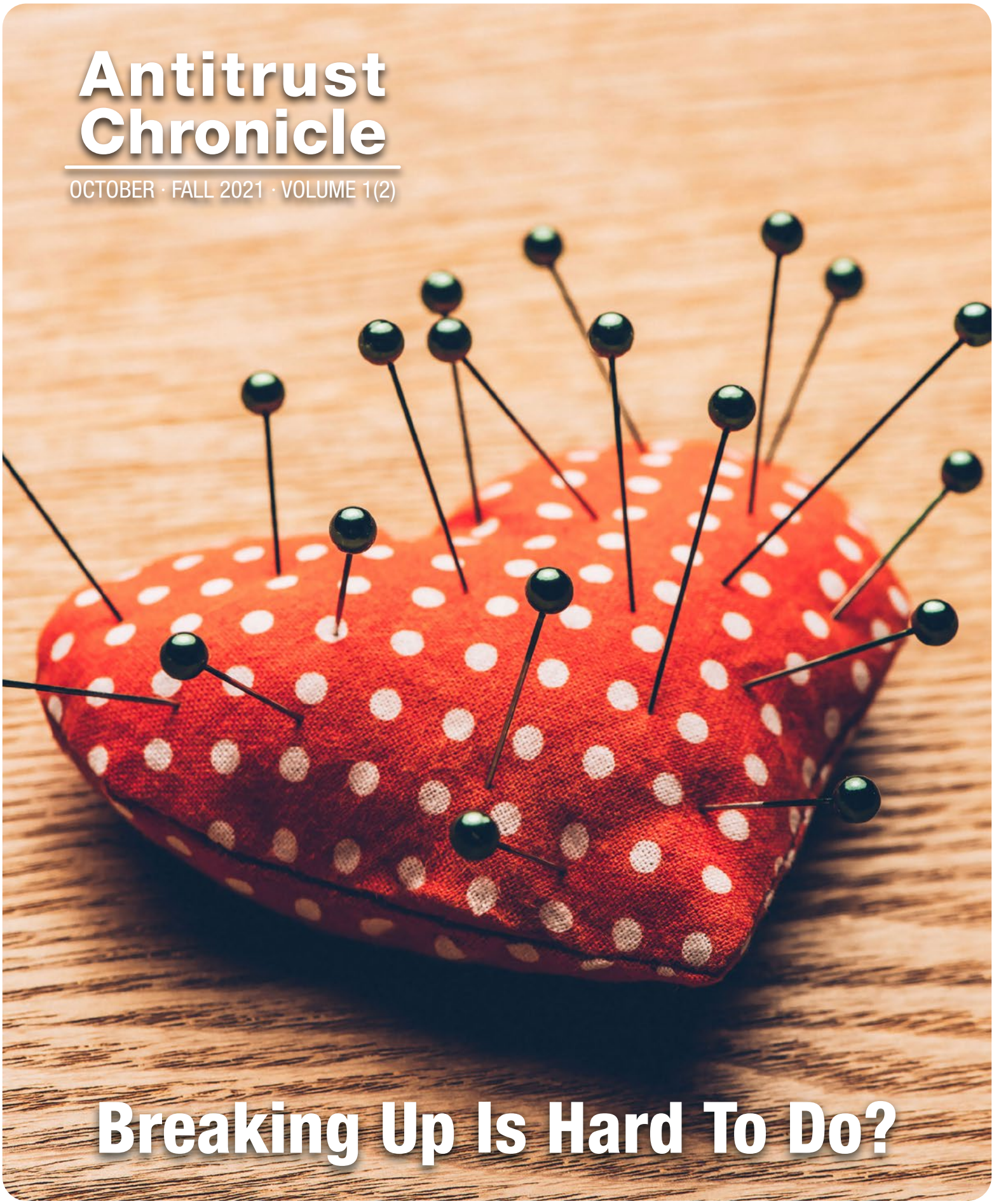

Breaking Up Is Hard To Do?

CPI COMPETITION POLICY INTERNATIONAL

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LETTER FROM THE EDITOR

Dear Readers,

Can you unscramble an egg? This is the analogy that many commentators apply to the question of breaking up a company with market power. The question of whether antitrust regulators should enforce a remedy amounting to the breakup of a company raises multifaceted issues.

Calls for breaking up monopolies largely focus on proving that past acquisitions are anticompetitive. Another major concern relates to the occasional request to break up a single large company. After establishing that an anticompetitive merger or other act has occurred, there is frequently skepticism of breakups as a remedy. Are governments competent to execute such a difficult task? Past examples include the breakups of Standard Oil and AT&T, and the success of these solutions remains subject to scrutiny. Even advocates of more vigorous antitrust enforcement frequently recommend less radical remedies.

That said, the call for such breakups is not uncommon in contemporary antitrust discourse. A key question thus relates to the question of whether these breakups are an effectively administrable remedy that actually benefits consumers.

The pieces in this Chronicle address the above issues in their various facets, based on viewpoints from key antitrust enforcement jurisdictions.

As always, many thanks to our great panel of authors.

"They say that breaking up is hard to do…
…Comma, comma, down dooby doo down down"

Sincerely,
CPI Team

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Antitrust and policy circles are abuzz with calls against the power, monopoly and other, held by large firms. If one is worried about a firm being too large, then the solution seems obvious: break up the firm and surely that will solve the problem. Any attempt to break up large firms is likely to face many practical and legal challenges. In this article I ask whether breakup is the correct answer, even if these challenges can be overcome.

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Common regulatory perspective on the relationship between data, value, and competition in online platforms has increasingly centered on the volume of data accumulated by incumbent firms. This view posits the existence of "data network effects," where more data leads to product improvements, which in turn leads to additional users and more data. In particular, this has raised concerns around incumbent data advantage creating an insurmountable barrier to entry and leading to winner-take-all outcomes in online platforms. However, this perspective generally does not reflect the value of data in practical settings. More recent work across economics, management science, and engineering shows that there are a variety of factors that impact the value of data and that implications for competition are much more complex and subtle. The framework in this paper presents four key factors – data quality, scale and scope of data, and data uniqueness – that can influence the value that firms can derive from data. Applying the framework to Netflix, Waymo, and the online advertising industry provides compelling evidence that incumbent data advantage, while generating value for innovation and for the consumer experience, does not necessarily lock out competitors and is not determinative of success. These examples illustrate that data can often serve as a catalyst for innovation that benefits both consumers and the broader ecosystem. The extent to which data accumulation can provide actual incremental value, and whether this is a cause for concern in enabling healthy competition, requires a case-by-case evaluation using the framework, as these factors depend significantly on the domain and context.

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WHAT'S NEXT?

For November 2021, we will feature Chronicles focused on issues related to (1) **Corporate Compliance**; and (2) **TechREG**.

ANNOUNCEMENTS

CPI wants to hear from our subscribers. In 2022, we will be reaching out to members of our community for your feedback and ideas. Let us know what you want (or don't want) to see, at: antitrustchronicle@competitionpolicyinternational.com.

CPI ANTITRUST CHRONICLES DECEMBER 2021

For December 2021, we will feature Chronicles focused on issues related to (1) **CRESSE Insights**; and (2) **Grocery Sector**.

Contributions to the Antitrust Chronicle are about 2,500 – 4,000 words long. They should be lightly cited and not be written as long law-review articles with many in-depth footnotes. As with all CPI publications, articles for the CPI Antitrust Chronicle should be written clearly and with the reader always in mind.

Interested authors should send their contributions to Sam Sadden (ssadden@competitionpolicyinternational.com) with the subject line "Antitrust Chronicle," a short bio and picture(s) of the author(s).

The CPI Editorial Team will evaluate all submissions and will publish the best papers. Authors can submit papers on any topic related to competition and regulation, however, priority will be given to articles addressing the abovementioned topics. Co-authors are always welcome.

CPI TALKS…

…with Catherine Tucker

In this edition of CPI Talks we have the pleasure of speaking with Catherine Tucker, the Distinguished Professor of Management at MIT Sloan.

Thank you, Professor Tucker, for taking this time to talk to CPI.

1. Is the breaking up of a company ever viable as an antitrust remedy? What has the historical experience taught us thus far?

As an undergraduate in economics, I was reared on stories of breaking up natural monopolies. Indeed, the industrial organization of the 1980s and 1990s was focused on questions of whether you could take a natural monopoly and make it more efficient by breaking it up.

The economics underlying breakup remedies, when it came to the apparent natural monopolies of the 1980s, was reasonably straightforward. The argument was that there were natural economies of scale in erecting and maintaining phone lines, for example. This implied that the existing incumbent would always have a sustained competitive advantage over an entrant.

Typically, the rationale now given for the breakup of platforms is that there are network effects that lead to a natural monopoly. I have written extensively why this viewpoint does not reflect the empirical literature in economics on the nature and scope of network effects.

However, even if one ignores this empirical literature, and tries to make the case that network effects do lead to natural monopoly, the underlying nature of the economics of that argument means that breakup is not an attractive remedy.

2. What about the welfare effects of breakup remedies? Are breakup remedies effective at improving consumer welfare?

The key difference between network effects and economies of scale is that at their essence, network effects are a demand-side phenomenon. Network effects enter directly into a prospective platform users' utility function. Indeed, when I teach entrepreneurs how to build platforms, I get them to mentally model the likelihood of their acquiring a customer as being a function of the network effects they can create.

By contrast, economies of scale do not directly enter into a consumer's utility function. Instead, they allow a producer to supply a good at a cheaper cost than its rivals. Much of antitrust debate is focused on the question of how much of that cost advantage benefits the consumer in terms of lower prices, relative to benefiting the firm in terms of higher profit margins. However, this economic ambiguity of how the gains of lower costs are split between consumer and firm does allow for debate. It also means that a regulator intent on breaking up a firm to limit economies of scale could perhaps argue that consumers could in theory still benefit, because if competition leads to lower profit margins, then this could counteract naturally higher costs and still lead to lower prices.

By contrast, because network effects directly enter into a platform's utility function, there is no ambiguity that a breakup focused on curtailing network effects would diminish platform users' utility directly. And there is no clear argument about lower prices that would help temper this direct reduction in utility. First, many users of platforms pay a zero price or are subsidized. Second, the reason a user-group on one side of the platform is typically subsidized is because users on the other side of the platform benefit asymmetrically from their presence. If we restrict a platform's ability to construct network effects, then the rationale for a cross-subsidy disappears. So that means that not only do you have a reduction in welfare from the direct eradication of network effects, but you extinguish one rationale for a mutually beneficial cross-subsidy. In other words, if a regulator seriously believes in the argument that network effects lead users to be persistently attracted to a particular platform, then any breakup remedy designed to curtail platforms' network effects will negatively affect consumer welfare.

3. Could breakup remedies be effective at increasing competition between so-called “digital platforms”?

There are many reasons to think that network effects are localized and fragile in nature and unlikely to give sustained competitive advantage. But let us imagine a two-sided platform where regulators have managed convincingly to demonstrate empirically that the network effects of that platform are both global and persistent in a way which led to a winner-takes-all market. What would that imply for the likelihood of a breakup improving competition?

Well, in some sense, it seems almost a trite question to ask. If you seriously believe that network effects are persistent and global enough to lead to a winner-takes-all market, then the effects of any breakup will be temporary. All that will happen is you take the ‘Winning’ platform, and temporarily split it into two platforms that compete. However, the same network effects that drove the decision to break up the platform will also lead to the re- emergence of a single winner, and the stronger the network effects are that the regulator is trying to counteract, the quicker that will happen.

ANTITRUST AND BIG TECH BREAKUPS: PIERCING THE POPULAR MYTHS BY CAUTIOUS INQUIRY

BY ELEANOR M. FOX & DONALD I. BAKER[1]

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I. INTRODUCTION

"Antitrust" had been a low-profile technical discipline for decades. But then came the rise of Big Tech/Big Data platforms, an explosion of public fear that the platforms are taking over our lives and minds, political campaigns highlighting their alleged predations, and the emergence of a popular narrative that goes like this:

The Big Tech firms are pervasive, abusive and dangerous; enemies of the people. They subvert democracy and the economy. They misuse our data, they gobble up rising stars, they sabotage firms that compete on their platforms, they wall-in their gardens and dig moats around their castles. They spread disinformation and nurture divisiveness. *They are too big and powerful. Antitrust is the tried and trusted tool. Break 'em up.*[2]

We write this essay to push back on the myth-telling and to cast a clear eye on what is the problem and what are the questions that should inform any restructuring solution. We focus on single-firm monopolization, not monopoly achieved by mergers. First, we identify the myths, prominently including the viral non-sequitur: These are monopolies, so use antitrust to break them up. Second, we frame the inquiry: Why breakup? What is the problem? Does break-up fit as a solution? Third, we revisit the history of antitrust and breakups and find the past breakups few, unique and not particularly helpful for understanding the wisdom of restructuring proposals for innovation-based monopolies. Fourth, we highlight the special case of *United States v. AT&T*, which is the only U.S. antitrust breakup of modern times and is an unusual example where the structural remedy snugly fitted the competitive problems and created positive incentives for innovation and competitiveness. Fifth, we conclude, observing that breakups are not a standard remedy to cure Sherman Act Section 2 monopolization violations, but they are still a possible judicial option following proof of seriously anticompetitive conduct supported by market structure, as well as a possible legislatively-mandated remedy based on other public interest concerns. While realism about history might temper expectations for a rosy post-breakup world, breakup is clearly an issue on the public policy table now, and we recount experience and frame questions that should inform a decision to break up, or not to break up, today's newly dominant platforms.

As noted, we focus on monopoly achieved primarily by internal growth, not by mergers and acquisitions.[3] The merger and acquisition problem is different for three reasons. First, divestiture is logically the remedy of choice to restore the status quo ante when the acquisitions *caused* the competitive problem. Second, to the extent the acquisition was of stock that could be divested or assets that had been held separate, divestiture can be a relatively easy task. Third, a default rule of divestiture for illegal acquisitions promotes incentives not to make anticompetitive acquisitions in the first place. Despite these essential differences, we shall reference certain classic cases of illegal acquisitions and consolidations for they are famously part of the U.S. narrative of breakup.

II. THE MYTH-MAKING

"These firms are monopolies. Antitrust breaks up monopolies. Break them up."

This statement is fundamentally incorrect. Words can be cheap. Yet a word can conjure up images that speak a thousand words and touch heartstrings. "Monopoly" and "breakup" are two such words. The idea that very large firms are monopolies, and that Big Tech/Big Data platforms are monopolies, has spread like wildfire across the country and around the globe. So too has the idea that these firms are too big, that antitrust breaks up firms that are too big, and that Big Tech should be broken up. This casual use of the word "monopoly" is not new. The word has been used elastically through time.[4] The idea that bigness needs a remedy and that the standard remedy is breakup is not a legal tradition. The fanciful usage of "monopoly" and "breakup," while expressive in conveying policy positions and in rallying support, is not helpful when confronting the reality of a law committed to economic efficiency and making markets work.

2 For an example of this narrative, see, e.g. Zephyr Teachout, Break 'Em Up: Recovering Our Freedom from Big Ag, Big Tech, and Big Money (2020).

3 The dominant digital platforms have made some competitively significant acquisitions, but the crucial engine for their growth has been a distinctive service such as "search" or "social networking" or certain transactional capabilities. Therefore, we put Facebook in the single-firm monopoly category (if it is a monopoly), even though the FTC case against Facebook highlights acquisitions and the structural relief sought focuses on divestiture of Instagram and WhatsApp as allegedly having been illegally acquired. See First Amended Complaint for Injunctive and other Equitable Relief, *FTC v. Facebook, Inc.*, No. 1:20-cv-03590-JEB (D.D.C. Aug. 19, 2021), ECF No. 75-1.

4 See William L. Letwin, C*ongress and the Sherman Antitrust Law: 1887-1890*, 23 U. Chi. L. Rev. 221, 226 (1956) ("'Monopoly,' as the word was used in America, meant at first a special legal privilege granted by the state; later it came more often to mean exclusive control that a few persons achieved by their own efforts; but it always meant some sort of unjustified power, especially one that raised obstacles to equality of opportunity.").

This is the reality of the U.S. antitrust law: The relevant law is Section 2 of the Sherman Act, which prohibits monopolization. It does not prohibit a firm from being a monopoly[5] or charging a monopoly price.[6] Instead, it prohibits a firm from acquiring or maintaining a monopoly by conduct or transactions.

Establishing liability requires a plaintiff, usually a U.S. enforcement agency, to complete a three-stage process. As a first screen, the offending firm must have monopoly power in a relevant market. Proving monopoly power is not an easy exercise. Traditionally, it entails a showing that the putative monopolist has the power to raise prices and lower output in a well-defined market.[7] (This may be too narrowly stated for good public policy, which is a matter of current debate.[8]) As a second screen, the offending firm must have engaged in serious anticompetitive conduct that is condemned by the law in order to acquire or sustain its monopoly. To many (but not all) judges, this means conduct that causes net harm to consumers. The law gives an incumbent monopolist considerable latitude to act without regard to adverse effects on competitors,[9] although this perspective is being increasingly debated since the Biden administration came to office. Under current interpretations, conduct can be anticompetitive and not condemned, in the name of preserving (even monopoly) firms' incentives to invest and invent.[10]

After steps one and two, there is a dauntingly difficult third step: What is the best remedy for the violation? This means a remedy that will cure or significantly mitigate the anticompetitive effects or tendencies while promoting (or at least not undermining) society's interest in competitive and innovative markets. The antitrust remedy in non-criminal cases is not meant to be punishment. It is meant to be based on competitive effects and predicted improvement in the conditions of competition. In non-merger monopolization cases, breakup is seldom a favored remedy.[11]

Thus, the popular epithet —"Big Tech are monopolies, break them up"— misses a few important steps when held up to the light of the law. The wide use of the epithet in public discourse has led to unrealistic expectations for the outcomes of antitrust suits against Google, Apple, Facebook, and Amazon (the GAFA).

But what about legislation? Legislation could bypass all of the Section 2 requirements, or even mandate corporate restructuring on some other basis.[12] Numerous bills targeting the big tech platforms are pending and several of the bills have structural dimensions, although none would simply break up the dominant platforms because they are dominant. The Ending Platform Monopolies Act would force the large platforms to sell lines of business where the platforms' multiple functionalities give rise to an irreconcilable conflict of interest.[13] The American Choice and Innovation Online Act would prohibit the major platforms from discriminating against firms that compete with them on their platforms. This bill

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5 In early days, in view of the *Alcoa* decision, see *infra* text accompanying notes 49–52, the law was ambivalent. See Edward Levi, *A Two Level Anti-Monopoly Law*, 47 Nw. U. L. Rev. 567 (1952). The law was ambivalent on treatment of monopoly status through the 1960s and into the 1970s, a period in which some noted scholars urged that "too large" a market share, persistently held, should be dissipated by antitrust. Phillip Areeda & Herbert Hovenkamp, Antitrust Law: An Analysis of Antitrust Principles and their Application, ¶ 614 (4th & 5th eds. 1978); Donald F. Turner, *The Scope of Antitrust and Other Economic Regulatory Policies*, 82 Harv. L. Rev. 1207 (1969). The U.S. law is ambivalent no longer. E.g. *Verizon Commc'ns., Inc. v. Law Offs. of Curtis V. Trinko LLP,* 540 U.S. 398 (2004) [hereinafter "Trinko"]. Other jurisdictions are also unlikely to find a competition law violation or to order structural separation based on monopoly status, but there are exceptions, especially related to powers of market inquiries. The most prominent example of structure as the basis for divestiture is the UK case of British Airways, which held more than half the landing slots at the Heathrow airport and capacity constraints prevented expanding the number of slots. The UK Competition and Markets Authority required divestiture of three airports. Competition & Markets Authority, BAA Airports: Evaluation of the Competition Commission's 2009 Market Investigation Remedies at 1.2 (May 16, 2016), https://assets.publishing.service.gov.uk/media/57399d43ed915d152d00000b/evaluation_of_baa__market_investigation_remedies.pdf.

6 Trinko, *supra* note 6.

7 See Memorandum Opinion, *FTC v Facebook, Inc.*, No. 1:20-cv-03590-JEB (June 28, 2021), ECF No. 73 (initial complaint dismissed for failure to plead sufficient facts to satisfy the first step).

8 See, e.g. John M. Newman, *The Output-Welfare Fallacy: A Modern Antitrust Paradox*, 107 Iowa L. Rev. (forthcoming 2022), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3866725. It is argued that, for example, the Big Tech firms have a new kind of market power; that they are abusing that power, yet they are not trying to lessen output; that the test of sufficient power should be, for example: Can the firm act in abusive ways to fend off competition without facing competitive pressures to constrain it? The debate includes whether the goal of antitrust is to prevent harm to consumers or whether it is more dynamic: preserving market process and robust markets for the good of all market players other than those who seek protection from competition.

9 See, e.g. *Trinko*, *supra* note 6; *Pac. Bell Tel. Co. v. linkLine Commc'ns*, Inc., 555 U.S. 438 (2009); *FTC v. Facebook*, *supra* note 8.

10 *Id.* (all citations).

11 See *United States v. Microsoft Corp.*, treated in text after note 60 *infra*. But see Rory Van Loo, *In Defense of Breakups: Administering a 'Radical' Remedy*, 105 Cornell L. Rev. 1955 (2020) (arguing that the ingrained judicial hostility to breakups is unfounded and that breakups are administrable).

12 See Public Utility Holding Company Act of 1935, Pub. L. No. 74-333 (codified as 15 U.S.C. § 79 et seq.), *repealed by* Energy Policy Act of 2005, Pub. L. No. 109-58, § 1263, 119 Stat. 594 (2006).

13 Ending Platform Monopolies Act, H.R. 3825, 117th Cong. (2021). The bill, introduced by Representative Pramila Jayapal (D-WA) and others, provides that covered platforms may not own subsidiaries that compete on the platform. This would require a spin off (breakup) if the platform competes with rivals it hosts on its platform. See *id.* §§ 2, 3(a).

provides that, in the case of violations stemming from conflict of interest, the court shall consider divestiture.[14] Both bills are directed against gatekeepers that compete with firms they host on their platforms. It has been suggested that the American Choice bill is also a breakup bill because the non-discrimination rules might impel the big platforms to divest to avoid liability.[15] Perhaps instead, breakup is dangled as a sword of Damocles; a sword that may fall on their "heads" if Big Tech fails to follow the rules.

We cannot predict what Congress will do. We can predict that, for any pending Sherman Act cases, courts will apply the law in a cautious mode. We hope that this essay will help give guidance on how courts are likely to receive any proposals for breakup remedies, and that it provides helpful details to inform choice of remedy.

III. WHY BREAKUP? WHAT IS THE PROBLEM? — QUESTIONS TO INFORM THE CHOICE OF A BIG TECH BREAKUP

To set the stage, and before we review history and experience that might inform Big Tech breakup, it will be helpful to put the breakup remedy into the Big Tech context. What are we talking about when we talk about breaking up Big Tech? What are the problems as to which breakup might be an answer? What are the questions that need to be answered before jurists or legislators can make an informed choice?

The process of breakup, whether as a remedy for an antitrust violation or to comply with a legislative mandate, requires more than ordinary effort[16] and should include a well-informed assessment of whether the post-restructured world will be better for the public, either as compared with the world as it is before restructuring or with alternate relief. Therefore, the choice should be made on an adequate factual record and in view of answers to basic questions. Here are five basic questions: 1) What is the problem to be cured (or significantly alleviated)? 2) What cures are available, including behavioral and restructuring options? 3) How likely is the chosen structural remedy to cure or significantly alleviate the problem? 4) How long will it take to implement the chosen restructuring remedy and at what cost? 5) The counter-factual: What would be the probable state of the market in the absence of restructuring by the time (for example) the remedy can be implemented?

For Big Tech (as in all cases), we first need to identify the problem. The public conversation commonly lumps the Big Tech platforms together, although their business models, the competition problems, and prospects for effective relief without undermining useful functions, are different. Some, such as Google and Facebook, are information/data platforms. They offer a no-fee service to users to attract as many users as possible, collecting their data and selling it to advertisers. Others, such as Amazon, Apple App Store, and Visa, are transaction platforms (even though they also collect data). They enable third-party users to efficiently transact with each other, for which the platform generally charges a fee; and sometimes the platform itself participates on one side of some sales (as Amazon extensively does as a seller on its own transaction platform).

Despite differences, the complaint we most predominantly hear is aggregate: The Big Tech platforms are just too big; they have too much control over the cyberwaves, our minds and our lives. In broad strokes, the broad public concerns center on three main elements: (i) the dominant information platforms are megaphones on which voices and news reach and influence billions of citizens and voters worldwide; (ii) the platforms broadly (and cheaply) distribute false and misleading information from sources who seek to promote divisions in our society (including some politicians, foreign agencies, and in general troublemakers); and (iii) the platforms undermine our privacy by "hoovering" our personal information; they sell it for profit and might at any time use it for surveillance.

To the extent that this agglomerate nightmare is THE problem, it is a huge social problem, far bigger than market competition, which is our compass as antitrust lawyers. Although we do not address the broad existential problem, what we have to say regarding the antitrust questions applies equally to the existential question (although the existential opponents of Big Tech will give more weight to the benefit side of the breakup balance). Thus: Will people feel better off (in terms of control over our lives, autonomy, democracy, speech, etc.) if, for example, we have three Facebooks and a fragmented array of Google, Amazon and Apple? How do we count the costs of what might be foregone by users of the platforms, including the gains from economies of scale and scope in these network markets where the winner takes most, and may be able to offer consumers a superior service, at least in areas such as search?

As for antitrust, there are two sets of problems. The first is the "gatekeeper" problem, when a dominant platform competes with rivals it hosts. The second set focuses on the competition between a platform and its platform competitors.

14 American Choice and Innovation Online Act, H.R. 3816, 117 Cong. (2021), introduced by Representative David Cicilline, Chairman of the Antitrust Subcommittee of the House Judiciary Committee, and others.

15 See Marianela Lopez-Galdos, *Tech Regulatory Overhaul Series: A Discrimination Bill against Consumers*, Disruptive Competition Project (June 22, 2021), https://www.project-disco.org/competition/062221-tech-regulatory-overhaul-series-a-discrimination-bill-against-consumers/.

16 See *infra* Part V.

The gatekeeper issues include self-preferencing, demoting and sabotage of rivals on the platform, appropriation of rivals' ideas to use as their own, and appropriation of users' data to sell to advertisers. The first two are exclusionary restraints; the latter two are exploitative.

The gatekeeper category evokes the claim that the dominant platform is akin to an essential facility to which businesses on the platform should have fair access and a right not to be exploited. U.S. law is hostile to the essential facility doctrine because it requires "[e]nforced sharing"[17] and it does not accept exploitation as a ground for an antitrust violation.[18] Other jurisdictions are sympathetic to both claims. The EU has adjudicated a self-preferencing claim against Google;[19] pending legislation in the EU[20] and in the UK[21] would enact rules granting rights of nondiscriminatory access to the major platforms; and pending legislation in the United States would mandate non-discrimination by the major platforms.[22]

To the extent that lack of fair access is the problem, the grant of a right of access would be a natural alternative remedy to structural separation. Advocates of structural separation may argue that, in view of incentives, the dominant gatekeeper platforms cannot be trusted to give fair access. The Cicilline bill against discrimination (American Choice and Innovation Online) anticipates this possibility and provides a path for breakup. The EU and UK pending regulations likewise reserve breakup as a string in the bow.[23] In any event, policy makers considering structural change will want to consider what services desired by consumers and other users would be lost by mandating separation, what effect restructuring might have on incentives to invent, and what other costs are likely to be incurred, and to weigh the costs against the expected gains of restructuring (which would include gains of innovation and other gains from competition in a restructured world).

The second set of antitrust problems is posed by the fact (or claim) that there is almost no competition between and among existing or possible platforms. Facebook accounts for some 70 percent of personal social networking; Google has more than 90 percent of search; Amazon has nearly half of retail e-commerce; Apple and Google/Android have the only two significant operating systems for hand-held devices. The platforms allegedly block opportunities for rivals to enter or survive in each of their main platform markets by blocking interoperability and data portability; and they allegedly exploit developers on their platforms by overcharging them and blocking their maneuvers to avoid the high price of access to the operating system. The platforms allegedly offer poor terms of usage, including poor privacy protection, and it is possible that more competition would induce better privacy options.

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17 Trinko, *supra* note 6, at 408. *Cf. FTC v. Facebook*, *supra* note 8. Prior to *Trinko*, access to a vitally important facility necessary for effective competition was granted in the monopoly cases of MCI Telecommunications Corp. v. AT&T, 708 F.2d 1081 (7th Cir. 1983) and *Otter Tail Power Co. v. United States*, 410 U.S. 366 (1973), and in the joint venture cases of *Associated Press v. United States*, 326 U.S. 1 (1945) and *United States v. Terminal R.R. Ass'n*, 224 U.S. 383 (1912).

18 *Trinko*, *supra* note 6, at 407: "The mere possession of monopoly power, and the concomitant charging of monopoly prices, is not only not unlawful; it is an important element of the free-market system. The opportunity to charge monopoly prices--at least for a short period--is what attracts 'business acumen' in the first place; it induces risk taking that produces innovation and economic growth. To safeguard the incentive to innovate, the possession of monopoly power will not be found unlawful unless it is accompanied by an element of anticompetitive conduct."

19 European Commission 27 June 2017 Case AT.39740 *Google Search (Shopping).*

20 *Proposal for a Regulation of the European Parliament and of the Council on Contestable and Fair Markets in the Digital Sector (Digital Markets Act)*, COM (2020) 842 final (Dec. 15, 2020) [hereinafter *Digital Markets Act*] https://eur-lex.europa.eu/legal-content/en/TXT/?qid=1608116887159&uri=COM%3A2020%3A842%3AFIN.

21 In December 2020, the Digital Markets Taskforce of UK's Competition & Markets Authority rejected the idea that the new Digital Markets Unit (DMU) in the CMA should have breakup power. It made this recommendation in view of "the costs associated with this remedy, the fact it interferes to a greater extent with a company's property rights, and that the decision cannot be reversed." The Taskforce noted that the power to require divestiture would "remain available to the CMA, following a market investigation." Competition & Markets Authority, A New Pro-Competition Regime for Digital Markets —Advice of the Digital Markets Taskforce, CMA 135, 2020, ¶¶ 4.69-70 (UK), https://assets.publishing.service.gov.uk/media/5fce7567e90e07562f98286c/Digital_Taskforce_-_Advice.pdf. However, the question is apparently still open. The UK government's most recent consultation document states that it has "not yet formed a view on whether certain interventions, including ownership separation, should be excluded from the Digital Markets Unit's toolkit." Secretary of State for Digital, Culture, Media & Sport and the Secretary of State for Business, Energy and Industrial Strategy, A New Pro-Competition Regime for Digital Markets, CP 489, 2021, ¶ 111 (UK), https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1003913/Digital_Competition_Consultation_v2.pdf.

22 American Choice and Innovation Act, *supra* note 15 (Chairman Cicilline's bill).

23 For the EU, Article 16(1) of the proposed Digital Markets Act authorizes the European Commission to impose "any behavioural or structural remedies which are proportionate to the infringement committed and necessary to ensure compliance with [the DMA]" on gatekeepers who "systematically infringe . . . the obligations laid down in [the DMA]." *Digital Markets Act*, *supra* note 21. Under Article 16(3) DMA, gatekeepers will be "deemed to have engaged in a systematic non-compliance . . . where the Commission has issued at least three non-compliance or fining decisions . . . against a gatekeeper . . . within a period of five years . . . ." *Id.* Thus, the legislation if adopted will allow the Commission to order a breakup of Big Tech firms that are systematic infringers if breakup is proportionate and necessary to ensure compliance with the DMA.

Competition Commission Vestager has said that the EU has not ruled out the "nuclear option" (breaking up Big Tech) but does not believe it will be necessary. See James Cook, *EU Could Break up Tech Giants as 'Nuclear Option', says Vestager*, The Telegraph (Dec. 5, 2020), https://www.telegraph.co.uk/technology/2020/12/04/europe-will-consider-nuclear-option-breaking-tech-giants-says/.

What remedies are available to cure these problems? Some distinctions would need to be made between transaction and information platforms. The EU and UK pending legislation would impose interoperability requirements and give portability rights.[24] So too would the Scanlon bill in the U.S. House of Representatives: Augmenting Compatibility and Competition Service by Enabling Service Switching, also called the ACCESS Act.[25] The EU adopted its General Data Protection Regulation (GDPR) in 2016,[26] significantly protecting privacy rights. The EU and the UK have commenced litigation against Apple for charging developers excessive fees, and a private lawsuit, *Epic v. Apple*,[27] which attacks the conduct that enables the high fees, has just been dismissed for lack of proof of monopoly power.[28] A remedy likely to be considered in the transaction platform cases is authorizing developers to allow their customers to use the developers' payment systems rather than be forced to make all transactions through the platform's App store.[29]

In considering the structural alternative to the problem of "not enough competition between platforms," policy-makers will want to consider not only the alternatives above but also: Are some of the platforms natural monopolies, and should they be regulated (and fair access mandated) rather than broken up? If the market can sustain several significant players, can tipping be foreseen and prevented? Will interoperability obligations and portability rights help significantly to keep the market contestable? And, finally, if the market will sustain several players, if interoperability obligations and portability rights are not sufficient to induce sustainable entry, and if the markets will not predictably become competitive before structural relief can be implemented, what will be the tasks of breakup and how likely is the project to succeed?

These principles, facts, and questions are background as we move to an exploration of what history teaches.

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24 For the U.K.'s approach, see A New Pro-Competition Regime for Digital Markets, *supra* note 22, at ¶104 ("The Digital Markets Unit will need the power . . . to overcome network effects and barriers to entry/expansion through mandating interoperability, third-party access to data or certain separation measures."); for the E.U. approach, see *Digital Markets Act*, *supra* note 21, at ¶52 ("The gatekeepers should therefore be obliged to ensure access under equal conditions to, and interoperability with, the same operating system, hardware or software features that are available or used in the provision of any ancillary services by the gatekeeper."). See also Art. 6 §1(c), (f) (stipulating that a gatekeeper shall "allow the installation and effective use of third party software applications or software application stores using, or interoperating with, operating systems of that gatekeeper" and "allow business users and providers of ancillary services access to and interoperability with the same operating system, hardware or software features that are available or used in the provision by the gatekeeper of any ancillary services").

25 ACCESS Act of 2021, Augmenting Compatibility and Competition by Enabling Service Switching Act of 2021, H.R. 3849, 117 Cong. (2021).

26 Commission Regulation 2016/679 of Apr. 27, 2016, General Data Protection Regulation, O.J. (L 119).

27 Complaint, *Epic Games Inc. v. Apple Inc.*, No. 4:20-cv-05640 (N.D. Cal. Aug 13, 2020).

28 *Epic Games Inc. v. Apple Inc.* (N.D. Cal. September 10, 2021).

South Korea has just become the first country to enact legislation, amending the Telecommunications Business Act, to give app developers the right to bypass the platforms' app stores and have alternative access to consumers. Heekyong Yang, *S. Korea's Parliament Passes bill to Curb Google, Apple Commission Dominance*, Reuters (Aug. 31, 2021), https://www.reuters.com/technology/skoreas-parliament-passes-bill-curb-google-apple-commission-dominance-2021-08-31/.

29 Apple has settled a class action lawsuit by smaller developers that would loosen some restrictions on these developers. The settlement is subject to court approval. See Stephen Nellis, *Apple Strikes App Store Deal with Small Developers as it Waits for 'Fortnite' Ruling*, Reuters (Aug. 27, 2021, 5:45 AM), https://www.reuters.com/technology/apple-will-change-app-store-practices-after-settlement-with-small-developers-2021-08-27/.

IV. A BRIEF HISTORY LESSON: THE VERY LIMITED USE OF BREAKUPS IN SINGLE-FIRM MONOPOLIZATION CASES DURING THE 131 YEARS SINCE THE SHERMAN ACT WAS ENACTED

In a handful of cases of single-firm monopolization not based on consolidation of competitors or cartel behavior, U.S. courts have granted or seriously contemplated structural relief.[30] This set of cases famously includes *Alcoa*,[31] *United Shoe Machinery*,[32] *Microsoft*,[33] and *AT&T*,[34] and it would have included *IBM*[35] if the relief stage had been reached. In addition, *Standard Oil*[36] and *American Tobacco*[37] are so iconic that, although they are consolidation cases, they warrant reference in any study that seeks to capture what the history of antitrust breakups may teach.[38]

Scholars have canvassed the field in informative articles,[39] and we do not presume to repeat their work (which incidentally expresses various different views on the necessity, wisdom, administrability, and effectiveness of structural relief). Rather, in this short section, we relate some relevant details from *Standard Oil*, *American Tobacco*, *Alcoa*, *United Shoe Machinery*, *IBM*, and *Microsoft*, before exploring the unique and instructive *AT&T* case brought by DOJ in 1974 and settled eight years later with a very large, apparently successful divestiture remedy.

In the *Standard Oil* case,[40] John D. Rockefeller and associates captured most of the oil refining market by buying up and stamping out competitors (as well as introducing efficient rationalizations of the industry, for which the Court gave little credit). As Robert W. Crandall reports:

The relief decree was rather simple in design. It required that the New Jersey trust be dissolved and that the stock in each of the constituent companies be spun off to Standard's stockholders. As a result, 38 separate companies were established as independent entities, albeit with common ownership.[41]

Although the court apparently thought that dissolution would trigger immediate competition, this was not the case. Crandall writes:

> The decree established 10 refining companies, but these companies were separated by substantial distances and were unlikely to begin competing against each other very soon after the decree. All were simply set free with their assets. Some, such as Standard of California and Standard of New Jersey, had extensive pipeline and marketing facilities. Others, such as Standard of Kansas, had none. Ohio Oil and Prairie Oil and Gas were crude oil producers with pipelines, but South Penn Oil was left as a crude oil producer without pipelines. In short, the post-dissolution structure of the industry was largely an accident of Standard's pre-1911 corporate organization.[42]

30 In the period 1890 to 1996, according to Robert W. Crandall, who did a thorough study of structural remedies in Sherman Act monopolization cases, divestiture was required in only four cases of single-firm monopolization. These are: the old IBM tying case, Kansas City Star, United Shoe Machinery (although divestiture was at first denied and was ordered only 15 years later), and AT&T. Robert W. Crandall, *The Failure of Structural Remedies in Sherman Act Monopolization Cases*, *in* Microsoft, Antitrust and the New Economy: Selected Essays 292–97 (David S. Evans ed., 2001). There has been no breakup for single-firm monopolization since 1996, the end of the period studied by Crandall.

31 *United States v. Aluminum Co. of Am.*, 148 F.2d 416 (2d Cir. 1945).

32 *United States v. United Shoe*, 110 F. Supp. 295 (D. Mass. 1953), *aff'd*, 391 U.S. 244 (1968).

33 *United States v. Microsoft Corp.*, 97 F. Supp. 2d 59, 64 (D.D.C. 2000), *vacated*, 253 F.3d 34 (D.C. Cir. 2001).

34 *United States v. AT&T*, 524 F. Supp. 1336 (D.D.C. 1981) (denying AT&T's motion to dismiss at the close of the Government's case); *United States v. Am. Tel. & Telegraph Co.*, 1982–2 (CCH) Trade Cas. ¶ 64,900 (D.D.C. 1982) (consent decree ordering divestment).

35 *United States v. IBM Corp.*, No. 69-Civ-200 (S.D.N.Y. 1969).

36 *Standard Oil Co. v. United States*, 221 U.S. 1 (1911).

37 *United States v. Am. Tobacco Co.*, 221 U.S. 106 (1911).

38 Also of high profile is *United States v. Grinnell Corp.*, 384 U.S. 563 (1966), which achieved its monopoly position in the insurance-accredited central station service fire and burglar alarm market (much criticized as a proper market) largely through acquisitions, and dissolution was viewed as essential in light of *Standard Oil*. *Id.* at 580.

39 E.g. Herbert Hovenkamp, *Antitrust and Platform Monopoly*, 130 Yale L.J. 1952, 2008–10 (2021); Rory Van Loo, *In Defense of Breakups*, *supra* note 12; Robert W. Crandall, *The Failure of Structural Remedies in Sherman Act Monopolization Cases*, *supra* note 31; Howard A. Shelanski & J. Gregory Sidak, *Antitrust Divestiture in Network Industries*, 68 U. Chi. L. Rev. 1 (2001); William E. Kovacic, *Designing Antitrust Remedies for Dominant Firm Misconduct*, 31 Conn. L. Rev. 1285 (1999); Fiona Scott Morton, Opinion, *Why 'Breaking Up' Big Tech Probably Won't Work*, Wash Post. (July 16, 2019, 2:41 PM), https://www.washingtonpost.com/opinions/2019/07/16/break-up-facebook-there-aresmarter-ways-rein-big-tech/.

40 *Standard Oil Co. v. United States*, 221 U.S. 1 (1911).

41 Crandall, *supra* note 31, at 302. Although the design may have been simple, execution was not uncomplicated; still, the dissolution proceeded "relatively smoothly." Kovacic, *supra* note 40, at 1289.

42 Crandall, *supra* note 31, at 304–05.

But still, the breakup facilitated "the emergence of a number of substantial independent competitors — including Amoco, Chevron, Exxon, and Mobil — where there had been but a single firm before."[43]

Like Standard Oil, the American Tobacco Company was a trust. It was the product of the combination of at least 86 different companies.[44] The dissolution order divided the production of cigarettes into three parts. American Tobacco kept about 37 percent of production. P. Lorillard had 15 percent. Liggett & Meyers, a new company, was provided with assets amounting to 28 percent.[45] The decree thus changed a monopoly into an oligopoly. Crandall reports that the oligopolists "did not engage in vigorous price competition."[46] But again, the dissolution crafted three significant firms where there had been only one.

Alcoa[47] is the first case of single-firm monopolization. Alcoa had safeguarded its U.S. monopoly of aluminum, but not by exclusionary restraints. Instead, it increased its production capacity and output whenever it deciphered new demand — conduct that would not count today as anticompetitive. The court essentially found a monopoly status violation[48] (which is not the law today).

The remedy was postponed until after World War II. During the war the government had constructed numerous plants for aluminum production. After the war it assigned these assets to Reynolds Metal and Kaiser, two private firms which would then be competitors of Alcoa. The district court judge assigned to the remedy phase, Judge John Knox, was obviously relieved. He believed that a breakup of Alcoa would weaken it and diminish its competitiveness, with highly speculative benefits.[49] Had the two new firms not entered the market, breakup may have seemed the natural remedy. But by chance the government had created competition, and breakup was unnecessary. The court required the shareholders of Alcoa to sell their stock either in Alcoa or its sister Canadian Aluminum Ltd., prohibited patent grant-backs, and authorized sale of a government plant.[50]

United Shoe Machinery[51] was a product of the 1950s and 1960s, when antitrust "opinion" still held that very large market share should be dissipated, if possible. United Shoe Machinery was held to have illegally monopolized the shoe machinery market, of which it controlled 85 percent. Unlike *Alcoa*, United Shoe Machinery built its monopoly on exclusionary acts. The acts created barriers to entry, steering USM's customers to lease instead of buy the machines (chilling formation of a second-hand market), and to use their USM machines to the full before purchasing a machine of another seller. The judge, Charles Wyzanski, found abundant exclusionary conduct, even while he queried whether predatory conduct was a necessary ingredient of the violation.[52] Wyzanski declined to order dissolution, however, and entered a decree imposing many obligations on USM designed to establish a second-hand market and significantly reduce USM's market share and thus restore workable competition.

Ten years later, USM's share was reduced to only 62 percent. The DOJ went back to court to amend the decree to require divestiture. The district court denied the petition. The Supreme Court reversed the denial, saying that, if after 10 years the decree had not achieved its object to extirpate the anticompetitive practices and restore workable competition, "the time has come to prescribe other, and if necessary more definitive, means to achieve the result."[53] On remand, the district court ordered USM to divest approximately one third of its operations.[54]

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43 Kovacic, *supra* note 40, at 1300, 1302.

44 Crandall, *supra* note 31, at 306.

45 *United States v. Am. Tobacco Co.*, 221 U.S. 106 (1911); Crandall, *supra* note 31, at 307.

46 Crandall, *supra* note 31, at 308.

47 *United States v. Aluminum Co. of Am. (Alcoa),* 148 F.2d 416 (2d Cir. 1945).

48 There was significant foreign production of aluminum. A world cartel kept foreign aluminum substantially out of the United States, but the court perhaps surprisingly did not find that Alcoa was a member of the world cartel.

Separately, the court found an illegal price squeeze, but the remedy was principally addressed to the monopoly status. For Alcoa as a monopoly status violation, see Levi, *A Two Level Anti-Monopoly Law*, *supra* note 6.

49 *United States v. Aluminum Co. of Am. (relief),* 91 F. Supp. 333, 416–18 (S.D.N.Y. 1950).

50 *Id.*

51 110 F. Supp. 295 (D. Mass 1953), *aff'd*, 347 U.S. 521 (1954).

52 110 F. Supp. at 342–44.

53 *United States v. United Shoe Mach. Corp.*, 391 U.S. 244, 252 (1968).

54 *United States v. United Shoe Mach. Corp.*, 1969 U.S. Dist. LEXIS 13280 (D. Mass. Feb. 29, 1969).

We fast forward to *United States v. IBM*. This was the beginning of the era of innovation-based dominance. IBM allegedly had a monopoly position in general purpose digital computers (also called mainframes) (it accounted for about 74 percent of the market), and made peripheral equipment such as disks and memories to go with it. IBM adopted a series of aggressive tactics against competitors and potential competitors, allegedly preventing them "from having an adequate opportunity effectively to compete for business in the general purpose digital market."[55] The complaint charged IBM with bundling hardware, software, and support systems; introducing low-priced fighting machines where competitors were otherwise likely to be successful, and announcing the imminent introduction of new generation products which were actually fictitious, to dissuade its customers from shifting to competitors' new and better products. Moreover, when peripheral competitors' products became better and cheaper than IBM's, IBM formed a committee called SMASH, which brainstormed strategies to destroy the rivals, including by creating incompatibilities and by charging selective low prices. The Justice Department sued IBM for monopolization in 1969. From the start, it announced that it would seek a breakup that would result in competitively balanced firms. A staff economist declared: "Competition in the computer industry can be improved . . . only by a profound restructuring of IBM's assets."[56]

The case got off to a bad start. Delay followed delay. The DOJ trial staff constantly changed. The judge, David Edelstein, was not an expediting judge. The case went to trial in 1975 after six years of discovery. The computer industry was already changing, with small powerful machines displacing the giant mainframes. The trial proceeded, slowly, for almost seven years. By 1980 antitrust law principles and analysis were changing from a perspective hostile to bigness to a perspective sympathetic to business and respectful of its need for space for innovation. In 1981, William Baxter became Assistant Attorney General, under President Reagan. Baxter thoroughly reviewed the case. He found the evidence outdated and the case in disarray. He questioned the merits of the case, he questioned whether appropriate relief could be granted even if the government won at trial, and he estimated as small the chances of prevailing on appeal.[57] As to structural relief, he said, in a memorandum to the Attorney General suggesting withdrawal of the case:

Structural relief in this case would be totally disproportionate to the nature and scope of the violations that we might be able to prove. Further, despite years of effort, no structural relief proposal has been identified that would inject new competition into the industry while retaining the efficiencies necessary to create viable successor companies.[58]

In 1982 the Reagan administration's DOJ withdrew the case as no longer viable.[59]

We turn now to *United States v. Microsoft*, leaving *United States v. AT&T* for a later section of its own. As a network and innovative-market case, *Microsoft* logically follows the discussion of *IBM*. In the two decades after IBM was targeted with antitrust for exclusionary practices that allegedly chilled competition in large mainframe computers, computing technology grew and changed. Small personal computers were invented. Microsoft dominated the market for operating software for personal computers, accounting for upwards of 90 percent. Applications (such as word processing and browsers) were the consumer-facing functions and they needed to interface with the operating system. The applications' developers needed to write code to an operating system. Microsoft Windows was the operating system of choice. Because of network effects, it reached many more users and potential users than any fledgling operating system could do. Microsoft wanted to keep developers focused on Windows and feared any technology that could bypass it because that would break Microsoft's power over the operating system.

Meanwhile, Netscape developed the browser, Navigator, and Sun Microsystems developed a new language, Java. Java was a cross-platform language; if commercialized, applications developers could use Java to write to any operating system, and this would "commoditize" Microsoft. Netscape proposed to carry Java language on its browser, and when Navigator reached a critical mass of users, Netscape/Java would be able to launch the technology that could break the power of Microsoft. Microsoft reacted. It adopted a series of practices to hold the threatening new technology at bay. Chief among these were strategies — including tying, exclusive dealing, and refusal to share interface connections — to keep the Netscape browser from getting a critical mass of users on Windows. Other challenged practices by Microsoft were designed to protect its "fort" from emerging innovation of others.

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55 Complaint ¶¶ 20–21, *United States v. IBM*, No. 69-Civ-200 (S.D.N.Y. 1969), *quoted in* Donald I. Baker, *Government Enforcement of Section 2*, 61 Notre Dame L. Rev. 898, 909–10 (1986).

56 Richard T. DeLamarter, Big Blue 328 (1986), *quoted in* John E. Lopatka, *United States v. IBM: A Monument to Arrogance*, 68 A.T.L.J. 145, 160 (2000).

57 When he reviewed the case in 1976-77, then Assistant Attorney General Donald Baker had had some analogous concerns. However, he believed it would be politically difficult to dismiss the case even in order to save DOJ enforcement resources for better use elsewhere. When Baxter dismissed the case in 1982, he was able to couple that announcement on the same day of the widely-praised AT&T settlement (which we will discuss in the next section).

58 Memorandum from Abbott B. Lipsky, Jr. "at the direction of Assistant Attorney General Baxter in his absence" to the Attorney General (Jan. 6, 1982) (released by the Department with a press release on January 8, 1982). Quoted by Baker, *supra* note 56, at 912.

59 Baker, *supra* note 56, at 912; Lopatka, *supra* note 57.

The government had learned (some) lessons from *IBM*. It developed a clear theory of the case against Microsoft, it retained a top antitrust trial lawyer, it assembled an expert trial team, and it tried this complicated case in a record five months. At the start of the trial, the DOJ declined to say what remedy it would seek. It suggested that the appropriate remedy could be determined only after the trial revealed what the court would find as facts. At the close of trial, the court held for the DOJ on liability.[60]

Settlement negotiations for an agreed remedy, all based on behavioral requirements, failed. Back in court for the remedies phase, the DOJ announced that it wanted a breakup. There was much discussion, not only among the parties but also among policymakers and the academic community, as to what a breakup would entail. A new phrase crept into the vocabulary, in honor of Microsoft's CEO Bill Gates and the only prior breakup of recent memory, "Ma Bell"—the American telephone system, which had been broken into seven "Baby Bells." "Baby Bills" was born.

What would the Baby Bills look like? Would a breakup be horizontal, vertical, or both? In the public conversation, all were proposed. Vertical would mean separating the operating system business from the applications businesses. Horizontal would mean keeping the functional integration but splitting every function in half or thirds. Hybrid would draw from both.

The government proposed a vertical breakup into two Baby Bills; one for the operating system including all operating system software, and one with all applications software and all remaining software assets. The officers and shareholders would not be allowed to hold executive or ownership positions in both. Behavioral conditions would also apply; for example, Microsoft would be prohibited from designing Windows to disable or compromise rivals' products. Neither restructured limb would be banned from expanding into the market of the other.

The court held only a summary proceeding on remedy. The judge said (without basis) that, in view of the DOJ victory on liability, the DOJ should be able to dictate the terms of the remedy. Over objections of Microsoft both on substance and process, including its preclusion from offering testimony in opposition to the specific DOJ proposal, the judge adopted the DOJ's proposed relief.[61]

The Court of Appeals for the D.C. Circuit affirmed most (but not all) of the liability holdings. It held that Microsoft had been denied due process on relief, and reversed and remanded the question of relief, after declaring that breakup is a drastic remedy and should not be lightly ordered.[62] The court also ordered that the case be remanded to a new district court judge to rule on relief, even though the new jurist would necessarily be less familiar with facts on which the affirmed liability findings were based. Presidential administrations changed. The DOJ no longer sought a breakup. On remand, the new district court judge entered a long behavioral consent decree as proposed by DOJ, but opposed by some its staff and co-plaintiffs.[63]

While all designs for breakup hold some concerns, the DOJ choice and thus the vacated district court breakup order were criticized on a number of grounds even before the reversal. First, the design (vertical separation) did not create competition. It would have eliminated perverse incentives that stemmed from the vertical integration, but a hope that the newly unintegrated applications company would create a new operating company was a stretch of imagination, given the presence of network effects and the reality that "one firm wins most." Second, despite being touted as a clean surgical break, the breakup would entail substantial supervision of both the process of breaking up and the behavioral requirements. Third, unlike AT&T, "Microsoft was a young entrepreneurial company run by very few top executives . . . , and its divisions are very fluid." "[A] break-up would pose significant managerial problems and severely reduce the company's flexibility."[64]

Taking stock at this point and reflecting on the history of remedies in monopolization cases as background for the "break 'em up" slogan of 2021, we offer these observations (subject to additional lessons from AT&T, below): There are still few lessons from past enforcement efforts that can give good guidance for providing relief in the single-firm monopolization cases, much less for innovation-based monopolization cases. The early iconic cases of breakup were not cases of single-firm monopolization; they were cases of immense consolidations of most of the industry into one firm. The perspective that prevailed in the middle period (*Alcoa* through the filing of *IBM*) — that monopoly structure is presumptively bad and that dominated markets should be restructured to create competition — has been replaced by skepticism as to what courts and governments can effectively do and faith that markets will dissipate monopoly power at least faster and better than court-ordered restructuring. *Standard Oil* remains an icon, but it is a consolidation case and does not light the path to good policy for innovative markets where winners take most. "Big Tech is too big, antitrust is the tool, break 'em up" is a non sequitur.

60 *United States v. Microsoft Corp.,* 97 F. Supp. 2d 59, 64 (D.D.C. 2000), affirmed in major part, see below.

61 See Nicholas Economides, *The Microsoft Antitrust Case* (NYU Stern Sch. of Bus., Working Paper, 2001), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=253083.

62 *Microsoft Corp. v. United States*, 253 F.3d 34, 98 (D.C. Cir. 2001).

63 Final Judgment, United States v. Microsoft Corp., No. 98 Civ. 1232 (CKK) (D.D.C Nov. 12, 2002), available at https://www.justice.gov/atr/case-document/file/503541/download.

64 Economides, *supra* note 62, at 31; see also Crandall, *supra* note 31; but see Rory Van Loo, *supra* note 12.

V. UNITED STATES V. AT&T (1974-1982) AS A UNIQUE INSTANCE OF A SUCCESSFUL JUDICIALLY-MANAGED BREAKUP OF A MAJOR MONOPOLIST UNDER SECTION 2

In *United States v. AT&T*, DOJ was responding to two distinct competitive concerns — one historic and the other quite new. Each had critical structural dimensions.

The historic competitive concern was about the common ownership by AT&T of (i) the Western Electric communications equipment manufacturing company ("Western") and (ii) the local Bell System telephone utilities which provided retail telephone services to a majority of Americans ("Local Bells"). The local utilities were natural monopolies whose rates and services were regulated by state public utility commissions ("State PUCs"). This was done on the basis of classic rate-based regulation under which the utility was allowed to earn a *reasonable return* on the investment it made in order to provide the regulated services, its so-called *rate base*. This meant that the regulated local utility did not have any inherent objection to increasing its rate base by paying more for equipment so long as its State PUC did not think it was paying "too much" for its equipment.[65] With virtually all the Local Bells' communications equipment being procured from Western, it was almost impossible to determine whether they were paying "too much" for their equipment; and AT&T's incentives were to increase Western's sales prices and the Local Bells' rate bases. AT&T's justification for these (and other) monopolistic arrangements was always *reliability*, strongly arguing that it was providing the most reliable telephone service in the world.[66] Western's role as the monopolistic supplier of reliable equipment to the local telephone monopolies had been a central feature of an earlier DOJ case, which had been settled by a 1958 consent decree which DOJ regarded as wholly inadequate by the 1970s. By then, the obvious solution was structural — that AT&T be ordered to divest Western as a way of encouraging competition in telephone equipment and making that market more transparent.

The second, emerging competitive concern was based on new technology which was opening the potential for new competition in long distance telephone service. Historically, most long distance and local telephone service had been provided on an integrated basis by the same network, almost everywhere in the world. *Operating* them separately was treated as almost heretical from an engineering standpoint, given the network reliability arguments in favor of integration.

But different pieces of the integrated network were separately *regulated*, which had important political and economic dimensions which turned out to be significant catalysts for DOJ's AT&T case. AT&T's interstate long distance business was its Long Lines division whose rates and terms of service were regulated by the Federal Communications Commission ("FCC") in Washington. Of course, an actual long distance call was provided over facilities provided by both Long Lines and the Local Bell on either end—and this necessarily raised the practical issue of how the FCC-set rate on the long distance call should be allocated among Long Lines and the two Local Bells that originated and received each call. The State PUCs generally had a strong political interest that the basic rate for local resident service be kept low because it was normally paid by voters; and it was glad to have those rates subsidized by long distance callers who were often business users. So there was heavy political pressure on the FCC to allocate a disproportionate share of its long distance *rates* to the "local" utilities on either end, at the same time that long distance transmission *costs* were declining with engineering improvements.

Thus, by the early 1970s, Long Lines' costs for transmitting a call from San Diego to Boston were much lower than what it was charging the customer for doing so. Into this situation came a new communications company (Microwave Communications Inc., or "MCI") which had established an initial microwave network between Chicago and St. Louis over which it proposed to offer a lower cost long distance between those two cities. Of course, to complete its cheaper calls MCI needed access to the Local Bells in each city. Needless to say, AT&T was horrified and adamantly negative, while the FCC was also reluctant about such a disruption of the regulatory status quo. AT&T, MCI, and the FCC each regarded the MCI effort as the proverbial foot-in-the-door, a first step to something much bigger.

Meanwhile, MCI's widely watched efforts clearly alerted the DOJ to both (i) the still-novel engineering possibility of having a free-standing long distance service provider and (ii) the competitive danger of having AT&T controlling both Long Lines and the Local Bells. That the FCC's long distance rates were so out of whack with the declining transmissions costs was well-recognized by DOJ, the FCC, and the White House Office of

65 DOJ had already had a preview of this issue in the famous *Electrical Equipment* prosecutions that it had brought against General Electric, Westinghouse, and other manufacturers in the early 1960s. Many private local electrical utilities had seemed surprisingly indifferent to a widely suspected series of cartels among the producers of various products they routinely purchased (turbine generators, transformers, switchgear, etc.), while the higher prices were inflating their rate bases. The main whistleblower turned out to have been the federally-owned Tennessee Valley Authority.

66 These were not new arguments for DOJ. The staff had been through an extended fight after DOJ helped persuade the FCC to invalidate AT&T's long standing "foreign attachments" rule in its famous *Carterfone* decision in 1968. *In re* Use of Carterfone Device, 13 F.C.C.2d 420 (1968). This rule had prevented any local telephone subscriber from owning and using any equipment (mostly equipment from Western) that was not provided by its Local Bell. It took almost five years (1967-72) for DOJ to persuade the FCC to require AT&T to allow "foreign" equipment on its network as long it satisfied objective technical standards.

Telecommunications Policy, as well as many business executives and economists. Thus, there were substantial economic gains to be achieved from bringing a major case against AT&T, which all of us at DOJ recognized would require a major investment of the Antitrust Division's limited enforcement resources.[67]

On November 20, 1974, DOJ filed its Complaint in the District of Columbia. The three defendants were AT&T, Western, and Bell Labs, while the 23 Local Bells were treated as co-conspirators but not defendants. The Bell System was charged with providing communication service to more than 80 percent of the nation's telephones. The defendants were charged with attempting and conspiring to monopolize and monopolizing the markets for (i) telecommunications services and (ii) telecommunications equipment, in violation of Section 2. The offenses were based on obstruction of interconnection with various communications sources (including microwave and satellite services) and directing the majority of Bell System communications equipment purchases to Western.

Structural relief was clearly seen as central to the case. DOJ sought divestiture of Western and its further division into two or more competing equipment suppliers. The Complaint also sought separation of either Long Lines or the Local Bells from the Bell System as separate and independent companies. In the DOJ press release accompanying the Complaint, Assistant Attorney General Thomas E. Kauper explained, "the specific relief we will seek to separate the Long Lines Department from the Bell Operating Companies will depend on what is feasible based upon the evidence adduced at trial."[68] Those of us who worked on the case felt that the whole major effort would only be worth it if DOJ could ultimately obtain divestitures; and we realized splitting off Long Lines or the Local Bells from AT&T would be the more difficult task, given both were part of an integrated communications network.

Once filed, the case moved very slowly until Judge Harold Greene took over the case after the death of the originally assigned judge. Among other things Judge Greene wrote a long opinion in 1978 rejecting the defendants' arguments based on exemptions,[69] and in 1981 he conducted the multi-witness trial of DOJ's affirmative case and the first part of the defendants' case. Thereafter, Judge Greene rejected the defendants' motion to have the case dismissed at the conclusion of DOJ's case.[70] This led to active settlement discussions triggered by an AT&T proposal, and ultimately to an agreement that AT&T would divest both Western and the local retail telephone businesses operated by the Local Bells. The newly created New Local Carriers were required not to discriminate in offering their customers access to long distance services offered by AT&T and its new competitors. This agreement was formally embodied in a huge amendment to 1956 consent decree[71] and thus became known as the Modified Final Judgment ("MFJ"), which Judge Greene approved as being in the public interest, after reviewing a barrage of diverse objections to it.[72] The divestitures were formally accomplished a year later in 1984, but it would take at least six to seven more years of proceedings for the FCC and Judge Greene to sort out all of the details completing the separations of the New Local Carriers owned by some of AT&T's original shareholders.

The MFJ has turned out to be a great success competitively. Based on the MFJ combined with major changes in technology which the decree has helped to facilitate, the telecommunications industry has been transformed since 1984. The communications equipment market has become very competitive, while Western has faded as a competitor. The long-distance markets for voice, data and video services has grown enormously with AT&T as one of several competitors, including satellite companies. Cable companies offer telephone and broadband competition to Verizon and other New Local Carriers. Finally, wireless phones have become widely used and a major source of personal communications being offered now by Verizon Wireless, AT&T Wireless, and T-Mobile; and many individuals have abandoned their landline residential telephones to rely just on their wireless phones. The MFJ and the FCC have assured non-discriminatory interconnections and access.

Our ultimate conclusion is that *United States v. AT&T* was a special case where (i) historic corporate structures created the basic Section 2 problems, and (ii) DOJ presented a strong substantive case that led a negotiated divestiture agreement, but this still required a prolonged implementation progress. Divesting AT&T's ownership in Western was comparatively straight-forward because it required transfers of shares. Divesting the local telephone businesses to be run by the New Local Carriers was a long bumpy road because the underlying network assets were so intertwined (as the big digital platforms' assets appear to be).

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67 The fact that DOJ had so many attorneys and economists already committed to the seemingly endless IBM Section 2 was an understandable caution at the time.

68 DOJ Press Release (Nov. 20, 1974).

69 461 F. Supp. 1314 (D.D.C. 1978).

70 524 F. Supp. 1336 (D.D.C. 1981).

71 This 1956 decree settled a 1949 DOJ complaint case brought in New Jersey seeking divestiture of Western; but the much-criticized settlement involved no divestitures and only a few injunctions.

72 552 F. Supp. 131 (D.D.C. 1982).

VI. CONCLUSION

We have tried to talk realism and to sort out the truth about antitrust and breakups. We have shown that the first truth is: The public conversation about antitrust and breakups has been distorted; it is based on myths and non-sequiturs. The second truth is: U.S. antitrust law does not lean towards breakups for single-firm monopolization. Breakup is rare. It has been a standard remedy only when monopoly has been created by acquisition or consolidation of numerous rivals (something that no longer occurs on the scale of Standard Oil as a result of modern anti-merger enforcement). The third truth is: Breakup has been effectively implemented only after extensive, difficult efforts by government enforcers and judges.

This does not mean that there should never be breakups, whether for antitrust or social reasons. But it does imply long and hard attention to the relevant questions before the choice of breakup is made.

IF BREAKING UP IS THE ANSWER, THEN WHAT IS THE QUESTION?

BY AVIV NEVO[1]

1 I am the George A. Weiss and Lydia Bravo Weiss Penn Integrates Knowledge Professor at the University of Pennsylvania with appointments in the Wharton School and the Economics Department in the School of Arts and Sciences. Disclosure: I testified in 2018 on behalf of the Federal Trade Commission in its successful challenge of Wilhelmsen Ship Services attempted acquisition of Drew Marine, and in 2020 on behalf of the Department of Justice in the attempt by Sabre to acquire Farelogix. I testified on behalf of Qualcomm in defense of allegations by the FTC and the Korean FTC of Qualcomm's licensing practices and was scheduled to testify on similar issues in a matter brought by Apple that settled. In the past three years, I have provided antitrust advice to Facebook. I have also, in the past 3 years, provided advice to roughly ten other clients on matters unrelated to the topic of this article.

In many policy circles big tech companies, usually meant to refer to Google, Amazon, Apple, and Facebook, are viewed as having too much power.[2] Despite such concerns, consumers continue to shop on Amazon, search using Google, connect with their friends using Facebook and Instagram, and purchase Apple devices and services. Consumers' continued support of these companies could be an indication that the products and services offered by big tech have benefited consumers and are superior to alternatives, or they could be an indication that consumers are locked into choices and effectively denied alternative options and the benefits of healthy competition.

Critics of big tech clearly think it is the latter and have proposed solving the problem by making big tech somewhat smaller. This involves limiting future acquisitions as well as potentially breaking up existing business units. For example, some have called for separating Amazon the retailer from Amazon the marketplace, to undo Facebook's acquisition of Instagram and WhatsApp, and to separate Google's search engine from Google's other lines of business. At some level, we can think of this as taking the "big" out of big tech. Seems like an obvious way to proceed. But is it?

For one thing any attempt at breaking up big tech will likely face legal headwinds. There is some historical precedent in breaking up large firms (and trusts) – consider Standard Oil and the Bell System. Yet more modern attempts of breaking up large companies have been less successful. The lengthy investigation and litigation of Microsoft in the 1990s and early 2000s, first by the FTC and then the DOJ, sought to break up the company. Despite the case generally having been considered a win for the antitrust agencies (and for the economy), Microsoft was not broken up. Interestingly, some have claimed that the win in that case is what allowed the current generation of big tech firms to thrive.[3] Hearing these claims, one cannot avoid linking tech to Hydra, the serpent-like monster in Greek mythology that grew two new heads every time one of its heads was cut off.

Given these difficulties, we should ask if breaking up companies is solving the real problems we are concerned with. For example, some of the concerns raised with Facebook is that it is used to spread misinformation. Similarly, concerns have been raised with Google's and Amazon's control (and alleged abuse) of consumer data. The hope is that breaking up big tech will lead to more competition and that competition will solve these problems. Neither of these is guaranteed.

To have the hope of increasing competition one must break up a firm into viable business units. In the breakup of Standard Oil and AT&T there seemed to be natural ways to do so. This need not always be the case. For example, some of the discussions of breaking up Microsoft involved separating the operating system from other parts of the business, such as the web browser. From the consumer's point-of-view such separation might make sense, but it is less clear how to deal with various implementation issues. For example, who gets to keep what assets? Where does top management go? How do you ensure that the pieces into which a company is broken up will constitute viable business units?

In some cases, the goal of antitrust policy is to ensure that a dominant firm does not abuse its position. For example, the *Microsoft* case aimed to ensure that Microsoft does not use its position in operating systems to harm competition in the browser market. With the benefit of hindsight, it seems like generating competition for Microsoft's browser did not require breaking up Microsoft. Interestingly, Google, the firm that has come to lead in this browser market, is now a target of antitrust concern.

Even if breakup leads to additional competition, it is not clear that this competition will have the desired effect. Competitive markets are generally good at reducing prices and increasing variety, quality, and output. This is the case because firms compete to attract consumers through lower prices, higher quality, and better service. However, competition for consumers can sometimes lead to unexpected outcomes. Suppose, for example, that we are worried about privacy and the misuse of consumer data. One can imagine a world in which competition improves privacy policies, especially if consumers view privacy as a desired attribute. If consumers are more likely to adopt a platform that has more stringent privacy policies, then competition will encourage firms to improve their policy standards.

However, consider a world in which consumers do not care about privacy, or care about it very little. Privacy and misuse of data could get worse with competition. Since consumers care little about privacy, the platforms will have little incentive to improve it to attract consumers. Furthermore, suppose the platforms compete for advertisers and therefore when faced with greater competitive pressure the firms might have an incentive to collect more detailed consumer data and find new and innovative ways to attract advertising dollars. In this world, it is the competition for advertising that drives the incentive for collecting, and potentially abusing, consumer data. Therefore, breaking up the platforms is unlikely to address concerns regarding privacy and indeed might make things worse.

2 See for example https://2020.elizabethwarren.com/toolkit/break-up-big-tech claiming that "[t]oday's big tech companies have too much power—too much power over our economy, our society, and our democracy."

3 See for example a speech given by Makan Delrahim, at the time the Assistant Attorney General, https://www.justice.gov/opa/speech/assistant-attorney-general-makan-delrahim-delivers-remarks-antitrust-new-frontiers ("Although Microsoft was not broken up into smaller companies, the government's successful monopolization case against Microsoft may very well have paved the way for companies like Google, Yahoo, and Apple to enter with their own desktop and mobile products.").

Similarly, it is not clear that having multiple platforms will create less misinformation. Generally, monopolists reduce output relative to more competitive outcomes. Following this logic, competition can lead to more output, and if output is considered "bad" then competition can potentially lead to adverse outcomes. Therefore, one might claim that less competition is better when trying to restrict "bad" output. Taking the argument seriously – that a loss of competition is good when the firms create a product that is "bad" – has some unintended implications, and illustrates that one needs to be careful when applying the logic of competition and antitrust to somewhat unique non-traditional aspects For example, should we allow cigarette manufacturers to merge so they raise prices and reduce output? Or should we allow two polluting plants to merge so they reduce output and reduce pollution? In both these cases the answer depends on the goal. If the focus is enforcing competition laws the answer seems clear: we should not allow these mergers if they involve a "loss of competition." Policy makers that want to reduce smoking and pollution, have other policy tools at their disposal. Competition policy should focus on competition issues. In other words, if we break up a company, we should be clear that it is for the right reasons. Breaking up is not a catch all solution, and indeed as the above discussion shows might not be a solution at all.

While many policy makers are concerned with acquisitions of nascent competitors and contemplating difficult if not impossible breakups, U.S. courts are letting acquisitions of potential competitors move ahead. A case in point is the attempted acquisition of Farelogix, an industry disrupter, by Sabre, a dominant firm in the industry.[4] The U.S. District Court found that Sabre and Farelogix view each other as competitors and have competed in the past.[5] One would think that this would lead to a finding that the merger leads to a "loss of competition" and therefore violates Section 7 of the Clayton Act. This was not the case. The Court ruled that the merger can proceed, because of reading the Supreme Court *Amex* decision as saying that a (one-sided) firm (like Farelogix) cannot compete, as a matter of law, with a two-sided platform (such as Sabre). Luckily in this case, CMA saved the day by blocking the merger, at which point the parties abandoned the transaction.[6]

Some have proposed breaking up firms, or after-the-fact scrutiny as being sometimes necessary as a solution to the uncertainty inherent in the merger review process, especially in mergers involving nascent competitors.[7] In extreme cases, after-the fact scrutiny might indeed be needed and justified. However, this should be limited to extreme cases and based on careful review of the evidence. Evidence that is particularly hard to evaluate is market outcomes. One might be tempted to use *ex post* success of an acquired firm as evidence of the potential for competition that existed pre-merger. This type of evidence is potentially problematic since the *ex post* success of the acquired firm could be evidence of competition that would potentially have been lost but-for the merger. Alternately, it could be evidence of the efficiencies, including synergies in investment and R&D, generated by the merger.

Punishing firms *ex post* by breaking them up merely because the acquired firm ends up being successful will decrease incentives to invest in acquired firms and realize potential efficiencies. This is especially problematic when at the same time we are also worried about "killer acquisitions," namely, acquisitions where the acquiring firm acquires a potential competitor and shuts them down. Punishing firms for the acquired firm being too successful and for not being successful enough would create the wrong incentives. An active policy of breaking up firms after deals have been cleared would create unneeded uncertainty, especially if the decision to break up will vary with the ideology of the political party in charge.

The discussion above leaves a grim view on the possibility of breakup or its usefulness as a policy tool. However, the threat of breakup can be a very powerful tool. Current policy makers should take a page out of Teddy Roosevelt's book. Teddy Roosevelt is widely credited with invigorating antitrust policy by aggressive use of the Sherman Act and energizing a progressive movement that led to the Clayton Act and the formation of the FTC. It was this movement that eventually led to Supreme Court decision to break up Standard Oil in 1911.

There is much that we can learn from Roosevelt's approach, but I will point to a pillar of his foreign policy. While still Vice President he is believed to have said: "Speak softly and carry a big stick, and you will go far." These are words of wisdom that current policy makes would be wise to consider. The threat of breakup is a threat that no CEO or company president will take lightly, and therefore would be willing to go to great length to avoid. This gives the antitrust agencies great leverage. The smart move on their part would be to use this leverage to get targeted settlements to well specified problems. Such settlements would not be "sexy" and would likely draw broad critique from politicians and back seat

4 As disclosed above, I provided testimony on behalf of the DOJ in this case.

5 For example, the Court found that "a preponderance of the evidence shows that Sabre and Farelogix do view each other as competitors"; "Sabre considers Farelogix a competitor in developing NDC technology for direct connects,"; "the record reflects competition between Sabre's and Farelogix's direct connect solution for major airlines,"; "Farelogix identified Sabre as a 'key competitor' in order delivery and offer management," *US v. Sabre Corp., et al.,* 1:19-cv-01548-LPS, April 8, 2020, p. 31-32.

6 For further discussion see Kostis Hatzitaskos, Brad Howells & Aviv Nevo, "A Tale of Two Sides: Sabre/Farelogix in the United States and the UK," Journal of European Competition Law & Practice, June 2021; and Lindsey Edwards & Jonathan Jacobson, "Missing the Forest for the Trees: The Application of *Amex* in *United States v. Sabre*," *The Antitrust Source*, June 2021.

7 See C. Scott Hemphill & Tim Wu, "Nascent Competitors," 168 University of Pennsylvania Law Review 1879, 2020.

drivers. However, given the current legal landscape and the many years litigation would take, the FTC and DOJ should consider what the threat of breakup can get them at the negotiation table. In the current environment and given how (risk) adverse most CEOs are to the possibility of breakup, the threat of breakup is likely going to yield a more favorable outcome than actual litigation.

As the saying goes, "A clever man gets out of a situation which a wise man never gets into in the first place." Policy makers and antitrust agencies need to be clever to find a way out of the current situation, but they also need to be wise and forward looking and anticipate the problems of the future. Breaking up firms should be a last resort and should be used only if one is sure that it is likely to solve the problem and not generate problems in the future. In other words, that it is both a clever and wise solution.

THE VALUE OF DATA AND ITS IMPACT ON COMPETITION

BY MARCO IANSITI[1]

1 Marco Iansiti, David Sarnoff Professor of Business Administration, is a codirector of the Laboratory for Information Science at Harvard and of the Digital Initiative at Harvard Business School; The author and Keystone have performed consulting work on behalf of Facebook and most other technology platforms, as well as the US Department of Justice and the European Commission. The author thanks Rohit Chatterjee, Junsu Choi, Shehryar Hasan, and Jeff Marowits for invaluable help in performing the analysis for the paper.

Applying the framework to Netflix, Waymo, and the online advertising industry provides compelling evidence that incumbent data advantage, while generating value for innovation and for the consumer experience, does not necessarily lock out competitors and is not determinative of success. These examples illustrate that data can often serve as a catalyst for innovation that benefits both consumers and the broader ecosystem. The extent to which data accumulation can provide actual incremental value, and whether this is a cause for concern in enabling healthy competition, requires a case-by-case evaluation using the framework, as these factors depend significantly on the domain and context.

I. OVERVIEW

Debate on competition policy in digital markets has increasingly focused on data as the centerpiece of arguments. A recent government-initiated investigation into possible changes to the UK's competition framework, for example, reported that accumulation of data by incumbent firms is a significant barrier to market entry and could lead to increased concentration in digital markets (Furman *et al.*, 2019).[2]

This view tends to focus on the volume of data accumulated (i.e. "more is better") and emphasizes the "feedback loop" generated by data, where more data leads to product improvements, which in turn leads to additional users and more data – eventually leading to increased revenues and market share for incumbent firms. Borrowing on the theory of network effects, this has led to discussions around "data network effects" and how data accumulation can lead to winner-take-all outcomes in online platforms. This perspective, however, generally does not reflect the value of data in practical settings. While common regulatory perspective often assumes a superlinear increase in value as a function of data volume, research demonstrates that this is typically not the case.

The most recent work across economics, management science, and engineering offers some nuance in understanding the value of data and implications for competition. Firms typically face diminishing returns to data value, and depending on the context and complexity of the domain, additional data may not necessarily confer learning across other users of the product. For example, Netflix discovered that there were rapidly diminishing returns to data in driving improvements in their recommendation algorithm, beyond a modest threshold. Similarly, Waymo, with all the data it has collected over the past decade, continues to face challenges associated with the long tail of scenarios its autonomous cars encounter on the road. Waymo's challenge is further compounded due to localized learning: learnings from the tail in one city generally do not transfer to other cities due to specifics such as traffic rules, weather, and geographic terrain.

While both Netflix and Waymo have made significant investments in developing the capabilities and infrastructure required to leverage data at petabyte-scale, neither has been able to avoid competition. In fact, both firms have seen increasing levels of competition and innovation in their respective markets. In the case of Netflix, the new entry of firms such as Disney, HBO, and Apple into content streaming demonstrates that Netflix's incumbent data advantage did not lock out competitors. Similarly, Waymo is compelling evidence of robust competition and innovation amidst significant scale and scope of data. Even in online advertising, which is frequently cited as an example where data accumulation by incumbents has led to insurmountable barriers to entry, there is nuance required in assessing data value and data is often not the sole determinant of success.

What appears to be needed is a practical and realistic framework to assess the actual value of data and its impact on competition. This paper lays out such a framework, integrating ideas from the economics, management science, and engineering literature. The framework focuses on four key characteristics of data – quality, scaling, scope, and uniqueness. The extent to which data accumulation can provide actual incremental value and whether this is a cause for concern in enabling healthy competition can be evaluated on a case-by-case basis using the framework described.

2 Furman, J. et al. (2019) Unlocking digital competition: Report of the digital competition expert panel. HM Treasury.

II. LITERATURE REVIEW

A. Concerns Regarding Data as a Barrier to Entry and Data Network Effects

Over the past decade, economists, practitioners, and regulators have voiced concerns regarding market failures that might arise due to the accumulation of data (Carriere-Swallow & Haksar, 2019;[3] Furman *et al.*, 2019; Schweitzer & Welker, 2019;[4] de Corniere & Taylor, 2020;[5] Tirole, 2020).[6] In particular, several works have claimed that there is a self-reinforcing data feedback loop: better access to data helps firms improve upon their product, leading to more users, which in turn leads to additional data (Farboodi *et al.*, 2019;[7] Ichihashi, 2020).[8] This has raised regulatory concerns with regards to "big data" as a significant barrier to entry, potentially resulting in winner-take-all markets in data-intensive industries, and allowing incumbent firms to leverage their data resources in order to enter and capture adjacent markets (Stucke & Grunes, 2015;[9] Rubinfeld & Gal, 2017).[10]

More recently, this has extended to the notion that certain markets are characterized by "data network effects" (Gregory *et al.*, 2020).[11] Markets are characterized by "network effects" when the value of a network to a user depends on the number of other users on the network (Rohlfs, 1974)[12]. Network effects have also been at the forefront of discussions on competition in online markets, where discourse has centered around network size being determinative of the outcome of a winner-take-all system and potentially leading to market failure (Church & Gandal, 1992; Besen & Farrell, 1994; Sheremata, 1997).[13] Extending this to data, some have claimed that the strength of data network effects depends mainly on data volume and could potentially lead to market failure in industries where incumbents have access to a large volume of data (Abrahamson, 2014; Prufer & Schottmüller, 2017).[14]

However, even with traditional network effects, more recent literature suggests that network size is just one factor in determining the strength of network effects (Kokkoris & Lianos,[15] 2010; Afuah, 2013;[16] Koh *et al.*,[17] 2014; Hagiu & Rothman, 2016;[18] McIntyre & Srinivasan,

3 Carriere-Swallow, Y. & Haksar, V. (2019) The Economics and Implications of Data; An Integrated Perspective. 2019/013. International Monetary Fund. Available at https://ideas.repec.org/p/imf/imfdps/2019-013.html (Accessed: May 14, 2021).

4 Schweitzer, H. & Welker, R. (2019) "Competition policy for the digital era," The Antitrust Chronicle. robertwelker.bplaced.net, 3(2), pp. 16–24.

5 de Corniere, A. ^ Taylor, G. (2020) "Data and Competition: A General Framework with Applications to Mergers, Market Structure, and Privacy Policy." Available at https://papers.ssrn.com/abstract=3547379 (Accessed: May 14, 2021).

6 Tirole, J. (2020) "Competition and the industrial challenge for the digital age," paper for IFS Deaton Review on Inequalities in the Twenty-First Century. tse-fr.eu. Available at https://www.tse-fr.eu/sites/default/files/TSE/documents/doc/by/tirole/competition_and_the_industrial_challenge_april_3_2020.pdf.

7 Farboodi, M. et al. (2019) "Big Data and Firm Dynamics," AEA Papers and Proceedings, 109, pp. 38–42.

8 Ichihashi, S. (2020) "The Economics of Data Externalities," Available at SSRN 3778397. doi: 10.2139/ssrn.3778397.

9 Stucke, M. E. & Grunes, A. P. (2015) "Debunking the myths over big data and antitrust," CPI Antitrust Chronicle, May. awa2016.concurrences.com. Available at http://awa2016.concurrences.com/IMG/pdf/ssrn-id2612562.pdf.

10 Rubinfeld, D. L. & Gal, M. S. (2017) "Access barriers to big data," Arizona law review. HeinOnline, 59, p. 339.

11 Gregory, R. W. et al. (2020) "The Role of Artificial Intelligence and Data Network Effects for Creating User Value," AMRO. Academy of Management. doi: 10.5465/amr.2019.0178.

12 Rohlfs, J. (1974) "A Theory of Interdependent Demand for a Communications Service," Bell Journal of Economics. The RAND Corporation, 5(1), pp. 16–37.

13 Church, J. & Gandal, N. (1992) "Network Effects, Software Provision, and Standardization," The Journal of industrial economics. Wiley, 40(1), pp. 85–103; Besen, S. M. & Farrell, J. (1994) "Choosing How to Compete: Strategies and Tactics in Standardization," The journal of economic perspectives: a journal of the American Economic Association. aeaweb.org, 8(2), pp. 117–131. Sheremata, W. A. (1997) "Barriers to Innovation: A Monopoly, Network Externalities, and the Speed of Innovation," The Antitrust Bulletin. SAGE Publications Inc, 42(4), pp. 937–972. Snell, J., Swersky, K. & Zemel, R. S. (2017) "Prototypical Networks for Few-shot Learning," arXiv [cs.LG]. Available at http://arxiv.org/abs/1703.05175.

14 Abrahamson, Z. (2014) "Essential data," Yale LJ. HeinOnline, 124, p. 867. Prufer, J. & Schottmüller, C. (2017) "Competing with Big Data." doi: 10.2139/ssrn.2918726.

15 Kokkoris, I. & Lianos, I. (2010) The Reform of EC Competition Law: New Challenges. Kluwer Law International B.V.

16 Afuah, A. (2013) "Are network effects really all about size? The role of structure and conduct," Strategic Management Journal. Wiley, 34(3), pp. 257–273.

17 Koh, T. K. et al. (2014) "Multihoming users' preferences for two-sided exchange networks," The Mississippi quarterly. MIS Quarterly, 38(4), pp. 977–996.

18 Hagiu, A. & Rothman, S. (2016) "Network effects aren't enough," Harvard business review. alexduchak.com, 94(4), pp. 64–71.

2017;[19] Zhu & Iansiti, 2019;[20] Iansiti, 2021).[21] Claims regarding remedial failure as a consequence of network effects often rely on strict assumptions and fail to consider that its strength depends on a wide variety of factors, including network structure and the presence of multi-homing (Aldrich & Kim, 2007;[22] Choi, Kim & Lee, 2010;[23] Zhu *et al.*, 2019;[24] Jullien & Sand-Zantman, 2021).[25] The same is true for data network effects, where theory has often relied on simplistic assumptions and has not been translated into a rigorous economic model nor established empirically (Lerner, 2014;[26] Tucker & Wellford, 2014;[27] Kennedy, 2017;[28] Auer *et al.*, 2019).[29]

B. Additional Nuance in Characterizing the Value of Data and Data Network Effects

Recent literature suggests that there are a variety of factors, beyond data volume, that must be considered in order to understand the value of data and implications for competition. These factors include the ways in which data can drive product improvements, how learnings from data transfer across users, and whether competitors are excluded from using similar data (Tucker, 2019;[30] de Corniere & Taylor, 2020;[31] Cappa et al., 2021).[32]

Depending on whether learnings from data are "within-user" or "across-user," data network effects may not occur (Hagiu & Wright, 2020a).[33] Across-user learning refers to when a firm is able to improve its product for each customer based on the learning across data from all customers. This may result in network effects in specific scenarios – for example, when it is combined with continued product improvements (Hagiu & Wright, 2020b).[34] On the other hand, while within-user learning can improve the experience for individual users and generate switching costs, it does not result in a network effect as learning is localized to each user. Other factors that affect data value include a firm's position along its "learning curve" (the rate of progress in deriving learning from additional data) and the properties of that learning curve.

19 McIntyre, D. P. & Srinivasan, A. (2017) "Networks, platforms, and strategy: Emerging views and next steps," Strategic Management Journal. Wiley, 38(1), pp. 141–160.

20 Zhu, F. & Iansiti, M. (2019) "Why Some Platforms Thrive and Others Don't," Harvard Business Review, 1 January. Available at https://hbr.org/2019/01/why-some-platforms-thrive-and-others-dont (Accessed: May 24, 2021).

21 Iansiti, M. (2021) Assessing the strength of network effects in social network platforms. Harvard Business School. Available at https://www.hbs.edu/ris/Publication%20Files/21-086_a5189999-6335-4890-b050-a59a4b665198.pdf (Accessed: May 18, 2021).

22 Aldrich, H. E. & Kim, P. H. (2007) "Small worlds, infinite possibilities? How social networks affect entrepreneurial team formation and search," Strategic entrepreneurship journal. Wiley, 1(1–2), pp. 147–165.

23 Choi, H., Kim, S.-H. & Lee, J. (2010) "Role of network structure and network effects in diffusion of innovations," Industrial Marketing Management. Elsevier, 39(1), pp. 170–177.

24 Zhu, F. et al. (2019) "Network Interconnectivity and Entry into Platform Markets," Harvard Business School. doi: 10.2139/ssrn.3310477.

25 Jullien, B. & Sand-Zantman, W. (2021) "The Economics of Platforms: A Theory Guide for Competition Policy," Information Economics and Policy. Elsevier, 54, p. 100880.

26 Lerner, A. V. (2014) "The Role of'Big Data'in Online Platform Competition," Available at SSRN 2482780. papers.ssrn.com. Available at https://papers.ssrn.com/sol3/Papers.cfm?abstractid=2482780.

27 Tucker, D. S. & Wellford, H. (2014) "Big Mistakes Regarding Big Data," Antitrust Source, American Bar Association. Available at https://papers.ssrn.com/abstract=2549044 (Accessed: May 14, 2021).

28 Kennedy, J. (2017) "The myth of data monopoly: Why antitrust concerns about data are overblown," Information Technology and Innovation Foundation.

29 Auer, D. et al. (2019) Comments of International Center for Law & Economics: Understanding Competition in Markets Involving Data or Personal or Commercial Information. FTC Project No. P181201. International Center for Law & Economics. Available at https://laweconcenter.org/wp-content/uploads/2019/07/Understanding-Competition-in-Markets-Involving-Data-or-Personal-or-Commercial-Information-FTC-hearings-ICLE-Comment-7.pdf.

30 Tucker, C. (2019) "Digital Data, Platforms and the Usual [Antitrust] Suspects: Network Effects, Switching Costs, Essential Facility," Review of Industrial Organization. Springer, 54(4), pp. 683–694.

31 de Corniere, A. & Taylor, G. (2020) "Data and Competition: A General Framework with Applications to Mergers, Market Structure, and Privacy Policy." Available at https://papers.ssrn.com/abstract=3547379 (Accessed: May 14, 2021).

32 Cappa, F. et al. (2021) "Big data for creating and capturing value in the digitalized environment: Unpacking the effects of volume, variety, and veracity on firm performance," The Journal of product innovation management. Wiley, 38(1), pp. 49–67.

33 Hagiu, A. & Wright, J. (2020a) "Data-enabled learning, network effects and competitive advantage," in working paper. monash.edu.

34 Hagiu, A. & Wright, J. (2020b) "When data creates competitive advantage," Harvard business review. anjala.faculty.unlv.edu, 98(1), pp. 94–101.

For data to provide a sustainable competitive advantage, they must provide accurate, actionable insights that can be utilized by firms to drive learning in real-world scenarios (Lambrecht & Tucker, 2015;[35] Athey, 2017).[36] Data must also be inimitable and rare, resulting in learnings that rivals are unable to easily replicate (Lerner, 2014; Lambrecht & Tucker, 2015). In practice, this occurs infrequently, as data are non-rival in consumption, have low production costs, and are often either available open source or can be acquired by new entrants through data markets (Varian, 2018;[37] Jones & Tonetti, 2020).[38] The fact that customers frequently multi-home across several digital services further weakens data barriers to entry.

C. Engineering Literature on Value of Data

Engineering literature provides a particularly useful lens in understanding the economics of data in real-world applications. In general, machine learning research has shown that using more data to train and optimize an algorithm can lead to improvements in performance (Banko & Brill, 2001; [39] Halevy, Norvig & Pereira, 2009).[40] This has been particularly true in the case of deep learning, where model performance continues to increase as a function of the size of the dataset in tasks such as machine translation, speech recognition, and computer vision (Hestness *et al.*, 2017; [41] Kaplan *et al.*, 2020;[42] Bahri *et al.*, 2021).[43]

However, the same research also shows that the extent to which data can result in a sustainable competitive advantage depends heavily on the domain and application. Model "learning curves" (how model performance increases as a function of dataset size) generally consist of three regions: (i) the "small data" or "cold start" region; (ii) the "power-law" region; and (iii) the "irreducible error" region (Hestness et al., 2017).[44] In the "cold start" region, models find it challenging to learn from the small number of training samples available, so any additional data that can be acquired to form a minimum viable corpus are highly valuable. In the "power-law" region, each additional data point helps to improve the performance of the algorithm. Crucially, there are diminishing returns to data in this region, the steepness of which is defined by a power-law exponent. In applications such as machine translation, as an approximation, model performance has been found to improve with the square root of the number of data points. Finally, the model enters the "irreducible error" region, where additional data do not help to improve performance.

While the steepness and characteristics of the learning curve (e.g. when each region occurs) are context-dependent and must be tested empirically, they are crucial in understanding data value and implications for competition. In one example, research conducted by Amazon found no empirical evidence of a version of data network effects in retail product forecasting, where increasing the number of products did not result in substantial improvements across various lines of merchandise, beyond a small threshold (Bajari *et al.*, 2019).[45] Other research has shown that in domains such as news personalization and video recommendations, model performance saturates rapidly with additional data (Takács *et al.*, 2008;[46] Larson *et al.*, 2018;[47] Claussen, Peukert & Sen, 2019).[48]

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35 Lambrecht, A. & Tucker, C. E. (2015) "Can Big Data Protect a Firm from Competition?," Available at SSRN 2705530. doi: 10.2139/ssrn.2705530.

36 Athey, S. (2017) "Beyond prediction: Using big data for policy problems," Science, 355(6324), pp. 483–485.

37 Varian, H. (2018) Artificial Intelligence, Economics, and Industrial Organization. w24839. National Bureau of Economic Research. doi: 10.3386/w24839.

38 Jones, C. I. & Tonetti, C. (2020) "Nonrivalry and the Economics of Data," The American economic review. aeaweb.org, 110(9), pp. 2819–2858.

39 Banko, M. & Brill, E. (2001) "Scaling to Very Very Large Corpora for Natural Language Disambiguation," in Proceedings of the 39th Annual Meeting of the Association for Computational Linguistics. Toulouse, France: Association for Computational Linguistics, pp. 26–33.

40 Halevy, A., Norvig, P. & Pereira, F. (2009) "The Unreasonable Effectiveness of Data," IEEE intelligent systems, 24(2), pp. 8–12.

41 Hestness, J. et al. (2017) "Deep Learning Scaling is Predictable, Empirically," arXiv [cs.LG]. Available at http://arxiv.org/abs/1712.00409.

42 Kaplan, J. et al. (2020) "Scaling Laws for Neural Language Models," arXiv [cs.LG]. Available at http://arxiv.org/abs/2001.08361.

43 Bahri, Y. et al. (2021) "Explaining Neural Scaling Laws," arXiv [cs.LG]. Available at http://arxiv.org/abs/2102.06701.

44 *Op. cit.*

45 In another dimension, Amazon found that increasing the number of time periods a product was for sale resulted in increased forecast performance for that specific product (with diminishing returns). Bajari, P. et al. (2019) "The Impact of Big Data on Firm Performance: An Empirical Investigation," AEA Papers and Proceedings, 109, pp. 33–37.

46 Takács, G. et al. (2008) "Investigation of Various Matrix Factorization Methods for Large Recommender Systems," in 2008 IEEE International Conference on Data Mining Workshops, pp. 553–562.

47 Larson, M. et al. (2018) "Towards minimal necessary data: The case for analyzing training data requirements of recommender algorithms," Boise State ScholarWorks. Boise State University. doi: 10.18122/b2vx12.

48 Claussen, J., Peukert, C. & Sen, A. (2019) "The Editor vs. the Algorithm: Targeting, Data and Externalities in Online News." doi: 10.2139/ssrn.3399947.

The time-dependency of data also impacts the extent to which data are valuable. Depending on the domain, the relevancy of data can diminish over time due to shifts in customer tastes and behaviors (Chiou & Tucker, 2017;[49] Li & Ching, 2020;[50] Valavi *et al.*, 2020). As a result, a current dataset of bounded size can obtain similar, or better, performance compared to a much larger volume of historical data (Valavi *et al.*, 2020).[51] In a domain where data is highly time-dependent, "stocks" of historical data are therefore less valuable than continuous data "flows." Relatedly, there has been an increasing amount of research on *data quality and relevance* as opposed to *data quantity*, which shows that whether – and the extent to which – data are valuable is context-dependent. Individual data points have varying degrees of contribution to algorithm performance, and in the case of mislabeled data, or data drawn from a different distribution, they can even harm performance (Ghorbani & Zou, 2019;[52] Jia *et al.*, 2019;[53] Ghorbani, Kim & Zou, 2020; [54] Swayamdipta *et al.*, 2020).[55]

Recent work has also continuously advanced techniques that can be used to replicate learnings with smaller sets of data, further reducing barriers to entry. Techniques such as synthetic data generation, and transfer and few-shot learning can help firms achieve a high level of performance with a limited set of context-specific data.

D. A Hybrid Approach to Assessing the Value of Data and its Competitive Advantages

It is clear that there is complexity and nuance in assessing the value of data and implications for competition. The current regulatory perspective, which focuses on data volume and a simplistic view of data network effects, is inadequate in providing practitioners and regulators a realistic assessment of the circumstances in which data can provide a sustainable competitive advantage. A practical framework needs to merge concepts found across economics, management science, and engineering literature and must be applied on a case-by-case basis, depending on the context and domain, in order to determine the true value of data.

49 Chiou, L. & Tucker, C. (2017) Search Engines and Data Retention: Implications for Privacy and Antitrust. w23815. National Bureau of Economic Research. doi: 10.3386/w23815.

50 Li, X. & Ching, A. T. (2020) "How Does a Firm Adapt in a Changing World? The Case of Prosper Marketplace," Available at SSRN 3403404. doi: 10.2139/ssrn.3403404. Liu, Z. et al. (2019) "Large-Scale Long-Tailed Recognition in an Open World," arXiv [cs.CV]. Available at http://arxiv.org/abs/1904.05160.

51 Valavi, E. et al. (2020) Time and the Value of Data. Harvard Business School. Available at https://hbswk.hbs.edu/item/time-and-the-value-of-data.

52 Ghorbani, A. & Zou, J. (2019) "Data Shapley: Equitable Valuation of Data for Machine Learning," arXiv [stat.ML]. Available at http://arxiv.org/abs/1904.02868.

53 Jia, R. et al. (2019) "Towards Efficient Data Valuation Based on the Shapley Value," in Chaudhuri, K. & Sugiyama, M. (eds.) Proceedings of the Twenty-Second International Conference on Artificial Intelligence and Statistics. PMLR (Proceedings of Machine Learning Research), pp. 1167–1176.

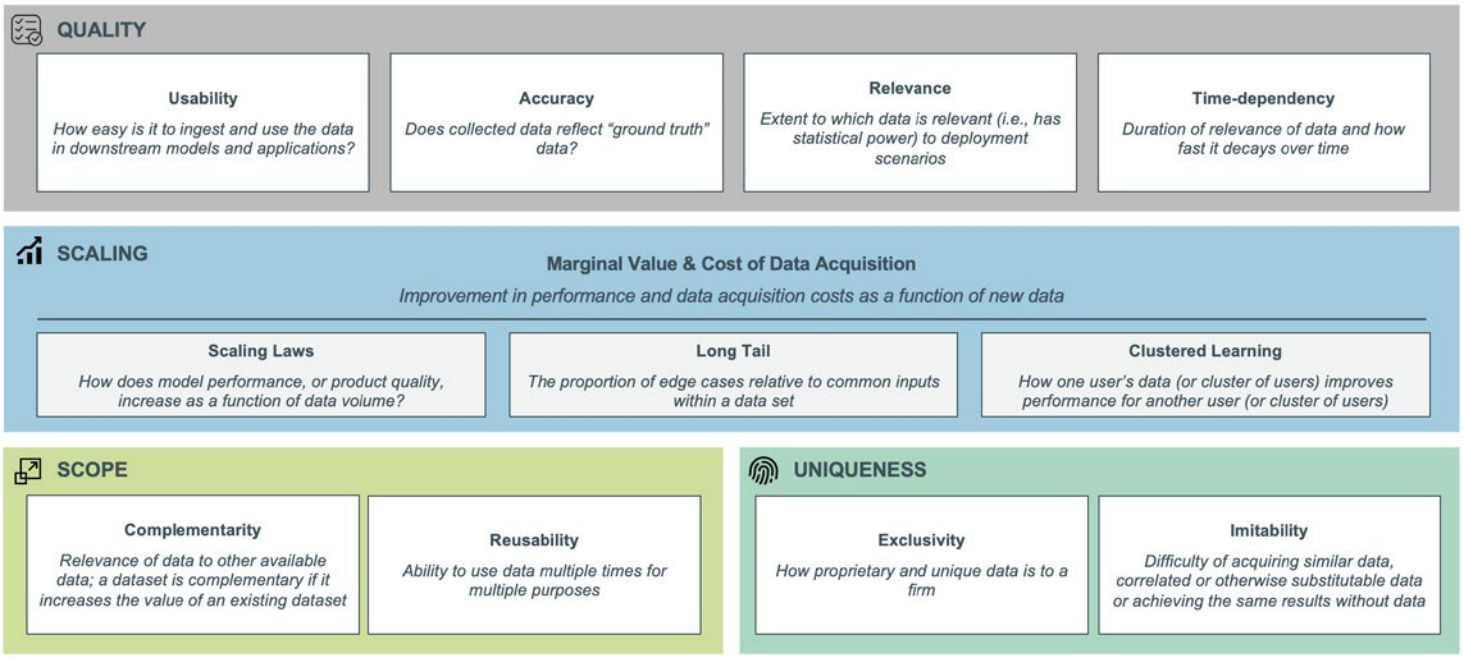
54 Ghorbani, A., Kim, M. P. & Zou, J. (2020) "A Distributional Framework for Data Valuation," arXiv [cs.LG]. Available at http://arxiv.org/abs/2002.12334.

55 Swayamdipta, S. et al. (2020) "Dataset Cartography: Mapping and Diagnosing Datasets with Training Dynamics," arXiv [cs.CL]. Available at http://arxiv.org/abs/2009.10795.

III. FRAMEWORK FOR ASSESSING THE VALUE OF DATA AND ITS IMPACT ON COMPETITION

The value of data, and the extent to which data can confer competitive advantage, depends on four key dimensions: (i) data quality, (ii) how data value and costs scale with additional data, (iii) scope and boundaries within and across which data can add value, and (iv) uniqueness of data access and data-enabled learning. Figure 1 below outlines a framework incorporating these dimensions.

Figure 1: Value of Data Framework



A. Data Quality

Data by themselves are not inherently valuable if they are not *usable*. In order to provide value, data first need to be collected, cleaned, and processed for downstream usage. The complexity of data collection and ensuring data usability has continued to increase in recent years with the scale and diversity of data collected, with issues ranging from data discovery (finding the necessary data and serving to those who require it) to data integrity (Panzer-Steindel, 2007;[56] Talmon, 2020;[57] Dixit, 2021).[58] There are also considerations and processes specific to making data usable for machine learning systems. For example, data must first be labeled in order to train a supervised machine learning algorithm,[59] and in the case of data dispersion – where multiple relevant datasets are stored in unique formats – data must be joined into a dataset suitable for machine learning.

Data quality is also determined by how *accurate* and *relevant* data are for the task at hand, as measured by the extent to which data reflect ground truth labels and can improve model performance in real deployment scenarios. In the context of machine learning systems, mislabeling of data occurs frequently, can be difficult to identify at scale, and negatively impacts model performance (Northcutt, Athalye & Mueller, 2021).[60]

56 Panzer-Steindel, B. (2007) "Data integrity." Available at https://indico.cern.ch/event/13797/contributions/1362288/attachments/115080/163419/Data_integrity_v3.pdf.

57 Talmon, H. (2020) Nemo: Data discovery at Facebook - Facebook Engineering. Available at https://engineering.fb.com/2020/10/09/data-infrastructure/nemo/ (Accessed: May 18, 2021).

58 Dixit, H. D. (2021) Silent data corruption: Mitigating effects at scale - Facebook Engineering. Available at https://engineering.fb.com/2021/02/23/data-infrastructure/silent-data-corruption/ (Accessed: May 18, 2021).

59 Supervised learning algorithms rely on an expert-labeled dataset of the outcome (Y) based on the features (X). The objective is for the algorithm to match these labels as best as possible using the features. For example, a supervised learning approach to classifying cats vs. dogs would require each picture being labeled appropriately (as either cat or dog). Other approaches include unsupervised learning, which attempts to identify patterns in the features without labels, and reinforcement learning, where an agent learns to interact with the environment and aims to maximize the reward it receives through an iterative process of exploration and exploitation.

60 Northcutt, C. G., Athalye, A. & Mueller, J. (2021) "Pervasive Label Errors in Test Sets Destabilize Machine Learning Benchmarks," arXiv [stat.ML]. Available at http://arxiv.org/abs/2103.14749.

Data collected for training, and how they are labeled, ultimately determines the output of machine learning systems and quality of user experience. Non-relevant, low-quality data can cause "data cascades," where data issues lead to compounding events causing negative downstream effects that result in technical debt (Sambasivan *et al.*, 2021).[61] While data cascades are prevalent, machine learning practices have traditionally undervalued data quality and have instead focused more on data volume and model development.

The duration of data relevancy and how fast it decays over time – referred to as *time-dependency* – is also crucial in understanding the value of data, particularly in domains with rapidly shifting user preferences and trends (e.g. social media, streaming platforms). Loss of data relevancy can lead to deterioration in model performance and business value. For example, Facebook discovered that using stale machine learning models significantly impacted performance for a wide set of algorithms the firm deployed, including one designed to ensure community integrity (as adversaries constantly come up with new ways to display objectionable content). Algorithms that power the News Feed and Ads Ranking were also impacted significantly by stale models, with the impact being "measured in hours" for the latter (Hazelwood et al., 2018).[62] In such cases, a limited but current set of data can result in similar, or even better, performance than a large amount of historical data, and increasing data volume by incorporating older datasets may even hurt performance (Valavi *et al.*, 2020).[63]

The usability, accuracy, relevance, and time-dependency of data significantly influence the degree to which firms can gain value from data and implications for competition. Each provides an additional dimension to consider beyond data volume and requires a case-by-case evaluation depending on the domain.

Dimensions of data quality include:

- Usability: how easy is it to ingest and use the data in downstream models and applications?
- Accuracy: does collected data reflect "ground truth" data? For example, mislabeled data will hurt performance for machine learning models.
- Relevance: extent to which data are relevant (i.e. has statistical power) to deployment scenarios.
- Time-dependency: duration of relevance of data and how fast it decays over time.

B. Data Scaling

In considering data volume and its implications for value and competition, there must be an assessment of how additional data can transfer into real-world learnings (e.g. improvements in algorithm performance, product quality and user experience, revenue and costs). In practical deployments, additional data rarely result in an exponential increase in algorithm performance and face diminishing returns to scale.

Model learning curves, or *scaling laws*, are typically comprised of three regions: a "small data" or "cold start" region, a "power-law" region, and an "irreducible error" region (Hestness *et al.*, 2017).[64] Once a firm is past the "small data" region and overcomes the cold start problem, it falls into the "power-law" region, which exhibits diminishing returns to data, until performance finally plateaus in the "irreducible error" region. These regions, in turn, inform how much value can be derived from data. In the "cold start" region, any additional data are particularly valuable as models find it challenging to learn from the small number of training samples available. In the "power-law" region, there are diminishing returns to data, the steepness of which is generally defined by a power-law exponent that must be tested for empirically.[65] Finally, the model enters the "irreducible error" region, where additional data do not help to improve performance.

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61 Sambasivan, N. et al. (2021) "'Everyone wants to do the model work, not the data work': Data Cascades in High-Stakes AI," in Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems. New York, NY, USA: Association for Computing Machinery (CHI '21, 39), pp. 1–15.

62 The deterioration of performance, in this case, was due to the combination of leveraging stale data and models (i.e. not being able to explore new models and parameters). Hazelwood, K. et al. (2018) "Applied machine learning at Facebook: A datacenter infrastructure perspective," in 2018 IEEE International Symposium on High Performance Computer Architecture (HPCA). 2018 IEEE International Symposium on High Performance Computer Architecture (HPCA), IEEE. doi: 10.1109/hpca.2018.00059.

63 Valavi, E. et al. (2020) Time and the Value of Data. Harvard Business School. Available at https://hbswk.hbs.edu/item/time-and-the-value-of-data.

64 *Op. cit.*

65 This assumes that the model, and model parameters, are fixed. In real-world deployments, learning curves can be closer to linear in this region with significant engineering effort, through an iterative process of adding high-quality data and model development.

Scaling law dynamics are, in part, driven by the fact that data often follow a *long-tailed* distribution, which has implications for marginal data value and cost of data acquisition. Depending on the domain, and the extent to which data are long-tailed, firms may face diseconomies of scale where the economics of data get worse over time relative to new entrants. This is because the marginal value of an additional data point diminishes quickly as it becomes more difficult to find a unique, and thus valuable, data point in the tail. In comparison, the cost of acquiring, processing, and maintaining data found in the tail may plateau, or decrease at a slower rate, as more time and resources are spent dealing with edge cases. In particular, it is becoming clear that long-tailed distributions are common in machine learning (Zhang *et al.*, 2016;[66] Van Horn *et al.*, 2017;[67] Liu *et al.*, 2019).[68]

The economics of data depend not only on the length of the tail, but also the coverage required of the tail. This requirement is heavily dependent on the domain and product specifications – for example, development of fully autonomous vehicles requires complete coverage of the tail in order to create a functional product (in which case, data in the tail are both highly valuable and costly to collect), whereas recommendation engines may require less coverage of the tail in order to deploy a high-quality product.

Finally, the extent to which *clustered learning* can occur informs the strength of learning effects and the value of data points in the long tail. A "cluster" typically contains observations that are correlated along a dimension (e.g. segment of users with similar tastes, or in a similar geographic region). Clustered learning then enables transferability of learnings across data points in a cluster, or from one cluster to other clusters. For example, in autonomous vehicle development, transferability can be limited as learnings from one city may not inform learnings in other cities due to differences in traffic rules, weather, and geographic terrain. At the extremes, learning can either be "across-user" (where data from an individual user inform learning across all users) or "within-user" (where learning is limited to only that individual user). However, in most applications, there will be gradations between those two points, where learning can transfer across clusters of correlated data points.

In assessing the value of data and implications for competition, it is therefore crucial to assess the length of the tail and coverage required, and the extent to which learnings are clustered. These dynamics ultimately manifest as scaling laws, and while their shape and characteristics are context-dependent and must be tested for empirically, they are key in understanding the value of data.

Dimensions of scaling include:

- Scaling Laws: how does model performance, or product quality, increase as a function of data volume?
- Long Tail: proportion of edge cases relative to common inputs within data. The extent to which data are long-tailed will impact the economics of data (marginal value and costs of data acquisition).
- Clustered Learning: how one user's data (or cluster of users) improve model performance, or product quality, for another user (or cluster of users)

C. Data Scope

Data scope defines the boundaries within and across which data can be used to derive value. Data are typically more valuable if it is *complementary* to other types of data and if it can be *reused* across a diverse set of use cases.

Combining complementary datasets – sometimes referred to as data "recombination" – can generate significant performance improvements for machine learning tasks (Jia & Liang, 2016).[69] Recently, this has particularly been true in recommendation systems, where models such as graph neural networks have been used to leverage diverse types of data. Pinterest, for example, uses graph neural networks for recommendations, incorporating the graph structure inherent to its platform (e.g. pins and boards as *nodes*, membership of pins to corresponding boards as *edges*), as well as both visual and textural features, to obtain significant improvements in performance (Ying *et al.*, 2018).[70] Similarly, Netflix utilizes a diverse set of data for its recommendation algorithms, with inputs including movie metadata, user demographics, and viewing context

66 Zhang, X. et al. (2016) "Range Loss for Deep Face Recognition with Long-tail," arXiv [cs.CV]. Available at http://arxiv.org/abs/1611.08976.

67 Van Horn, G. et al. (2017) "The iNaturalist Species Classification and Detection Dataset," arXiv [cs.CV]. Available at http://arxiv.org/abs/1707.06642.

68 Liu, Z. et al. (2019) "Large-Scale Long-Tailed Recognition in an Open World," arXiv [cs.CV]. Available at http://arxiv.org/abs/1904.05160.

69 Jia, R. & Liang, P. (2016) "Data Recombination for Neural Semantic Parsing," arXiv [cs.CL]. Available at http://arxiv.org/abs/1606.03622.

70 Ying, R. et al. (2018) "Graph Convolutional Neural Networks for Web-Scale Recommender Systems," arXiv [cs.IR]. doi: 10.1145/3219819.3219890.

(Netflix Technology Blog, 2012).[71]

However, while data recombination can be valuable, it is not guaranteed to result in performance improvements. In the context of machine learning, the practical issue of data dispersion must be addressed, where different formats of data – often stored in different places – must first be combined into a dataset that can be used to train machine learning algorithms (Paleyes, Urma & Lawrence, 2020).[72] Ultimately, the data being combined must be relevant to the task at hand and there must be meaningful interaction, and complementarity, between the data to provide benefits.

The non-rival nature of data also allows firms to *reuse* the same data across many different use cases. For example, location data can be utilized for several different purposes: Google uses location information not just to improve search results and personalize advertisements, but to drive research in epidemiology, natural disaster response, and infrastructure planning (Google AI Blog, 2019).[73] Multiple firms can also collaborate and use the same data simultaneously, which can drive innovation and efficiency for consumers (Jones & Tonetti, 2020).[74] For example, both Netflix and Waymo have previously released large datasets to the public, demonstrating how firms can utilize the non-rival nature of data to drive innovation in their ecosystems.

Dimensions of scope include:

- Complementarity: relevance of data to other available data; a dataset is complementary if it increases the value of an existing dataset.
- Reusability: ability to use data multiple times for multiple purposes.

D. Data Uniqueness

Data value is further defined by the extent to which they are *exclusive* and *imitable*. If data are not proprietary or do not result in learnings that are unique to a firm, they cannot provide a sustainable competitive advantage.

In practice, data that are useful for driving product improvements are often possible for companies to acquire or emulate as data are non-rival and have low production costs (Lambrecht and Tucker, 2015;[75] Varian, 2018;[76] Jones and Tonetti, 2020).[77] Firms have utilized open-source data and data markets in order to acquire data, and new entrants can often collect similar data resources to incumbents as customers frequently multi-home across services. For instance, data on social interaction are not unique to Facebook, but are also available on Twitter or LinkedIn (among others), and are tailored to each platform (for example, LinkedIn obtains social interaction data that are more specific, and valuable, for its platform).

Even when data are exclusive, however, it may not lock out competitors if data are *imitable* and there are multiple routes to replicate the learnings from data (Lambrecht and Tucker, 2015).[78] Ultimately, users do not select a product based on the amount of data a firm has access to; instead, adoption is determined by the learnings from data and how they translate into a better user experience. Both Uber and Lyft disrupting the taxi industry, and Tinder disrupting online dating, are examples where a superior product experience enabled new entrants to overtake incumbents, without initial access to a large volume of data.

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71 Netflix Technology Blog (2012) Netflix Recommendations: Beyond the 5 stars (Part 2), Netflix TechBlog. Available at https://netflixtechblog.com/netflix-recommendations-beyond-the-5-stars-part-2-d9b96aa399f5 (Accessed: May 19, 2021).

72 Paleyes, A., Urma, R.-G. & Lawrence, N. D. (2020) "Challenges in Deploying Machine Learning: a Survey of Case Studies," arXiv [cs.LG]. Available at http://arxiv.org/abs/2011.09926.

73 Google AI Blog (2019) New Insights into Human Mobility with Privacy Preserving Aggregation. Available at https://ai.googleblog.com/2019/11/new-insights-into-human-mobility-with.html (Accessed: May 20, 2021).

74 *Op. cit.*

75 *Op. cit.*

76 Varian, H. (2018) Artificial Intelligence, Economics, and Industrial Organization. w24839. National Bureau of Economic Research. doi: 10.3386/w24839.

77 *Op. cit.*

78 *Op. cit.*

Furthermore, machine learning research shows continual progress in areas that allow for easier replicability of learnings from data, allowing firms to achieve high algorithm performance with limited amounts of data. State-of-the-art techniques include generation of synthetic data using generative adversarial networks, and transfer learning and few-shot learning, which allow models to be trained on a large dataset and subsequently fine-tuned on a smaller set of task-specific data (Snell, Swersky and Zemel, 2017;[79] Xu et al.,[80] 2019; Brown et al., 2020).[81] These advancements – while relatively new – serve to further minimize barriers to entry.

In cases where data are truly exclusive and inimitable, they can provide significant value and competitive advantage. However, data are often not as uniquely valuable as is commonly assumed. When data, or the learnings from data, are easily imitable by competitors, they cannot provide a sustainable long-term advantage.
Dimensions of uniqueness include:

- Exclusivity: how proprietary and unique data are to a firm.
- Imitability: difficulty of acquiring similar data, correlated or otherwise substitutable data, or achieving the same results without data.

IV. CASE STUDIES

In this section, I apply the concepts described in the framework above and describe two case studies that illustrate markets where data are a crucial component, yet market leaders with a large accumulation of data continue to face robust competition and innovation. The first case study describes Netflix, which is facing increased competition from new market entrants despite its significant incumbent data advantage.[82] The other case study details Waymo, which despite possessing significant scale and scope of data, also faces competition in its goal to develop a fully autonomous vehicle. These two case studies illustrate that incumbent data advantage does not necessarily lock out competitors, and that nuance is required in evaluating the value of data.

Lastly, I also discuss data value in the context of online advertising, which is often used as an example to demonstrate that data accumulation and "big data" lead to winner-take-all outcomes. I describe two regimes of data used in online advertising, segmented by time-dependency, and show that it is challenging to conclude that data volume alone is determinative of success in online advertising.

A. Netflix

Since its earliest days as a DVD-by-mail rental service, Netflix has leveraged data and data-enabled learning to enhance and personalize the user experience. Now, with over 200 million users across more than 190 countries, Netflix relies on a sophisticated software and data infrastructure capable of processing petabytes of data per day in real time. These data are used to train algorithms that influence all aspects of its business, from recommending content to users to negotiating license agreements.

As a premium video streaming business, Netflix relies on relatively weak network effects. While it was able to provide value to consumers quickly by acquiring a critical mass of movies and TV shows, the same is true for competitors. Network effects are further weakened by prevalent multi-homing on both sides: Netflix procures content from production studios that often offer their content across multiple streaming platforms, and many Netflix users also tend to multi-home across streaming services, in part due to low switching costs.

In the absence of strong network effects, Netflix has continuously invested in harnessing learning effects: developing infrastructure to collect and process high quality data, increasing the scalability of its algorithms and the extent to which clustered learning can occur,[83] and expanding data scope. However, despite the firm's early focus on data and data-enabled learning, Netflix has not been able to avoid competition.

79 Snell, J., Swersky, K. and Zemel, R. S. (2017) "Prototypical Networks for Few-shot Learning," arXiv [cs.LG]. Available at http://arxiv.org/abs/1703.05175.

80 Xu, L. et al. (2019) "Modeling Tabular data using Conditional GAN," arXiv [cs.LG]. Available at https://papers.nips.cc/paper/2019/file/254ed7d2de3b23ab10936522dd547b78-Paper.pdf (Accessed: May 14, 2021).

81 Brown, T. B. et al. (2020) "Language Models are Few-Shot Learners," arXiv [cs.CL]. Available at http://arxiv.org/abs/2005.14165.

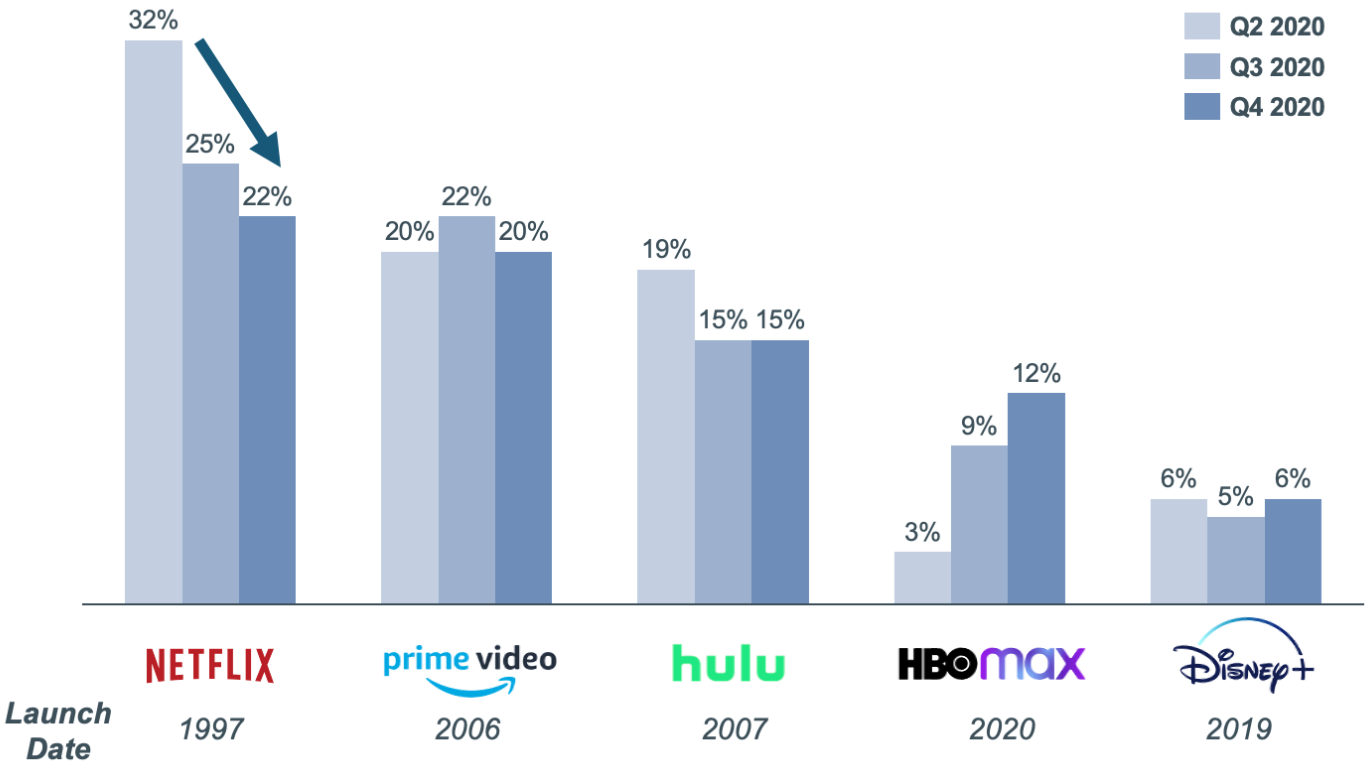
82 The Appendix contains additional details on Netflix for each dimension of the value of data framework.

83 In 2016, Netflix transitioned from local models (for each geographic region) to a global model for its recommendation engine, which allowed it to better leverage clustered learning and offer improved recommendations to users in new markets, as well as users with niche tastes. Additional details are found in the Appendix.

There are many reasons for sustained competition in premium video streaming services. First, there are limits to scaling of data value in the video streaming industry, where marginal value of data saturates rapidly while content and user acquisition costs continue to incur significant costs (Amatriain, 2014).[84] Second, competitors have been able to imitate Netflix's learnings from data, tailored to their own platform, after reaching a critical mass of content. Lastly, the competitive advantage that Netflix can derive from stocks of historical data is further weakened by time-dependency, where the relevancy of streaming data decays significantly with time (Hardesty, 2019).[85]

This is well-illustrated by the competitive landscape in the video streaming market. A number of firms offer competitive options in the video streaming space, including Amazon and Hulu. New market entrants are common: in recent years, multiple firms including Disney, HBO, Comcast, and Apple have entered the market, leading to a substantial decrease in market share for Netflix. In the year 2020 alone, Netflix saw its global market share fall from 29 percent to 20 percent (Frankel, 2021)[86] and its share of streaming activity fell from 32 percent to 22 percent from Q2 to Q4 2020, largely as a result of new market entrants (Reelgood for Business, 2021).[87]

Figure 2: Subscription Video on Demand Streaming Share, Top Five Platforms, Q2-Q4 2020[88]



It is clear that Netflix's incumbent data advantage has not been able to lock out competitors in the video streaming market. Instead, in order to remain competitive and attract customers, firms have had to continuously innovate on content and provide a more personalized user experience tailored to their platforms. Disney Plus, as a platform that has a lot of repeat viewing and a mix of short and long form content, is working to identify characteristics that define repeat viewing behavior (e.g. story arcs, protagonists); taking into account the specific context of the user's experience (for example, recommending a short if that appears to be the user's current "mood"); and using natural language processing

84 Amatriain, X. (2014) "10 Lessons Learned from Building ML Systems." MLconf, Youtube, 29 November. Available at https://www.youtube.com/watch?v=WdzWPuazLA8 (Accessed: May 20, 2021).

85 Hardesty, L. (2019) The history of Amazon's recommendation algorithm. Amazon Science. Available at https://www.amazon.science/the-history-of-amazons-recommendation-algorithm (Accessed: May 20, 2021).

86 Frankel, D. (2021) Netflix Lost 31% of Its Market Share in 2020. Available at https://www.nexttv.com/news/netflix-has-lost-31-of-market-share-in-one-year (Accessed: May 20, 2021).

87 Reelgood for Business (2021) Q4 2020 VOD Streaming Report. Available at https://biz.reelgood.com/rs/668-DQG-874/images/Reelgood%20Q4%202020%20VOD%20Streaming%20Report.pdf.

88 Figures adapted from *Q3 2020 Video Streaming Report* and *Q4 2020 VOD Streaming Report* (Santos, 2020; Reelgood for Business, 2021).

to analyze closed caption files to understand the "aboutness" of content and its emotional arcs (Forbes Insights Team, 2020).[89] On the other hand, HBO Max is taking an alternative approach to personalization. While algorithms are still used to recommend content, human curation is heavily emphasized, with pockets of the platform dedicated to content recommended by curators ranging from WarnerMedia editors to celebrities (Alexander, 2020).[90]

This competitive innovation has resulted in a diverse set of capabilities and experiences across video streaming platforms, providing a wider range of options to consumers. In the video streaming market, it is this innovation that attracts users and data to each platform in the first place, whereas large volumes of data and data network effects have a limited role in foreclosing competition.

B. Waymo

Waymo first started as an experimental self-driving car project inside Google's X lab in January 2009. Through the spinoff and transition to a subsidiary under Alphabet in 2016, Waymo has continued to focus on its goal of bringing autonomous vehicles to market.

Waymo relies significantly on machine learning algorithms to power key components of autonomous driving across perception, prediction, and planning. As such, data are essential in the development of fully autonomous vehicles. To collect data to train its neural networks, Waymo vehicles have driven over 20 million miles on public roads across 25 cities and have generated petabytes of data daily through the suite of lidar, radars, and high-resolution cameras equipped on its vehicles (Waymo, 2020b; Wiggers, 2020).[91] In addition to real world driving, Waymo also utilizes computer simulations to expand the scale and complexity of the data that it collects. A simulation enables for more miles to be driven (more than 20 million miles are driven per day inside Waymo's simulation software) and helps to accelerate the velocity of learning by introducing edge cases and testing experimental scenarios. By April 2020, Waymo had driven over 15 billion miles in simulation (Waymo, 2020a).[92]

However, more than a decade after inception, despite the immense amount of data and learnings generated from millions, and billions, of miles on public roads and in simulation, Waymo has not been able to avoid competition and a fully autonomous vehicle remains some time away (Abuelsamid, 2018).[93] One key technical challenge has revolved around the long tail of scenarios a vehicle encounters on the road, as autonomous vehicles require full coverage of edge cases (i.e. it is not acceptable for an autonomous vehicle to succeed in 99 percent of scenarios and fail in the other 1 percent, as compared to, for example, searches on Google or music recommendations on Spotify). Learning from the tail is further complicated by limited clustered learning: in many cases, learnings from one city do not transfer to others due to differences in traffic rules, weather, and geographic terrain.

Thus, in autonomous driving, the limits of scaling of data value are primarily driven by the long tail of scenarios, the coverage required across the entirety of the tail, and the limited transferability of learnings from edge case to edge case (localized learning). Due to these factors, there is a decreasing marginal utility to data, as the majority of data collected represents common scenarios that the software has already learned how to perceive, predict, and plan around. On the other hand, costs associated with collecting, processing, and utilizing additional data will generally stay flat, as the system must be tailored to deal with each edge case.

These challenges, and the amount of competition and innovation in the autonomous driving space, is reflected in Waymo's valuation over time. While Waymo holds a first-mover advantage and has collected more data than nearly all of its competitors, its valuation has been falling relative to these competitors in recent years. Between 2018 and 2020, Waymo's valuation fell from $175 billion to $30 billion. At the same time, competitors have continued to receive external funding, and in many cases have seen their valuations rise. For example, in January 2021, GM's Cruise raised $2 billion at a valuation of over $30 billion.

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89 Forbes Insights Team (2020) "How Disney Plus Personalizes Your Viewing Experience," Forbes Magazine, 21 April. Available at https://www.forbes.com/sites/insights-teradata/2020/04/21/how-disney-plus-personalizes-your-viewing-experience/ (Accessed: May 20, 2021).

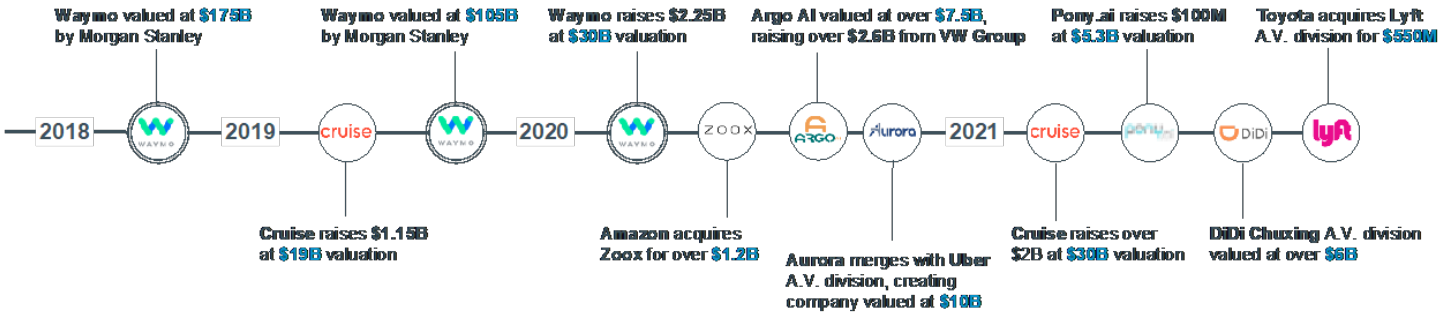
90 Alexander, J. (2020) "HBO Max is taking on Netflix with human curation instead of solely relying on algorithms," 27 May. Available at https://www.theverge.com/21268972/hbo-max-design-recommendation-human-curation-friends-kids-profiles (Accessed: May 20, 2021).

91 Waymo (2020b) Using automated data augmentation to advance our Waymo Driver. Available at https://blog.waymo.com/2020/04/using-automated-data-augmentation-to.html (Accessed: May 20, 2021). Wiggers, K. (2020) Waymo's autonomous cars have driven 20 million miles on public roads, VentureBeat. Available at https://venturebeat.com/2020/01/06/waymos-autonomous-cars-have-driven-20-million-miles-on-public-roads/ (Accessed: May 20, 2021).

92 Waymo (2020a) Off road, but not offline: How simulation helps advance our Waymo Driver. Available at https://blog.waymo.com/2020/04/off-road-but-not-offline--simulation27.html (Accessed: May 20, 2021).

93 Abuelsamid, S. (2018) "Transition To Autonomous Cars Will Take Longer Than You Think, Waymo CEO Tells Governors," Forbes Magazine, 20 July. Available at https://www.forbes.com/sites/samabuelsamid/2018/07/20/waymo-ceo-tells-governors-av-time-will-be-longer-than-you-think/ (Accessed: May 20, 2021).

Figure 3: Funding and Valuation of Autonomous Driving Companies, 2018 – 2021



Data are clearly crucial in developing autonomous vehicles. The long tail of scenarios, however, along with the requirement of full coverage of the tail, means that the relative advantage that Waymo derives from data can become smaller over time in comparison to competitors. Thus, despite Waymo's advantage in the scale and scope of data collected over the past decade, it is clear that this data advantage has not locked out competitors. There has been an enormous amount of competition and innovation in the space, as seen by competitors such as Cruise and Argo AI. Interestingly, competition around data has continued to become more open in nature, with firms starting to release large, high-quality data-sets into the open (e.g. Waymo Open Dataset, Argo AI Argoverse) in order to spark innovation in the research and development of autonomous vehicles.

C. Online Advertising

Online advertising is often cited as an industry where data accumulation by incumbents has created an insurmountable barrier to entry. This is sometimes argued to be caused by "network effects" associated with the scale and scope of data collected (Newman, 2014; Stucke & Grunes, 2015).[94]

However, the reality is that understanding the value of advertising data is complex. Ultimately, the value of advertising data depends on many factors including data quality, complementarity with other existing data, how data drive improvements in personalization, and, in turn, when increased personalization translates into increased ad effectiveness (Arnold *et al.*, 2018; Dobson, 2018).[95] This value can be significantly less than is often assumed in regulatory discussions. In one example, research demonstrated that for a national apparel retailer, incorporating additional data such as demographics and ad exposure data provided essentially no performance improvements, while other types of data such as purchase history and retail-defined customer categories provided only minor improvements (Johnson, Lewis & Reiley, 2017).[96] In fact, in this case, *reducing* data volume by removing purchase data prior to a customer's first ad exposure increased performance substantially more than adding new data.

Furthermore, the impact of advertising data on competition is also complex. In the context of targeted advertising, data can be thought to fall into one of two separate regimes depending on its degree of time-dependency. The first regime consists of stable, low time-dependency data, which are used to infer consumer characteristics that change slowly, or predictably, with time. Such characteristics include socio-demographic factors (e.g. age, race, education) and chronic health conditions (e.g. diabetes, hypertension). As this type of data has very stable time-dependency and can be identified across various points in time, it is generally not unique to specific platforms. For example, demographic and user interest

94 Newman, N. (2014) "Search, antitrust, and the economics of the control of user data," Yale journal on regulation. HeinOnline, 31, p. 401. Stucke, M. E. & Grunes, A. P. (2015) "Debunking the myths over big data and antitrust," CPI Antitrust Chronicle, May. awa2016.concurrences.com. Available at http://awa2016.concurrences.com/IMG/pdf/ssrn-id2612562.pdf.

95 Arnold, R. et al. (2018) Is data the new oil? Diminishing returns to scale. 184927. International Telecommunications Society (ITS). Available at https://ideas.repec.org/p/zbw/itse18/184927.html (Accessed: May 26, 2021). Dobson, C. (2018) "Targeted Advertising Requires Good Data," Forbes Magazine. Available at https://www.forbes.com/sites/forbestechcouncil/2018/04/05/targeted-advertising-requires-good-data/?sh=63aeb8db29db (Accessed: June 2, 2021).

96 Johnson, G. A., Lewis, R. A. & Reiley, D. H. (2017) "When less is more: Data and power in advertising experiments," Marketing science. Institute for Operations Research and the Management Sciences (INFORMS), 36(1), pp. 43–53.

data can be acquired from a variety of sources, including data providers such as comScore and Nielsen.[97] Other firms, from news publishers to smaller online stores, can also infer similar data on consumer characteristics to guide targeted advertising (Computer and Communications Industry Association, 2019).[98] Due to this lack of exclusivity, possessing a large stock of low time-dependency data typically does not provide a sustainable competitive advantage, especially as much of the data collected are duplicative and do not provide new insight on consumer characteristics. Research has also shown that low time-dependency data are often less valuable for targeted advertising compared to data that reveal short-term trends in user behavior (Yan *et al.*, 2009; He *et al.*, 2014).[99]

The second regime encompasses highly time-dependent data. Examples of such data include geo-location information for targeting consumers in a particular area and customer purchase intent data. While this type of data can be quite valuable for advertisers, it also has rapidly decaying utility, and data that are no longer relevant can fail to deliver returns on ad spending (McKenna, 2017; Oakes, 2020).[100] For example, once a customer leaves a certain geographic location, data that may have enabled hyperlocal advertisements can immediately lose most of their value. As a result, with high time-dependency data, continuous flows of data can be significantly more valuable than a large stock of historical data, which reduces any competitive advantage that incumbents may have due to data accumulation. In addition, high time-dependency data may also not be exclusive. Location data is frequently accessed by many applications on a consumer's phone and consistently available to a wide range of advertisers (Almuhimedi *et al.*, 2015).[101] Advertisers can also acquire location data through marketplace vendors such as Foursquare, which further lowers the exclusivity of such data.[102] Finally, across both regimes, there is a limit to how much data value can scale. Advertising data faces diminishing marginal utility, as the long tail of data generally contains information on thinner segments of the market that attract fewer advertisers (Arnold *et al.*, 2018).[103] In some cases, joining together diverse datasets, including granular consumer-level information, may not improve the performance of targeted advertisements as the data may not be complementary (Johnson, Lewis & Reiley, 2017).[104] This can also be true for data collected *across* multiple products or services, as data generated for each product are generally specific to that product and may hold limited complementarity with other existing data.

Based on these factors, it is difficult to conclude that the success of platforms in online advertising is solely due to the scale and scope of data accumulated. Their success is more likely due to a confluence of factors, including not only the value of data collected, but also innovation in product development, a competitive pricing strategy, and extensive sales efforts.

V. CONCLUSION

While common regulatory perspective on the relationship between data, value, and competition tends to focus on the volume of data accumulated by incumbents and posits the existence of data network effects, more recent work across economics, management science, and engineering shows that there are a variety of factors that impact the value of data and that implications for competition are much more complex and subtle.

The framework in this paper presents four key factors – data quality, scale and scope of data, and data uniqueness – that can influence the value that firms can derive from data. Understanding data value and its likely impact on competition requires a careful case-by-case evaluation, as these factors depend significantly on the domain and context. These factors also illustrate that the volume of data accumulated, by itself, does not determine data value. Applying the framework to Netflix, Waymo, and the online advertising industry provides compelling evidence that

97 For example, see https://www.comscore.com/Products/Activation/Audience-Targeting-Solution and https://www.nielsen.com/us/en/solutions/capabilities/audience-segments/ for comScore and Nielsen data.

98 Computer and Communications Industry Association (2019) CCIA's Submission to the UK Competition & Markets Authority. Available at https://www.ccianet.org/wp-content/uploads/2019/08/CMAs-filing-digital-advertising_Final.pdf.

99 Yan, J. et al. (2009) "How much can behavioral targeting help online advertising?," in Proceedings of the 18th international conference on World wide web. New York, NY, USA: Association for Computing Machinery (WWW '09), pp. 261–270. He, X. et al. (2014) "Practical Lessons from Predicting Clicks on Ads at Facebook," in Proceedings of the Eighth International Workshop on Data Mining for Online Advertising. New York, NY, USA: Association for Computing Machinery (ADKDD'14), pp. 1–9.

100 McKenna, T. (2017) Three Resolutions for Data-Driven Marketers in 2018. Available at https://adage.com/article/bazaarvoice/resolutions-data-driven-marketers-2018/311503 (Accessed: May 26, 2021). Oakes, E. (2020) Data freshness is a lifeline for marketers. Available at https://newdigitalage.co/retail/data-freshness-is-a-lifeline-for-marketers/ (Accessed: May 28, 2021).

101 Almuhimedi, H. et al. (2015) "Your Location has been Shared 5,398 Times! A Field Study on Mobile App Privacy Nudging," in Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems. New York, NY, USA: Association for Computing Machinery (CHI '15), pp. 787–796.

102 See https://foursquare.com/products/audience/ for Foursquare's offerings.

103 *Op. cit.*.

104 *Op. cit.*

incumbent data advantage, while generating value for innovation and for the consumer experience, does not necessarily lock out competitors and is not determinative of success. As these case studies show, data serve as a catalyst for innovation that benefits both consumers and the broader ecosystem.

VI. APPENDIX: DETAILS ON CASE STUDY

Since its earliest days, Netflix recognized the importance of using data to personalize the user experience. With the pivot towards online streaming in 2007, Netflix started to leverage an increasingly diverse set of data to personalize content for users. The company now provides personalization for over 200 million subscribers spread across more than 190 countries, and at the core of Netflix sits a sophisticated software and data infrastructure that collects, processes, and deploys petabytes of data daily. Netflix uses this data to train algorithms to influence virtually every aspect of its business, including recommending content to users, optimizing the signup process, and negotiating license agreements.

However, despite Netflix's significant investment in data, it has faced significant competition in the video streaming market. In recent years, multiple firms including Disney, HBO, Comcast, and Apple have entered the market, leading to a substantial decrease in Netflix's market share. The following discusses Netflix's investments in assuring data quality, increasing the scope in which data is deployed, and enhancing data scalability to show how the firm's investments in data have driven innovation and have benefited customers. However, at the same time, the case study explores the limits to scaling data value, as well as how competitors have been able to imitate Netflix's data-driven learnings.

1. Data Quality

Netflix has invested significantly in developing infrastructure and processes to enable real-time usability of data. In order to effectively capture and use the trillions of data events that are generated on the platform daily, Netflix developed its "Keystone Stream Processing Platform" as the firm's data backbone, allowing data to be collected, processed, and aggregated in real time (Netflix Technology Blog, 2018b).[105] Data collected includes video viewing metadata, user interface interactions, performance data, and troubleshooting records.

Netflix also spends considerable effort in optimizing the *relevance* of data that it uses to train its algorithms. For example, in 2017, Netflix shifted from a star-based rating system to a simpler "thumbs-up" model (Roettgers, 2017).[106] One primary reason for this shift was the recognition that star-based ratings were not necessarily good predictors of what users were interested in watching – for example, "users would rate documentaries with 5 stars, and silly movies with just 3 stars, but still watch silly movies more often than those high-rated documentaries" (Roettgers, 2017).[107] The "thumbs-up" feedback model provided a clearer link to personalization and resulted in an over 200 percent increase in ratings collected (Netflix, 2017).[108] This was also part of a broader shift at Netflix, from relying solely on the billions of ratings it had collected in its early days of personalization, to recognizing that certain types of data are more relevant than others (i.e. implicit user behaviors matter more than explicit ratings).

While Netflix has spent considerable effort to increase the relevancy of the data it collects, it operates in an industry where this relevancy also decays rapidly over time. Netflix's catalog of videos is updated constantly and viewership tends to decay rapidly after movies are newly released. Research from competing video streaming service, Amazon Prime Video, confirms that users are far more likely to watch a recent release than a highly rated classic (Hardesty, 2019).[109] Due to this *time-dependency* of data, effectively capturing a real time flow of data generated on the platform ("data flows") is far more valuable to Netflix than a large volume of historical data ("data stock") that will continue to decay in value with time.

105 Netflix Technology Blog (2018b) Keystone Real-time Stream Processing Platform - Netflix TechBlog, Netflix TechBlog. Available at https://netflixtechblog.com/keystone-real-time-stream-processing-platform-a3ee651812a (Accessed: May 20, 2021).

106 Roettgers, J. (2017) Netflix Replacing Star Ratings With Thumbs Ups and Thumbs Downs. Available at https://variety.com/2017/digital/news/netflix-thumbs-vs-stars-1202010492/ (Accessed: May 20, 2021).

107 *Op. cit.*

108 Netflix (2017) Goodbye Stars, Hello Thumbs. Available at https://about.netflix.com/en/news/goodbye-stars-hello-thumbs (Accessed: May 20, 2021).

109 Hardesty, L. (2019) The history of Amazon's recommendation algorithm. Amazon Science. Available at https://www.amazon.science/the-history-of-amazons-recommendation-algorithm (Accessed: May 20, 2021).

2. Scale Effects

Content recommendation is a core use case for Netflix. For recommendations, however, data faces significantly diminishing returns. In 2014, Xavier Amatriain, Netflix Director of Algorithms Engineering, showed that the performance of Netflix's in-production recommendation algorithm showed no improvement after just 2 million training examples (Amatriain, 2014).[110]

Figure 4: Netflix Recommendation System Scaling[111]

This rapid saturation in performance is, in part, due to Netflix's long tail of content. On one hand, this content is extremely valuable for Netflix and its viewers, and Netflix devotes significant effort to increase customer engagement by promoting the full extent of its video catalog in recommendations (Gomez-Uribe and Hunt, 2016).[112] On the other hand, the cost of acquiring long tail content will likely continue to incur significant costs for Netflix (in comparison to, for example, YouTube, where long tail content emerges organically as it is community driven).

These challenges were further compounded by limited *clustered learning* across users in individual regions. Initially, Netflix divided member countries into groups based on geographic region, language, culture, and video availability. In 2016, Netflix announced a pivot towards a single global model leveraging over 2000 "taste micro-clusters," which defines groups of users with shared viewing interests. This transition allowed Netflix to offer better recommendations to users in new markets, as well as users with niche tastes:

> "Another example of what our global recommendation system means for members around the world comes from the global community of health-conscious foodies, who are very interested in learning about food and the industry around it…

The percentage of members from each country in this community is actually relatively small. So if we were relying just on the data from a single country (especially a new one with a smaller number of members), our personalized recommendations would suffer as a result. By leveraging data from across the world and countries of all sizes, our global algorithms are able to tap those insights to make recommendations for this food conscious community that are more accurate and robust." (Netflix, 2016).[113]

110 Amatriain, X. (2014) "10 Lessons Learned from Building ML Systems." MLconf, Youtube, 29 November. Available at https://www.youtube.com/watch?v=WdzWPuazLA8 (Accessed: May 20, 2021).

111 Excerpt from "10 Lessons Learned from Building ML Systems" (Amatriain, 2014).

112 Gomez-Uribe, C. A. & Hunt, N. (2016) "The Netflix Recommender System: Algorithms, Business Value, and Innovation," ACM Trans. Manage. Inf. Syst. New York, NY, USA: Association for Computing Machinery (13), 6(4), pp. 1–19.

113 Netflix (2016) A Global Approach to Recommendations. Available at https://about.netflix.com/en/news/a-global-approach-to-recommendations (Accessed: May 20, 2021).

3. Scope

Netflix initially relied exclusively on user ratings to train its recommendation algorithms (Roettgers, 2017).[114] By 2012, however, Netflix was using data inputs ranging from video metadata to external social data for training its recommendation algorithm, which resulted in a significant improvement relative to relying solely on user ratings (Netflix Technology Blog, 2012).[115] More recently, Netflix has experimented with deep learning models in order to make contextual recommendations by leveraging sequential context about the user (e.g. country, device, time, content consumed) to predict what the user will engage with next based on their current context. In particular, combining this with discrete time variables (e.g. day of week) and continuous time variables (i.e. timestamps) resulted in a more than 40 percent improvement over traditional matrix factorization techniques (Basilico, 2019).[116]

Netflix has also continuously expanded the scope in which data drives value by *reusing* data across use cases. Netflix now uses user viewing history not just to drive personalized recommendations, but also to personalize the artwork that individual users see (Netflix Technology Blog, 2017).[117] Other examples include utilization of historical movie metadata to inform its content production; using factors such as viewing history, connection speed, device preference to improve the user streaming experience; and optimizing the sign up experience based on users' device, location, payment methodology, and more (Netflix Technology Blog, 2018a, 2020).[118]

4. Uniqueness

Ultimately, however, competitors have been able to imitate the data that Netflix collects and the learnings enabled by that data. While Netflix's data is proprietary and exclusive to Netflix, competitors such as Hulu, Amazon Prime Video, and Comcast Peacock have been able to obtain a critical mass of content and thus obtain data that is most valuable for its own platforms in order to power their algorithms. For example, Disney Plus, as a platform that has a lot of repeat viewing and a mix of short and long form content, has invested in identifying characteristics that define repeat viewing behavior (e.g. story arcs, protagonists) and taking into account the specific context of the user's experience (Forbes Insights Team, 2020).[119] Other platforms have also invested significantly in developing sophisticated data pipelines and recommendation engines – for example, Amazon Prime Video recognized the importance of time-dependency early on and optimized their neural network training procedure to take into account data freshness (Hardesty, 2019).[120]

114 *Op. cit.*

115 Netflix Technology Blog (2012) Netflix Recommendations: Beyond the 5 stars (Part 2), Netflix TechBlog. Available at https://netflixtechblog.com/netflix-recommendations-beyond-the-5-stars-part-2-d9b96aa399f5 (Accessed: May 19, 2021).

116 Basilico, J. (2019) "Recent Trends in Personalization: A Netflix Perspective," 15 June. Available at https://slideslive.com/38917692/recent-trends-in-personalization-a-netflix-perspective (Accessed: May 20, 2021).

117 Netflix Technology Blog (2017) Artwork Personalization at Netflix - Netflix TechBlog, Netflix TechBlog. Available at https://netflixtechblog.com/artwork-personalization-c589f074ad76 (Accessed: May 20, 2021).

118 Netflix Technology Blog (2018a) Growth Engineering at Netflix — Accelerating Innovation, Netflix TechBlog. Available at https://netflixtechblog.com/growth-engineering-at-netflix-accelerating-innovation-90eb8e70ce59 (Accessed: May 20, 2021). Netflix Technology Blog (2020) Supporting content decision makers with machine learning, Netflix TechBlog. Available at https://netflixtechblog.com/supporting-content-decision-makers-with-machine-learning-995b7b76006f (Accessed: May 20, 2021).

119 Forbes Insights Team (2020) "How Disney Plus Personalizes Your Viewing Experience," Forbes Magazine, 21 April. Available at https://www.forbes.com/sites/insights-teradata/2020/04/21/how-disney-plus-personalizes-your-viewing-experience/ (Accessed: May 20, 2021).

120 Hardesty, L. (2019) The history of Amazon's recommendation algorithm. Amazon Science. Available at https://www.amazon.science/the-history-of-amazons-recommendation-algorithm (Accessed: May 20, 2021).

BREAKING UP IS HARD TO DO DURING COMPETITION AGENCY REVIEW: FIXING BEFORE FILING CAN BE THE EASIER PATH TO CLOSING

BY WILLIAM MACLEOD[1]

1 Kelley Drye & Warren LLP.

Commentators throughout the competition community have reported, analyzed, and opined on the changes in merger and acquisition review in 2021. Vertical merger guidelines have been rescinded. Early terminations at the FTC are gone for the time being. Horizontal merger guidelines are under review. Investors, not just companies, are new subjects of interest. Adding to the uncertainty surrounding M&A, Congress is contemplating numerous bills to change burdens of proof and create special rules for concentrated markets. Meanwhile, the FTC has expressed doubts over the advice that staff has given on premerger issues.[2] And after all is done, new consent orders may require companies to get permission of the FTC before consummating future deals.[3] With a prior-approval clause in place, the agency could stop any deal covered by the order, regardless of its legality. What will come out of the Department of Justice, which awaits the next Assistant Attorney General, remains to be seen, but nobody is betting on the status quo.

In the wake of these shifting tides, one element of merger practice remains remarkably stable. A divestiture can save a deal otherwise destined for challenge. More encouraging, the substance of divestiture review remains largely consistent with the principles applied in years past, and the practices of the agencies bear more similarities than differences than before. In an era of heightened review, however, deal structure and timing may merit a new approach. Merging parties that fix deals before the culmination of review, and perhaps before the beginning of review, will have significant advantages.

The analysis, as always, should start with the law. Section 7 of the Clayton Act prohibits deals the effect of which "may be substantially to lessen competition, or to tend to create a monopoly." Some legislators want to make that standard easier – for example, Senator Klobuchar's bill, S. 225, would change the standard to "create an appreciable risk of materially lessening competition." Antitrust veterans recall when the more rigorous terms were enough to block a merger that resulted in a firm with less than 10 percent of a market and to prompt Justice Stewart to observe in dissent that "sole consistency that I can find is that, in litigation under § 7, the Government always wins." (*United States v. Von's Grocery Co.*, 384 U.S. 270 (1966) (Stewart, J. dissenting)) But the debate over standards should not matter to deals that present no risk or tendency to begin with. A deal shorn of overlaps does not violate the law.

Most deals that raise concerns are reported to FTC and DOJ before the overlaps have been eliminated. Parties may have plans for the most obvious divestitures, but it is not always obvious what concerns the investigating staff might raise, and parties are understandably reluctant to give up on a piece of business that they hope to talk an agency into allowing them to keep. The decision of what to divest becomes a collaboration between the agencies and the party, and the collaboration involves an intense investigation. Demonstrating to enforcement officials that an ancillary transaction will preserve competition means prodigious document productions, interviews of potential buyers, parsing of the contract terms, and more. The FTC offers an overview with a guide that scratches the surface of what parties should be prepared to face.[4] Selected instructions include:

- provide Compliance staff with the steps taken and concerns about any aspect of the diligence process;
- obtain direct access to [the spinoff's] information, facilities, and employees;
- obtain direct access to the hold separate business, the hold separate monitor and the hold separate manager
- explain the structure of the funding for the investment, including any limitations of the funds;
- provide all sources of financing for the acquisition of the divested assets, including private equity or other investors, and explain the criteria used for evaluating such sources;
- make representatives from the financing entities available for discussions with staff;
- provide detailed financial and business plans, with supporting documentation….

2 Holly Vedova, Bureau of Competition, FTC, "Reforming the Pre-Filing Process for Companies Considering Consolidation and a Change in the Treatment of Debt," Aug. 26, 2021, available at https://www.ftc.gov/news-events/blogs/competition-matters/2021/08/reforming-pre-filing-process-companies-considering.

3 Release, "FTC Rescinds 1995 Policy Statement that Limited the Agency's Ability to Deter Problematic Mergers," July 21, 2021, available at https://www.ftc.gov/news-events/press-releases/2021/07/ftc-rescinds-1995-policy-statement-limited-agencys-ability-deter.

4 Bureau of Competition, FTC, "A Guide for Potential Buyers: What to Expect During the Divestiture Process," Available at https://www.ftc.gov/system/files/attachments/merger-review/a_guide_for_potential_buyers.pdf.

Additional instructions apply to spinoffs of less than an entire business entity. Not surprisingly, reviews of divestitures take months, and typically don't commence in earnest until after staff has concluded that the principal transaction can progress if the divestiture is effective. This author has been involved in divestitures that took over a year to negotiate and clear, as well as spinoffs that wrapped up in a few months. In every case, the divestiture added time to the transaction. For a recent example of an extended review, see the FTC consent addressing the overlaps in Gallo's acquisition of assets from Constellation, announced in April of 2019 and closed in December of 2020.[5]

Several months of unexpected delay can strain a deal to the breaking point and run up hundreds of millions of dollars of expenses from renegotiations, rearranged financing, and postponed business opportunities. All this should be taken into account in light of the new developments at the FTC. Agency leadership has warned repeatedly that deals are getting closer scrutiny from staff already overworked from a surge in Hart Scott Rodino ("HSR") notifications, that second requests are going to be more difficult to negotiate, and that reviews will be more extensive.[6] And that does not count the delays that could occur if the staff deems divestitures are needed. In short, certifying compliance will take longer. And parties that get to the HSR finish line have been warned that if they certify and close before a review is done, they should not assume that their deal is safe from attack.[7] The risk of an agency challenging a deal months or years after it has closed has always existed, of course, but the business is forewarned that the odds have apparently increased.[8]

It is hazardous to predict how long HSR review will take in the new administration, but one factor is clear. When a deal is presented to the staff with an obvious divestiture to be negotiated, the merging parties lose control over the timing of the transaction. A proposed acquisition that presents a probable competitive problem is a deal that has to be negotiated with the staff and resolved with a complaint and consent. The more significant the problem, the easier it is for an agency to attack an entire transaction.

By contrast, a transaction structured to eliminate obvious problems before it is notified to the agencies puts the parties in control of timing. The benefits of removing investigative subjects will be immediate. At the outset, overlaps are the main cause of extended investigations. With the overlap eliminated, there is less for the staff to review. The efficacy of the overlap will likely get some attention, but that attention comes with less leverage. No longer is the main deal an obvious target of an easy attack. For example, the FTC declined to challenge a transaction properly structured on arrival in the *Reynolds-Lorillard-Imperial* deal in 2015. The agency issued a complaint and consent order approving the deal as proposed, while one Commissioner said the fix obviated the action altogether:[9]

> As a matter of principle, in a three (or more) way transaction, an order is unnecessary if the transaction—taken as a whole—does not give reason to believe competition will be substantially lessened. [That] a component of a multi-part transaction is likely anti-competitive when analyzed in isolation does not imply that the transaction when examined as a whole is also likely to substantially lessen competition.

This rationale would have obvious appeal to a federal judge considering a motion for a preliminary injunction.

In an agency strapped for resources, a resource-intensive merger battle is not likely to erupt over marginal issues. Parties can comply with the second request and let certification start the clock toward litigation or closing. Most likely, the result will be closing. As always, the agencies can warn that the investigation will continue even after the deal is closed, but history reveals that such warning will seldom materialize in action. If a challenge does come, and the repair is defensible, the agencies would face much higher burden persuading a court to grant the relief that the staffs could readily obtain during negotiations. Needless to say, an inadequate fix will not shift the burden, as Sysco and U.S. Foods discovered when they divested fewer assets than the FTC alleged were necessary to preserve competition if they merged.[10]

5 See, e.g. *E & J Gallo Winery/Constellation Brands*, December 23, 2020, available at https://www.ftc.gov/news-events/press-releases/2021/04/ftc-approves-final-order-imposing-conditions-e-j-gallo-winerys

6 Holly Vedova, Bureau of Competition, "Making the Second Request Process Both More Streamlined and More Rigorous During this Unprecedented Merger Wave," Sept. 28, 2021, available at https://www.ftc.gov/news-events/blogs/competition-matters/2021/09/making-second-request-process-both-more-streamlined (predicting investigations into "how a proposed merger will affect labor markets, the cross-market effects of a transaction, and how the involvement of investment firms may affect market incentives to compete.").

7 Holly Vedova, Bureau of Competition, FTC, "Adjusting merger review to deal with the surge in merger filings," Aug. 3, 2021 available at https://www.ftc.gov/news-events/blogs/competition-matters/2021/08/adjusting-merger-review-deal-surge-merger-filings ("Companies that choose to proceed with transactions that have not been fully investigated are doing so at their own risk.").

8 See e.g. Evans, Merger Enforcement in the Biden Administration, https://www.kelleydrye.com/News-Events/Publications/Client-Advisories/Merger-Enforcement-in-the-Biden-Administration.

9 *In the Matter of Reynolds American Inc. and Lorillard Inc.*, Dissenting Statement of Commissioner Joshua D. Wright, FTC File Number 141-0168,

10 See, e.g. Case Summary, *Sysco/USF Holding/US Foods*, available at https://www.ftc.gov/enforcement/cases-proceedings/141-0067/syscousf-holdingus-foods-matter.

Fix-it-first has long been a mantra in merger clearance. Up until now it typically meant that parties must prepare to negotiate with the staff during the investigation over how to restructure an entire deal. The announcements of longer, tougher reviews from the FTC bring new variables into the equation. Those factors add significant value to the benefits of fixing a deal before the review begins. The challenge to parties and competition counsel is to do more of their own assessments of the likely vulnerabilities of a deal, and to undertake the repair in advance, instead of committing the transaction to a process they cannot control.

CONWAY'S LAW, THE MIRRORING HYPOTHESIS, AND THE OVERLOOKED IMPORTANCE OF TECHNOLOGICAL CONSIDERATIONS

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I. INTRODUCTION

One of the most prominent issues in the current debates about antitrust law is the extent to which combining business units under the same corporate umbrella can allow big tech firms to favor their own services over those provided by third parties. These concerns about vertical exclusion have led to calls to deploy one of the least frequently used and most powerful remedies available to antitrust enforcement officials and require these companies to divest some of their subsidiaries. They have also prompted consideration of less intrusive alternatives that can redress the same problems, such as prohibiting firms from bundling certain products together or from favoring their own offerings over their competitors'.

The conventional wisdom on vertical exclusion has undergone something of a sea change since the middle of the 20th Century, influenced by several lines of scholarship. Studies motivated by price theory raised questions whether a monopoly in one market could be used as leverage over another market[2] or when vertical combinations can yield efficiencies, such as through the elimination of double marginalization or the rationalization of inputs that can be combined in variable proportions.[3] Another line of commentary has focused on how combining complementary functions in a single firm can minimize transaction costs.[4]

The growing emphasis on economic considerations, while important, has largely supplanted the focus on technical considerations that once dominated the study of vertical integration.[5] I contend that the pendulum has swung too far to the point where the role of technology is given too little weight and that analysis of vertical exclusion would benefit from reincorporating consideration of technical considerations, albeit in a manner updated to reflect the modern digital economy. While the prior work on the role of technology focused almost exclusively on operational complementarities in manufacturing, modern analyses should reflect how platforms rely on modularity to address the challenges of managing complex systems. It also draws on concepts from the computer science and management literature that emphasize how the institutional configuration of an industry must parallel its underlying technological structure if it is to realize its potential. The need for congruence between an industry's technical and organizational structure places underappreciated natural limits on policymakers' ability to restructure it to satisfy other concerns.

II. CONWAY'S LAW, THE MIRRORING HYPOTHESIS, AND THE IMPORTANCE OF MAINTAINING CONGRUENCE BETWEEN ORGANIZATIONS AND TECHNOLOGY

Those who would curb the power of digital platforms either by breaking them up or by blocking them from favoring their own offerings must consider the innate connection between organizational structure and technology. Computer scientists first captured the deep linkage between technology and organizations in what became known as *Conway's Law*, which holds that "The structure of any system designed by an organization is isomorphic to the structure of the organization."[6]

This concept has become embodied in the management literature as the *mirroring hypothesis*, which posits that the organizational structure of an industry necessarily mirrors the design of the underlying technical system, although the theory is agnostic as to which direction the causal arrow points. This theory asserts that technical design is also tied to the natural boundaries between firms. Empirical studies have confirmed the mirroring hypothesis is a common phenomenon while identifying areas in which other considerations play a role.[7]

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2 See, e.g. Ward S. Bowman, Jr., *Tying Arrangements and the Leverage Problem*, 67 Yale L.J. 19, 20-21 (1957) (providing the seminal critique of leverage).

3 See, e.g. Joseph J. Spengler, *Vertical Integration and Antitrust Policy*, 58 J. Pol. Econ. 347 (1950) (providing the seminal analysis of the elimination of double marginalization); Lionel McKenzie, *Ideal Output and the Interdependence of Firms*, 61 Econ. J. 785 (1951) (providing the seminal analysis of variable proportions).

4 All transaction cost analyses stem from R.H. Coase, *The Theory of the Firm*, 4 Economica 386 (1937). For the seminal works applying this framework to the antitrust law of vertical integration, see, e.g. Oliver E. Williamson, Markets and Hierarchies: Analysis and Antitrust Implications 16-19, 90-116 (1975); Oliver E. Williamson, *The Vertical Integration of Production: Market Failure Consideration,* 61 Am. Econ. Rev. (Papers & Proc.) 112 (1971); Benjamin Klein, Robert G. Crawford, & Armen A. Alchian, *Vertical Integration, Appropriable Rents, and the Competitive Contracting Process*, 21 J.L. & Econ. 297 (1978).

5 See, e.g. Williamson, *supra* note 3, at 112. For a classic example of this earlier work, see, e.g. Joe S. Bain, Industrial Organization 156, 357 (1968).

6 Edward Yourdan & Larry L. Constantine, Structured Design: Fundamentals of a Discipline of Computer Program and Systems Design 363 & n.* (1975) (offering this strong statement of Conway's Law and noting that the term was coined by the 1968 National Symposium on Modular Programming). The original statement comes from Melvin E. Conway, *How Do Committees Invent?*, Datamation, Apr. 1968, at 28, 31.

7 See, e.g. Lyra J. Colfer & Carliss Y. Baldwin, *The Mirroring Hypothesis: Theory, Evidence, and Exceptions*, 25 Indus. & Corp. Change 709 (2016) (coining the term and providing an excellent literature review).

The coupling between technology and organizations stems from the institutional aspects of innovation. Systems embody technological trajectories and design hierarchies that establish a technical agenda for an industry that serve as filters for determining which avenues are the most likely to prove successful. The paradigm also becomes embodied in the communications channels within organizations as well. The institutionalization of a technological trajectory both enables tremendous capability while creating resistance to changes inconsistent with that trajectory.[8]

Conway's Law and the mirroring hypothesis sound important cautionary notes for those seeking to restructure industries based purely on competitive concerns. They suggest that if such efforts fail to take technical considerations into account, they may force the organization of the industry away from the structure entailed by the underlying technology in ways that are likely to impose significant underappreciated harms to consumers and innovation. Divestitures and nondiscrimination mandates that may make sense from the standpoint of competition policy may conflict with the mandates of the underlying technology.

III. THE MODULAR STRUCTURE OF PLATFORM INDUSTRIES

Any attempts to address problems of vertical exclusion must thus incorporate a proper understanding of the structure of the underlying technology. This in turn raises the fundamental question: What is the technical structure of platform industries?

The primary organizing principle around which digital platforms are organized is modularity. Following the work of Nobel Laureate Herbert Simon, modularity manages complex systems by clustering together components with strong linkages in the same subsystem while placing components with weak linkages to exist in separate subsystems. This process of near decomposition permits experimentation to occur at the module level instead of with the system as a whole.[9]

The problems of complexity and the solutions offered by modularity have long been apparent to computer scientist. Brooks's Law has noted that when task partitioning is impossible, the addition of personnel to a software project that is running behind only slows it down still further largely because it causes the number of pairwise interpersonal communications needed to coordinate within the team to explode combinatorially.[10] The solution is to design interfaces to include only the information associated with interdependencies intended to be shared across module while hiding all of the information relating to interdependencies intended to be encapsulated within one module by omitting it from the interface.[11]

The result is an approach to analyzing the vertical structure of an industry that diverges from the conventional wisdom in striking ways. For example, it places significant weight on technological interactions that are not adequately captured by price theory by identifying clusters of tasks that can be performed effectively only within the same organization. At the same time, it identifies what Carliss Baldwin has called *transaction free zones*.[12] This insight can be conceived of as the polar case within the transaction cost paradigm in which transaction costs are infinite or as a qualitatively different phenomenon in which the impossibility of transactions renders the magnitude of transaction costs irrelevant.

Near composition and modularity have important organizational implications. They suggest that firm boundaries are determined in part by the level of technical interdependence among tasks and not just by economic considerations. They also imply the dangers of attempting to restructure the boundaries between firms based purely on competitive considerations. Instead, such boundaries can occur only at the "thin crossing points" where the technical interactions are the weakest.[13] In short, technical considerations may prevent dividing firms or mandating nondiscrimination at particular locations even when competitive exigencies support doing so.

8 Christopher S. Yoo, *Product Life Cycle Theory and the Maturation of the Internet*, 104 Nw. U. L. Rev. 641, 650-58 (2010).

9 Christopher S. Yoo, *Modularity Theory and Internet Regulation*, 2016 U. Ill. L. Rev. 1, 6-9

10 Frederick P. Brooks, The Mythical Man-Month: Essays on Software Engineering 18-19 (1975).

11 David L. Parnas, *Information Distribution Aspects of Design Methodology*, 1 Info. Processing 71: Proc. IFIP Cong. 1971, at 339, 344 (C.V. Freiman ed., 1972).

12 Carliss Y. Baldwin, *Where Do Transactions Come From? Modularity, Transactions, and the Boundaries of Firms*, 17 Indus. & Corp. Change 155, 157-58, 180-86 (2008).

13 *Id.* at 166.

IV. OVERCOMING ANTITRUST'S AMBIVALENCE TOWARD TECHNOLOGY

These principles militate against analyzing vertical exclusion based on purely economic considerations. Instead, they suggest that enforcement officials and antitrust courts addressing these problems will have to take the underlying technology into account.

Historical examples have largely borne out these insights. For example, studies of telecommunications industries suggest that such mandatory divestiture or opening of an interface are likely to succeed only when the market boundary is simple and involves relatively little exchange of information. This explains the success of the U.S. Federal Communications Commission's *Carterfone* rules that opened the market customer premises equipment to competition from third parties.[14] It also explains the mixed outcomes for regulatory and statutory requirements to provide unbundled access to all elements of telecommunications networks. While this approach enjoyed some modest success for relatively isolated elements, such as copper local loops, it failed for components that were more tightly integrated into the overall system.[15]

The problem is that courts have often expressed apprehension about delving too far into technological details. For example, Chief Justice Taft was so unnerved by the idea that broadcast radio was invisibly and unstoppably conveying multiple channels of programming that he kept the Supreme Court from having to address the new technology, declaring that "interpreting the law on this subject is something like trying to interpret the law of the occult. It seems like dealing with something supernatural."[16]

Courts' reluctance to delve into the details of technology is also reflected the hands-off approach that U.S. courts have adopted with respect to technological tying, which occurs when a monopolist redesigns its product in a way that combines two products that were previously sold independently. Lower courts have declined to apply the modified rule of per se illegality usually applied to tying to technological tying because of courts' lack of experience with the practice and concerns that too strict a standard of liability risked disincentivizing competition on the merits through product innovation.[17] In addition, although some courts have followed the conventional rule-of-reason approach of examining whether particular examples of technological tying are procompetitive or anticompetitive,[18] most courts confronting valid engineering disputes have adopted a more deferential posture that finds any showing of technological tie legal out of concerns of courts' institutional lack of competence to determine whether a technological tie represents procompetitive product innovation or an effort to harm competition.[19] Most notably, the Ninth Circuit has rejected calls for undertaking more searching inquiries into technological tying, noting that the D.C. Circuit had only nominally adopted a balancing approach without applying it and finding that "having courts oversee product design" risked "dampening of technological innovation," lacked administrable "criteria that courts can use to calculate the 'right' amount of innovation" in light of the uncertain nature of innovation, and "would . . . require courts to weigh as-yet-unknown benefits against current competitive injuries."[20]

Saying that the assessment of vertical exclusion should go further in taking technological considerations into account will raise difficult questions about how to strike the right balance. The courts' previous reluctance to weigh contested questions of engineering are subject to a number of caveats. Questions of institutional competence play differently in enforcement agencies, which have greater latitude to engage staff qualified to assess delicate questions of engineering and to present those findings in court. In addition, courts have proven adept at striking the right balance between scrutiny and deference when crafting doctrines such as hard look review under administrative law.[21] The nature of judicial expertise can also change over time, as has occurred with respect to economic analysis in the U.S. courts and is increasingly occurring in European courts. Indeed, the *Microsoft* cases presented may difficult questions about the desirability of technical integration and included a request to force the company to divest its software businesses that the court found itself competent to address. Having undertaken the inquiry, courts must take the steps necessary to ensure that it is done properly.

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14 Gerald R. Faulhaber, *Policy-Induced Competition: The Telecommunications Experiments*, 15 Info. Econ. & Pol'y 73 (2003).

15 Yoo, *supra* note 8, at 39-42.

16 Clarence C. Dill, Radio Law: Practice and Procedure ix-x (1938) (emphasis omitted).

17 *United States v. Microsoft Corp.*, 253 F.3d 34, 90-95 (D.C. Cir. 2001); *Foremost Pro Color, Inc. v. Eastman Kodak Co.*, 703 F.2d 534, 542 (9th Cir. 1983).

18 *Microsoft*, 253 F.3d at 58-59; *Transamerica Computer Co. v. IBM Corp.*, 481 F. Supp. 965, 1002-05, 1006-08 (N.D. Cal. 1979), *aff'd*, 698 F.2d 1377 (9th Cir. 1983).

19 *Allied Orthopedic Appliances Inc. v. Tyco Health Care Group LP*, 592 F.3d 991, 1000 (9th Cir. 2010); Response of *Carolina, Inc. v. Leasco Response, Inc.*, 537 F.2d 1307, 1330 (5th Cir. 1976); *ILC Peripherals Leasing Corp. v. IBM Corp.*, 458 F. Supp. 423, 439-41 (N.D. Cal. 1978), *aff'd per curiam sub nom. Memorex Corp. v. IBM Corp.*, 636 F.2d 1188 (9th Cir. 1980); *Telex Corp. v. IBM Corp.*, 367 F. Supp. 258, 347 (N.D. Okla. 1973), *rev'd on other grounds*, 10 F.2d 894 (10th Cir 1975).

20 *Allied*, 592 F.3d at 1000.

21 Christopher S. Yoo et al., *Due Process in Antitrust Enforcement: Normative and Comparative Perspectives*, 94 S. Cal. L. Rev. (forthcoming 2021) (see pp. 56-61 of the preprint draft available at https://wwrn.com/abstract=3558179).

V. CONCLUSION

Policymakers confronting digital platforms no doubt find it tempting to impose remedies that would break up companies or force them to open their interfaces to services provided by third parties. Any such widescale restructuring of an industry should take into account the natural limitations imposed by the underlying technology recognized by Conway's Law and the mirroring hypothesis, both of which emphasize the importance of congruence between an industry's institutional structure and its underlying technology. These insights make clear industries cannot be restructured based on purely competitive considerations without sacrificing considerable benefits to consumers. In addition, modularity theory reveals that the underlying technology constrains where the interfaces between separate companies can exist. Antitrust enforcement agencies and courts must take these limitations into account when deciding whether to impose these remedies. Doing so will require them to overcome their longstanding reluctance to weigh the relative merits of disputed questions of engineering and to restructure their operations and training to ensure that they possess the expertise necessary to perform this important task.

THE LIMITS OF ANTITRUST IN THE NEW ECONOMY

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1 Economics PhD student at Harvard University. For helpful comments and discussions, I thank Louis Kaplow, Larry Katz, and Habin Chung. The views expressed here are mine alone, as are any errors.

I. INTRODUCTION

Interest in antitrust law is cyclical. But the cycles stretch over many decades, to the point that a young practitioner or academic in, say, 2021, might not realize the extent to which debates over antitrust policy today so closely mirror debates that took place in the 1960s and 1970s. And sure enough, a historically familiar perspective has ascended in policy circles today: that a small number of big businesses have taken over a large amount of market share throughout the U.S. economy, and this rise in industrial concentration, caused by excessively lax antitrust enforcement, is bad for the economy, and must now be reversed by much more aggressive antitrust enforcement. Votaries of this position ("Neo-Brandeisian" to its friends, "hipster antitrust" to its skeptics) alternatively assert direct harm to consumers in the form of higher prices, or – and perhaps more commonly – broader harm to the process of competition, even in the absence of higher prices.

I would like to briefly suggest here that this view, though well-intentioned and familiar, is predicated on both a confused understanding of what the basic situation of the U.S. economy is today, and a confused understanding of what antitrust law can and cannot accomplish. In its place, I would like to offer an alternative view that might be more productive for concerned policymakers to achieve their ultimate goals.

II. THE BASIC SITUATION OF THE U.S. ECONOMY TODAY

Over the past four decades, the U.S. economy has become significantly more concentrated. In most sectors of the economy, the market share of, say, the largest four firms ("CR4," one popular measure of concentration), has increased – for instance, from less than 15 percent in the average 4-digit SIC retail sector in 1980, to over 30 percent by 2012.[2] And even these conventional measures (within narrowly defined sectors) obscure the fact that there has also been a rise in the number of distinct product markets the very largest firms are simultaneously in: a large multi-product corporation might be expanding both its market share *within* given 4-digit sectors while also expanding the *number* of distinct 4-digit sectors it is now operating in. (For example: the largest seller of groceries – SIC 5411 – in the U.S. today is Wal-Mart, a company which would usually be listed first in SIC 5311 – Department Stores. We have – so far – no good metric of industrial concentration that parsimoniously expresses both vertical and horizontal concentration at the same time).

In public life and media discussion about monopolies, the face of "Big Business" is often a Silicon Valley giant: Facebook, Google, etc. But the trend of rising industrial concentration is clearly seen throughout almost every major sector of the U.S. economy. The data shows that in sectors broadly spanning the economy, from grocery stores to animal slaughterhouses, to cardboard box manufacturing, a small number of very large firms have substantially raised their market share.

This, however, is the consequence of deeper economic developments. The IT Revolution of the past forty years has disproportionately benefited large firms. Large firms have always been, on average, more productive and more capital intensive than small firms. But over the past forty years, large firms have particularly benefited from large investments in IT capital, investments that often only make sense at scale and in informationally intensive business models (e.g. simultaneously involving many different customers, suppliers, and product lines). These investments have in turn made these large firms even more productive. There has been a documented increased in the productivity differences between the very largest firms and the rest of the firms in many sectors, which have in turn led to the growing differences in market share.

So the basic situation of the U.S. economy is one of increased inequality on the supply-side, in terms of technology and productivity. In most sectors, there is a small number of very large, very productive firms, and a long tail of much smaller, less productive, and less capital intensive firms. Most of the growth in market share in the large firms over the past forty years has come from internal growth ("organic"), on the strength of their superior productivity, not from M&A. This phenomenon of growing supply-side inequality even has a geographic and perhaps more familiar analogue: a small number of very productive cities in the U.S. today (San Francisco, New York City, Boston Chicago, etc.) are pulling away from the rest of the country in terms of basic economic measures like income per capita – a growing regional divergence – while in an earlier historical period (1880-1980) both U.S. States and U.S. cities were *converging* towards each other in economic performance.[3]

None of this is to say there are not specific cases where it looks like some large business is inefficient but excessively protected by a suboptimal regulatory environment (there are many convincing case studies to this effect, e.g. for ISPs, or the hospital sector). But the data and the latest systematic empirical studies we have today largely suggest the picture of the U.S. economy above, of a growing divide in technological and productive capabilities between the largest firms, and the rest of the firm size distribution.

2 Autor et al, "The Fall of the Labor Share and the Rise of Superstar Firms," QJE, 2020.

3 Ganong Shoag, "Why Has Regional Income Convergence in the US Declined?," JUE, 2017.

This supply-side inequality is a problem because it ends up abandoning too many firms, too many workers, and too much capital, to inefficient forms of production. An economy with an excessively long tail of unproductive firms will have difficulty in sustaining high levels of aggregate productivity growth. It is probably also intimately related to higher levels of income inequality between individual workers.[4] And the small number of extant large productive firms in such an economy will be unable to absorb the entirety of the rest of the economy, either on the input side or the market share side.

III. THE BASIC SITUATION OF ANTITRUST LAW

The claim that some kind of decline in U.S. antitrust enforcement is the main cause of the rise in U.S. industrial concentration has become extremely popular, despite no direct evidence in its favor empirically connecting antitrust enforcement to industrial concentration. Antitrust law is passed off as both the main explanation of the economic developments of the past four decades, and also as the chief repository of policy solutions for the future. These claims risk dramatically over-representing what U.S. antitrust law actually is and how it works. Some very brief words of clarification here.

The basic architecture of U.S. antitrust law, while familiar to practitioners, is continually misunderstood and misrepresented by policymakers and even economists and others without a legal background. Antitrust law is not the functional equivalent of a generic tax on "bigness," nor is it directly targeted at the variables that most formal economic models use to define "competition," like markups, elasticities of demand, etc. As chiefly enforced by two separate federal agencies – the Department of Justice, and the Federal Trade Commission – it is instead the regulation of very specific actions, like: certain horizontal mergers (especially in highly concentrated markets), price fixing, illegal "tying" of unrelated goods and services, etc. Actions a regulator has authority over must be those clearly specified in extant legislation (e.g. the Sherman Act, the Clayton Act, the Robinson-Patman Act.).

When one of these agencies determines that there has been an infraction of one of these rules, they file a lawsuit, asking a court to compel the firm to stop the infraction, and possibly also pay some kind of fine.[5] Antitrust suits can also be pursued by the Attorney Generals of individual U.S. States, or by affected private parties, or by some combination of the above. The legally mandated breaking up of a massive U.S. corporation simply because it has become "too big" is extraordinary rare - perhaps once every several decades - and still needs to be ostensibly tied to some more specific infraction (the most famous and most recent instance of this is the mandated divestiture of AT&T in 1982, and even then this was tied to a very specific claim about the illegal cross-subsidization of a regulated line of business by an unregulated line of business within AT&T – and the divestiture itself was actually proposed by AT&T during the settlement process!).

In general, the most direct and important relationship between antitrust enforcement and levels of industrial concentration centers around the regulation of horizontal M&A. Regulators might prevent a particular merger if they feel like the resulting company will have too much market share. But in principle there are no legal grounds to stop a highly productive company from *organically* growing as large as it can, provided it avoids specific infractions like those described above (price fixing, illegal bundling, etc.). Moreover, legal remedies for antitrust violations are specifically targeted at correcting past violations, not at hindering the company's future growth (outside of potential damages or behavioral remedies introduced to specifically discourage future antitrust infractions).

This implies that for the:

Declining Antitrust Enforcement ⇒ Rising Concentration
narrative to work, it almost certainly has to take the form of:
Declining Antitrust Enforcement ⇒ More Horizontal M&A ⇒ Rising Concentration

And even if the rise in industrial concentration had taken place mostly through large firms increasing market share by acquiring other firms, this would still not be proof of the antitrust-rising concentration theory, because merger waves are endogenous to many broader economic forces, and a rise in merger activity could simply follow from the rise of economies of scale. But there is an asymmetry here: if the rise in industrial concentration happens through internal, "organic" growth and not through M&A, it seriously discredits the main channel through which the declining antitrust-rising concentration story would have to run through. And in fact, this is what the microdata appears to show: that most of the rise in market share from the largest firms happened organically, not through M&A.[6]

4 See "Firming Up Inequality," Song et al, QJE (2019)

5 In the case of the FTC, if it is not seeking an injunction, a challenge may also take the form of an administrative proceeding before the FTC, instead of litigation before a court.

6 See e.g. "The Micro-Level Anatomy of the Labor Share Decline," Kehrig Vincent, QJE, 2021.

To be clear, there is heterogeneity across different industries on this dimension, and there are specific industries where a high level of recent merger activity has been plausibly linked to higher industrial concentration and adverse economic outcomes (for instance, Hospitals, or Health Insurance).[7] But when the U.S. economy is taken as a whole and every industry is included, it seems implausible that the rise in industrial concentration is a story primarily about M&A, instead of a story about a rise in organic growth from the largest businesses.

The "declining antitrust - rising concentration" story is further disfavored by a comparative perspective. U.S. antitrust law has probably become modestly less stringent on a number of dimensions over the past forty years (in large part because of the "law and economics" revolution in the 1970s: Robert Bork and others forcefully argued that antitrust law should be designed to maximize consumer welfare, instead of e.g. the welfare of small business owners). But if U.S. antitrust law has moved in one direction over the past several decades, antitrust law in virtually every other major economy has moved in the other direction, towards a position of greater scrutiny and tougher sanctions (as in the EU arguably is today[8]). And yet, it appears that the rise in industrial concentration is not a purely U.S. phenomenon.[9]

The vanguard of antitrust activists today are especially focused on a small handful of prominent high-tech firms (like Amazon or Facebook), which function as networks/platforms/two-sided markets, and pose a distinct set of regulatory issues. It may (or may not) be the case that conventional antitrust law now needs to be creatively modified to accommodate these firms (see e.g. the work Lina Khan, Glen Weyl, Jean Tirole), and that after such a modification, the expansion of such firms might slow down. But it is important to remember that such firms form a small subset of the economy (most estimates of the "High Tech" sector, broadly defined and including firms like Amazon, Google, and Facebook, put it at about 5 percent of GDP, and much less as a percentage of employment or of the number of total firms), and that the rise of industrial concentration is a far more general phenomenon, that stretches across industries from architecture to retail grocery stores. As intellectually curious a topic as platform regulation may be, it does not appear to directly bear on the future of industrial concentration in most industries or most firms.

Consider a thought experiment. Suppose a zealous regulator was allowed to take antirust enforcement to the hilt: all future M&A was to be outlawed, perhaps even all past M&A unbundled, all previously acquired companies spun off, every other kind of antitrust infraction ruthlessly punished. How much of the basic structural problem of supply-side inequality in the U.S. economy would be solved? My claim here is: not much. Almost all the deep inequalities between the largest, most productive, most technologically sophisticated firms, and the rest of the economy, would remain, and the former would continue to pull away from the latter.

IV. THE RECURRENT DEBATE

The debate over antitrust takes a historically recurrent form. One side takes a benign attitude towards high levels of industrial concentration, interpreting it as the consequence of economies of scale, good for overall productivity and good for consumers. The other side takes a cynical view, interpretating it as the consequence of lax enforcement, allowing unproductive big businesses to exploit smaller businesses, and harm consumers.

This is the basic tenor of much of the debate today, but it was also the case in the 1970s (the previous highpoint of public interest in antitrust) – see e.g. John McGee's 1971 "In Defense of Industrial Concentration" on one side, or something like E.F. Schumacher's 1973 "Small Is Beautiful" on the Other. And while antitrust law in the U.S. is usually understood as beginning with the Sherman Act in 1890, the same underlying argument about the relative value of big business goes back to the founding of the republic itself, and the debates between Hamilton and Jefferson over whether it would be better for America to be a nation of large national businesses or small yeoman farmers.

In modern American history, this debate also has a clear, if sometimes awkward or implicit, political valence. American conservatives typically defend the prerogatives of big business and the value of economics of scale; progressives are more likely to dismiss them. (Still perhaps a reasonable characterization of the situation today, give or take the tense relationship between the U.S. far-right and Silicon Valley).

7 See e.g. "The Price Ain't Right? Hospital Prices and Health Spending on the Privately Insured," Cooper et al, QJE, 2019.

8 While the EU and U.S. antitrust enforcement regimes share many doctrinal similarities, there are also several institutional and doctrinal differences, including the ability of many EU antitrust bodies to enforce actions like blocking mergers without court approval. Action can be taken by either the EU antitrust body, DG Comp, or by a national agency within an EU country. And recent doctrinal developments in the EU, like the theory of "conglomerate mergers," make merger blocking even easier. These differences combine to create a climate of much greater antitrust scrutiny than that of the U.S. (and this still does not take into account more nebulous but relevant political and cultural differences, which perhaps also contribute to the EU's more aggressive antitrust stance).

9 See Autor et al (2021), which documents similar patterns in the evolution of industrial concentration throughout the OECD economies.

At a high level, the terms of the debate always seem to be either (1) you accept high industrial concentration as a good thing, or (2) you interpret it as a bad thing, and you respond by attacking big business. But there is a third position available, one that may be both more realistic while also being more radical: perhaps high industrial concentration is a bad thing, but a symptom of a deep inequality in production technology between firms and requires a new kind of industrial policy to overcome.

V. THE ALTERNATIVE WAY FORWARD

Consider the American economy as it existed for much of the 19th century: largely agricultural. In the South, large-scale plantations. But in the North, an abundance of small family farms. These small-scale farms were nevertheless capable of high levels of productivity. This productivity in turn was directly supported by a creative set of national government policies. "Land grant universities" – established in the 1862 Morrill Act – were created by the federal government to research agricultural technologies and then disseminate this knowledge to farmers (examples of land grant universities still around today: MIT, Cornell). Small farmers were able to sometimes pool resources together in distinctive legal arrangements of property and contract (e.g. sharing grain silos or tractors), enabling them to replicate economies of scale while still being small. The government gave would-be small farmers free land from the public domain, through long-standing "homesteading" programs.

The basic alternative in trying to overcome high industrial concentration today is to ask the question: what would the 21st century version of this 19th century industrial policy look like? What policies could we experiment with that might enable small and medium businesses to better leverage investments in new production technologies, and remain competitive? What would a 21st century version of a land-grant university look like? We can invent new legal forms of property and contract that could help small businesses pool data, or pool hardware? Are there new forms of contractual collaboration between large businesses and the smaller firms they might otherwise try to acquire, that might better support a more decentralized and innovative economy?[10] Is there a 21st century equivalent of a homesteading program for small businesses? How could Silicon Valley specifically be encouraged to develop new production technologies with smaller businesses in mind?

And while the answers here are not obvious, today we are not even asking these questions. Instead, the focus of those concerned about high levels of industrial concentration has been almost exclusively on a narrow antitrust agenda. This focus is unpromising. A policy program that instead attempted to help these smaller firms become more productive would be more likely to succeed in solving the fundamental problem. It would then prove far more radical in its effect, while paradoxically also being both far more legally and politically palatable.

10 See "Contracting for Innovation: Vertical Disintegration and Interfirm Collaboration," Gilson Sabel Scott, Columbia Law Review (2009), which details new forms of contractual relations between firms in the pharma/biotech industry that take the place of M&A, allowing firms to achieve the advantages of scale while maintain the advantages of decentralization.

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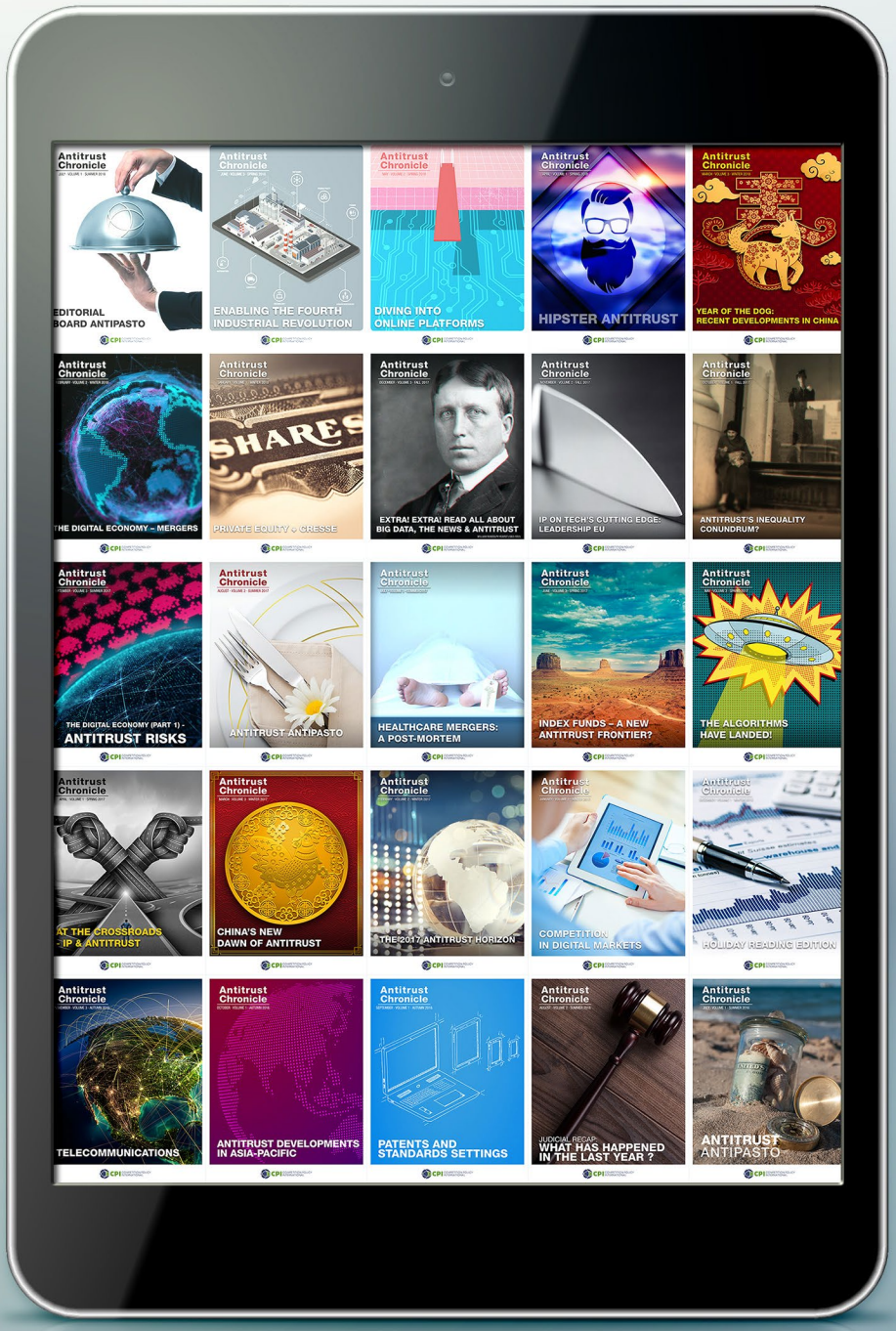


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