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Antitrust in the Information Economy: Digital Platform Mergers

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Abstract

The growth of large digital platforms has caused some observers to claim that merger policy has been too lax to protect consumer welfare, stating a predicate for antitrust policy reform. We address this by exploring the relative importance of past mergers to the current value of the five largest platforms (Google, Amazon, Facebook, Apple, and Microsoft). We find that mergers have not been as important to these platforms' size compared with other large technology companies. Even so, it could be argued that the mergers engaged in by these platforms have harmed efficiency. Listing the combinations often used to advance this view, we find that such mergers cited by reform advocates have often been associated with competitive or benign outcomes rather than with adverse effects associated with creation of a monopoly. Further analysis (and government litigation) will likely inform this perspective.

1. Introduction

In the past few decades, large digital platforms such as Google, Amazon, Facebook, Apple, and Microsoft (GAFAM) have grown rapidly and have increased their roles in a variety of aspects of daily life, including working, shopping, and entertainment. Despite the benefits of digital platforms, their scale has been associated with welfare-reducing effects of monopolization, which has generated proposals for reforming antitrust policy¹ that include establishing a new regulatory agency to oversee them (Stigler Committee on Digital Platforms 2019).²

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¹ Two prominent examples are S. 2992, the American Innovation and Choice Online Act, and S. 2710, the Open App Markets Act, both pending in the United States Senate, 117th Congress.

² One report recommends a new digital authority (DA): "The DA could be given merger review authority over all transactions involving digital businesses with bottleneck power because new competition against these entities is the most valuable for consumers. Businesses with bottleneck power would notify the DA and obtain preclearance for an acquisition of any size" (Stigler Committee on Digital Platforms 2019, p. 114).

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Most proposals would rein in the dominant platforms by limiting what products they could offer or how they deal with businesses using their platforms. Some antitrust scholars focus on what they believe is a prime source of the trouble: US merger policy. They would more tightly restrict future corporate acquisitions by the largest digital platforms. For instance, Hemphill and Wu (2020, p. 1896) recommend that legal authorities pursue a “distinctive doctrinal approach centered on nascent competition.” Kwoka (2020) concludes that such an approach is justified because the current dominant positions of larger platforms derive in part from the antitrust authorities’ repeated failure to block their acquisitions of smaller potential rivals.

Is there evidence that the large digital platforms have overly relied on acquisitions to achieve their impressive market positions? In this paper we review the evidence on the role of mergers in the digital economy with a focus on the GAFAM firms. While we cannot rule out the possibility that the US antitrust authorities failed to block some acquisitions that resulted in the elimination of a nascent firm that could have otherwise emerged as an important competitor, we find that mergers have generally played a minor role in the growth of the largest digital platforms. We also find that individual mergers commonly cited by reform advocates appear to have often been associated with competitive or benign outcomes rather than with adverse effects in market structure. Further analysis, including that performed under the auspices of courts adjudicating ongoing government litigation, will likely be useful in informing this perspective.

In what follows, we focus on the relative contribution of mergers to the current size of the largest 25 firms in the technology and communications sectors and then examine the importance of the mergers often cited as suggesting a need for tightening merger screens in antitrust policy. We offer tentative conclusions on the contribution of mergers to a reduction of competition and provide suggestions for additional inquiry.

2. Digital Platform Acquisitions of Early-Stage Firms

The fact that big tech platforms are so dominant—and so rich—means that they simply buy up any competitors that represent a threat to their position. An example of such a merger was the acquisition of Instagram by Facebook. Although few people saw the risk at the time, the merger allowed Facebook to lock in its dominance of social media by scooping up one of its most significant and fastest-growing competitors. (Reich, Sahami, and Weinstein 2021, p. 229)

Merger policy has drawn great attention in the current debate over antitrust reform. Critics of existing policy see enforcement of section 7 of the Clayton Act as too lax, allowing digital platforms to achieve excessive market power by buying actual and potential rivals. This appraisal applies to horizontal combinations that directly increase industry concentration and to vertical deals supporting the

aggregation of additional functionalities. In either event, the nature of early-stage rivalry does not allow regulators to observe the long-term consequences of mergers. Yet, in their totality, the consolidating effect of these transactions may pose important consequences for competition, particularly in terms of dynamic innovation. The stated fear is that the next killer app from a Silicon Valley garage entrepreneur is being nipped in the bud, tucked into the portfolio of an already established titan, never to develop the robust market rivalry otherwise possible. The response to that counterfactual is that entrepreneurs with the drive and vision to develop innovative start-ups are, in fact, incentivized and financially supported by the option to sell their technologies to firms that are highly specialized and deeply competent in deploying the applications, technologies, or business models they acquire.

Kwoka (2020), citing approximately 600 takeovers by the GAFAM platforms over the past 2 decades, identifies 19 prominent examples to illustrate how such mergers may have preempted the growth of new challengers to the dominance of their acquirers. Kwoka (2020, p. 110) observes that of these mergers, “the FTC [Federal Trade Commission] and DOJ [Department of Justice] appear to have challenged exactly one. That one challenge was to Google’s planned acquisition of ITA Software, which resulted in its approval subject only to a remedy of questionable effectiveness.” Other scholars share Kwoka’s doubts about antitrust law’s current screening procedures. Baker (2019, pp. 2–3) surmises that information technology “giants may be able to forestall challenges from new competitors by acquiring potential rivals before they become market adversaries, as perhaps happened.”

Hence, it is suggested that a primary reason why major digital platforms have achieved or maintained their status is not their competitive superiority but rather strategic buyouts that have removed long-range competitive threats (Khan 2017, p. 793; Wu 2018, pp. 119–26). The policy implication is that more restrictive merger enforcement could preempt the aggregation of unproductive market power by protecting emerging competitive threats, which could lead to greater price competition, superior products, or both. However, evidence of the potential economic benefits of such tighter merger rules has not been provided.³

There are costs to such a policy, and the difficulty of being able to precisely target problematic mergers could lead to more harm than good. Hemphill and Wu (2020, p. 1881) see “[t]he acquisition of a nascent competitor [as raising] several particularly challenging questions. . . . First, acquisition can serve as an important exit for investors in a small company, and thereby attract capital necessary for innovation. Blocking or deterring too many acquisitions would be undesirable.” Potential investments by large firms in start-ups down the road attract early funders who see a future liquidity event as an incentive to commit risky capital to

³ It is difficult to develop a framework for an empirical experiment to reveal the relevant evidence for digital platforms. However, a broad empirical analysis of antitrust policy concluded that enforcement actions historically tended to undermine efficiency-enhancing combinations (Crandall and Winston 2003).

highly specialized firms.⁴ Moreover, large platforms typically supply the complementary inputs required for the successful development of nascent firms, which yields improvements in products, services, and industrial structures.⁵ Varian (2021, p. 3) notes that between 1990 and 2020 “there have been 6 times as many acquisitions as [initial public offerings] in the venture capital industry.”⁶

Still, current antitrust policies may be too light, overprotecting integration incentives and underprotecting competition from independent rivals. We attempt to shed light on the debate by first estimating how much merger activity appears to be occurring among the top five digital platforms—Google, Amazon, Facebook, Apple, and Microsoft—and second by reviewing illustrative examples that could inform the case for reforming existing policy. As a preliminary matter, we underscore the caveat delivered by Hemphill and Wu (2020): discerning the trade-offs is difficult in a market evolution extending years or decades into the future. That the digital platforms are noted for rapidly scaling and repositioning via disruptive innovations makes the task inherently more arduous for antitrust authorities than the merger analysis required in less dynamic sectors.

2.1. Merger Incidence in Technology Firms and Digital Platforms

Before reviewing specific examples of mergers consummated by large digital platforms and their possible effects on consumers, it is appropriate to understand the extent to which large technology platforms tend to use acquisitions as a strategic tool in comparison with their use by other firms. We examine the level of merger and acquisition (M&A) activity by large tech platforms. The GAFAM enterprises currently account for about 21.5 percent of the value of the Standard & Poor’s 500 (as per closing prices on June 7, 2021; see Hulbert 2021). Yet, of the 99 largest mergers by market capitalization since 2000, the only ones involving major tech platforms are the Microsoft acquisition of LinkedIn in 2016 (ranked number 59 by value in 2019 dollars) and the Facebook merger with WhatsApp in 2014 (number 81).⁷

⁴ “In Silicon Valley, the most important thing to think about when starting a company is how you’re going to end it. The venture capital funding model that dominates the tech industry is focused on the ‘exit strategy’—the ways funders and founders can cash out their investment. While in common lore the exit strategy is an initial public offering (‘IPO’), in practice IPOs are increasingly rare. Most companies that succeed instead exit the market by merging with an existing firm. And for a variety of reasons, innovative startups are especially likely to be acquired by the dominant firm in the market, particularly when they are venture funded” (Lemley and McCreary 2021, p. 1).

⁵ “Acquisitions are broadly recognized as being key to Silicon Valley’s success. Buying startups is one of the fastest ways for companies to grow, enter a new market, acquire new technology and embrace disruption and innovation. Europe is often reported as far behind the USA in terms of startup acquisition, also an effective way to execute ‘open innovation’ strategies” (Pisoni and Onetti 2018, p. 26).

⁶ Total Google, Amazon, Facebook, Apple, and Microsoft (GAFAM) expenditures on small mergers (of the start-up variety) appear tiny compared with venture capital sources. Some \$3.4 billion per year in GAFAM mergers of under \$1 billion occurred during the 2017–20 period (Waters 2020), while annual capital flows to start-ups averaged \$123 billion per year (NVCA 2019, 2020, 2021, 2022a, 2022b).

⁷ Wikipedia, List of Largest Mergers and Acquisitions (https://en.wikipedia.org/wiki/List_of_largest_mergers_and_acquisitions).

Table 1
Digital Platform Acquisitions, 1998–2021

	Acquisitions	Mergers
Apple	118	22
Microsoft	222	41
Google	250	44
Amazon	92	24
Facebook	94	16
All GAFAM	776	147
Top 25 tech firms	1,901	509
Non-GAFAM firms	1,125	362
All firms	69,968	11,144

Note. Data on acquisitions are from Crunchbase for January 1, 1998, to December 31, 2021, and include deals with reported dollar values for acquiring companies with headquarters in the United States. GAFAM = Google, Amazon, Facebook, Apple, and Microsoft.

We compare growth via merger across GAFAM and other large technology firms. For this purpose, we generate a ranking of the largest 25 technology and communications sector enterprises (top tech 25), in market capitalization, using data from Yahoo!Finance.⁸ We calculate the contribution of mergers to the growth of the largest 25 firms, by market capitalization, in the top tech 25⁹ using Crunchbase, a database begun in 2007 and used by scholars investigating tech start-ups, digital platforms, and venture capital flows (Dalle, den Besten, and Menon 2017). The data can be employed to investigate the hypothesis that the large GAFAM tech platforms grow by merger more than other firms in their sector.

Table 1 displays the number of mergers consummated, 1998–2021, by the GAFAM platforms, the top tech 25, and US firms overall. Over this period, the database registers 358,878 new US business ventures and 81,112 M&A transactions. Across the top tech 25, there were 1,901 mergers recorded, of which 776 (40.82 percent) were acquisitions by GAFAM firms. Of these 776, only 147 have reported purchase prices; the firms acquired with unreported prices (629) are private firms and tend to be quite small.¹⁰ Among the top tech 25, the market value of GAFAM firms accounted for 68.9 percent of acquired firms by market capitalization as of February 18, 2022.¹¹

⁸ Firms are ranked by size and sector on Yahoo!Finance. Market capitalization data for firms are from CompaniesMarketCap.com as of February 18, 2022.

⁹ Amazon is categorized in Crunchbase as being in the consumer cyclicals sector and the Internet retail industry. We include this one entry from outside the officially designated sectors. When growth of the top 25 technology companies is summarized without GAFAM firms, it reduces, of course, to a top 20.

¹⁰ The Federal Trade Commission (2021) attempted to draw more data by conducting a survey of GAFAM firms, identifying acquisitions for 2010–19. The report found 616 mergers, with 65 percent of purchase prices between \$1 million and \$25 million.

¹¹ Some downward bias in the GAFAM acquisition ratio is provided by the facts that Facebook was not formed until 2004 and that Google and Facebook were not publicly traded until 2004 and 2012, respectively.

We use these data to calculate the importance of mergers for our sample of the top tech 25 on the basis of the value of total acquisitions (from the beginning of 1998 through year-end 2021) as a proportion of the enterprise value of the firm as of year-end 2021. The estimated statistic, Merger Incidence, is calculated as

$$\text{Merger Incidence for Firm}_i = \sum_{t=1998}^{2021} A_t / C_i,$$

where A_t is the nominal value of an acquisition in year t for 1998–2021 and C_i is the market capitalization of Firm $_i$ at closing share price on February 18, 2022.

To illustrate, if a firm acquired two firms from 1998 to 2021—one in 2010 for \$1 billion and another in 2018 for \$4 billion—and finished 2021 with a market capitalization of \$50 billion, the calculated merger proportion equals 5/50, or 10 percent. The nominal historical value may not be the appropriate metric; there is an opportunity cost of buying a firm as opposed to investing capital elsewhere. And because the timing of acquisitions differs across firms, there may be a systematic skew to the ratios calculated. Therefore, we additionally calculate merger incidence by adjusting acquisition values at the rate of growth of the NASDAQ index from merger dates in Crunchbase through year-end 2021.

Table 2 displays the results. The GAFAM enterprises tend to reflect low merger activity in the sense that their accumulated merger valuations account for relatively modest proportions of current market capitalizations.¹² With merger incidence calculated using historical nominal values, GAFAM firms average 2.4 percent; non-GAFAM tech firms average 24.7 percent of market capitalization. While the sample size is modest, the magnitudes are about an order of magnitude different, and the t -statistic for a difference-in-means test is 4.41, with a p -value of $<.01$, which suggests that the calculated difference is statistically significant. Using NASDAQ-adjusted values to year-end 2021, the gap is similar, with a GAFAM merger incidence of 8.4 percent and a non-GAFAM incidence of 82.6 percent.

Microsoft and Facebook are the most merger intensive of the five GAFAM firms, at 4.1 percent of nominal historical value. In contrast, Disney, Cisco, Oracle, Salesforce, Intel, AT&T, IBM, and Charter are all above 25 percent of their value.¹³ The NASDAQ-adjusted results suggest the same pattern in comparing GAFAM firms with non-GAFAM firms. It is interesting to note, however, that seven of the 20 non-GAFAM firms—Disney, Cisco, Oracle, IBM, Intel, AT&T, and Charter—generated merger value proportions greater than 100 percent. (The value of acquisitions alone would exceed current market capitalizations for the firms had they acquired NASDAQ-exchange-traded fund shares in lieu of the

¹² “Account for” may be slightly misleading, as each merger represents a two-way trade: the shareholders of the target receive equal value in payment from the shareholders of the acquirer. The metric represents a proportion revealing how valuable mergers have been relative to existing value, however, which is the purpose of the inquiry.

¹³ AT&T and Charter reflect the consolidation of communications toward national footprints. See the discussion in Section 3.

Table 2
 Merger Incidence for Top 25 Technology Firms, 1998–2021

Size rank:	Company	Merger Incidence		Sector	Industry	Market Capitalization
		With Historical Value	With NASDAQ-Adjusted Value			
1	Apple	.002	.008	Technology	Consumer electronics	2,730.00
2	Microsoft	.041	.127	Technology	Software infrastructure	2,160.00
3	Google	.017	.080	Communication services	Internet content and information	1,730.00
4	Amazon	.020	.054	Consumer cyclical	Internet retail	1,550.00
5	NVIDIA	.013	.033	Technology	Semiconductors	589.16
6	Facebook	.041	.151	Communication services	Internet content and information	589.41
7	Disney	.345	1.167	Communication services	Entertainment	275.57
8	Broadcom	.122	.453	Technology	Semiconductors	239.46
9	Cisco	.339	1.685	Technology	Communication equipment	241.49
10	Verizon	.121	.503	Communication services	Telecommunication services	241.29
11	Adobe	.084	.319	Technology	Software infrastructure	209.04
12	Comcast	.191	.384	Communication Services	Entertainment	211.43
13	Oracle	.485	2.167	Technology	Software infrastructure	199.14
14	Salesforce	.322	.624	Technology	Software infrastructure	193.89
15	Intel	.281	1.090	Technology	Semiconductors	183.40
16	Qualcomm	.030	.114	Technology	Semiconductors	188.93
17	AT&T	.822	2.543	Communication services	Telecommunication services	170.50
18	T-Mobile	.208	.491	Communication services	Telecommunication services	154.89
19	Texas Instruments	.000	.000	Technology	Semiconductors	153.99
20	Intuit	.157	.261	Technology	Software applications	136.26
21	AMD	.220	.492	Technology	Semiconductors	185.32
22	IBM	.491	1.818	Technology	Information technology services	111.46
23	Applied Materials	.073	.356	Technology	Semiconductor equipment and materials	118.41
24	ServiceNow	.001	.003	Technology	Software applications	111.20
25	Charter	.640	2.010	Communication services	Entertainment	103.10
	Mean (unweighted)	.247	.826			
	Mean (unweighted)	.024	.084			

Note. Merger incidence is calculated as a percentage of market capitalization. Market capitalization is in billions of dollars as of February 18, 2022. GAFAM = Google, Amazon, Facebook, Apple, and Microsoft.

mergers they executed, *ceteris paribus*.) These data suggest that the digital platforms appear to engage in relatively modest acquisition activity.

2.2. *Error Trade-Offs*

The relatively low incidence of mergers in digital platforms is suggestive, if not dispositive. The argument for tighter antitrust scrutiny of small, early-stage mergers may be compelling if it is observed that, while relatively few in number or low in market value, the acquisitions by digital platforms are much more likely to create long-term anticompetitive consequences—and that these harmful effects can be diagnosed and remedied by antitrust enforcers using tools not currently deployed. To analyze this possibility, we gleaned 23 potentially troubling GAFAM mergers discussed in the antitrust reform debate. These examples, listed in Table 3, are offered by advocates of stronger antitrust enforcement as mergers that could have led to anticompetitive outcomes, including acquisitions of nascent competitors.

The probative value of the mergers listed in Table 3 is potentially important: if the critics are correct, they should consistently illustrate inefficient outcomes in current merger policy. The examples have been advanced to capture situations in which a merger enhances market power and concomitant harm to consumers. To conclude that this outcome is the result of a failure of current antitrust policy, three requirements must be met. First, postmerger monopoly power ought to be apparent. Second, there should be compelling evidence of the merger causing this comparatively inefficient result. Third, the observed cause-and-effect pattern must be decidedly in the direction of laxity in the antitrust enforcement regime.

It is expected that errors are made in enforcement actions. These miscalculations hold not only in merger policy generally but with particular regularity in technology markets, where the environment changes frequently. A false positive, or type I error, indicates that antitrust authorities conclude that a given transaction is anticompetitive when, in fact, the combination is efficient. Conversely, a decision that the deal will be procompetitive when it is not constitutes a false negative, or type II, error. The aim for welfare-maximizing policy is a balancing that minimizes the sum of the errors (Easterbrook 1984; Manne and Wright 2010). The argument that US antitrust law is too lax implies that false negatives dominate. In a preliminary way, this view can be scrutinized by inspecting the examples offered to illustrate the asserted policy enforcement problem.

It is impossible to conduct an empirically exhaustive but-for analysis of each market event because there are no clear data to observe to determine how these dynamic markets would have evolved had a given merger not been consummated. However, it is informative to draw inferences across situations commonly cited as suggestive of underenforcement, as these transactions are compiled to represent the likeliest scenarios for anticompetitive merger outcomes. This first-approximation assessment is designed to extend the analysis of illus-

Table 3
Prominent Examples of Large Technology Platform Mergers

	Acquirer	Target	Value (\$)	Regulatory Challenge	Source
2006	Google	YouTube	1.65 billion	No	Kwoka (2020, table 7.2)
2007	Google	DoubleClick	3.1 billion	No	Kwoka (2020, table 7.2)
2013	Google	Waze	1.1 billion	No	Kwoka (2020, table 7.2)
2011	Google	ITA Software	700 million	Yes (approved with conditions)	Kwoka (2020, table 7.2)
2014	Google	Nest	3.2 billion	No	Kwoka (2020, table 7.2)
2011	Google	Motorola Mobility	12.5 billion	No	Kwoka (2020, table 7.2)
2011	Google	Zagat	151 million	No	Kwoka (2020, table 7.2)
2016	Microsoft	LinkedIn	26 billion	No	Kwoka (2020, table 7.2)
2011	Microsoft	Skype	8.5 billion	No	Kwoka (2020, table 7.2)
2013	Microsoft	Nokia	7.2 billion	No	Kwoka (2020, table 7.2)
2012	Facebook	Instagram	1 billion	Yes (ex post, 2020)	Kwoka (2020, table 7.2)
2014	Facebook	WhatsApp	19 billion	Yes (ex post, 2020)	Kwoka (2020, table 7.2)
2014	Facebook	Oculus	2 billion	No	Kwoka (2020, table 7.2)
1998	Amazon	IMDb	N.A.	No	Kwoka (2020, p. 109)
2008	Amazon	Audible	300 million	No	Kwoka (2020, table 7.2)
2009	Amazon	Zappos	928 million	No	Kwoka (2020, table 7.2)
2017	Amazon	Whole Foods	13.4 billion	No	Kwoka (2020, table 7.2)
2018	Apple	Shazam	400 million	No	Kwoka (2020, table 7.2)
1999	Apple	Akamai	N.A.	No	Kwoka (2020, table 7.2)
2017	Facebook	Ozlo	N.A.	No	Baker (2019, pp. 140–41)
2005	Google ^a	Android	50 million	No	Khan (2019)
2009	Amazon	Quidsi	545 million	No	Baker (2019, p. 110)
1997	MSFT ^b	Apple	150 million preferred nonvoting investment	No	Reich, Sahami, and Weinstein (2021, p. 257)

Note. Merger dates and acquisition values are from press reports. N.A. = not available.

^a The 2005 acquisition of Android by Google exemplifies the case of a “dominant platform that uses its supra-competitive profits to buy its way into other markets [which] can raise barriers to entry” (Khan 2019, pp. 1068–69).

^b If the \$150 million MSFT investment had not been sold in 2003 (in any part), on December 31, 2021, it would have been valued at \$201.2 billion.

trative examples beyond the most cursory institutional detail and to encourage further scrutiny.

Consider Google's acquisition of Android. The software was purchased, with employment arranged for the (fewer than 10) persons who initiated the project,¹⁴ for \$50 million in 2005. The acquired firm was less than 2 years old, there was no actual product, and the prospective product did not overlap with existing Google products (Varian 2021, p. 6). Android was subsequently developed through vastly greater expenditures by Google and was launched commercially in 2007 as a mobile operating system (OS). This effort, with complementary inputs supplied by Google (notably, Google Search and Google Play), soon became an extremely popular platform that was widely adopted by device makers (of smartphones, tablets, netbooks, desktop computers, and more), software application developers, and content producers. Google's role as the sponsor of this ecosystem proved to be highly lucrative.

The merger of Google and Android is offered by antitrust critics to illustrate that Google may have preempted the evolution of an independent smartphone ecosystem, which suppressed competition. This narrative is not implausible, but it is nearly so. The far more straightforward interpretation is that the merger was a complement to a range of unique efforts created or organized by Google and that these efforts succeeded in establishing direct and lasting competition to Apple's iOS platform, which was created with the launch of the iPhone in June 2007 and was enhanced by ties to iTunes and the (soon launched) Apple App Store. This is an important outcome because it is a case in which blocking a merger could have harmed welfare because Android would have been highly unlikely to independently compete so effectively against Apple.

Had a \$50 million software venture been sufficient to hatch the venture Google/Android succeeded in creating, why did not others do so? Several well-funded ventures tried. Indeed, in 2005 the largest smartphone platform in the world was owned by Nokia; number two was RIM Blackberry. Both systems had developed large, highly profitable global platforms, but both saw their markets collapse in the face of competitive entry by Apple and then Google.

At just the moment that Google purchased Android, another (and much larger) digital platform—Microsoft—was garnering a substantial mobile OS market share: 37 percent in 2006 and 42 percent in 2007.¹⁵ Yet Microsoft's Windows Mobile was also overcome by the emergence of competitively superior products (including Google Android): its US mobile OS market share plunged to 7 percent in 2010. Microsoft tried to recover by entering a partnership with Nokia in 2011, releasing a series of Windows phones (produced by Microsoft to compete directly with iPhones and Samsung devices running Android), and then acquiring Nokia's mobile phone business in 2013 for \$7.2 billion (Cribbs and Papenfuss

¹⁴ The entrepreneur who created Android was Andy Rubin, who then served as Google's senior vice president of mobile and digital content until 2013 and left the firm in 2014.

¹⁵ Wikipedia, Windows Mobile (https://en.wikipedia.org/wiki/Windows_Mobile).

2018). The result, Microsoft Mobile, flopped. In 2016 Microsoft exited the market, writing off over \$8 billion in losses.

Nokia, Microsoft, and Blackberry all failed to do what Google and Apple did. Given these failures by much larger incumbent ecosystems, it seems a narrow longshot that a nascent and independent Android, save for the Google acquisition, would have produced a result as successful, or even approaching, what the Google Android platform achieved.

It seems fair to count the merger of Google and Android as being consistent with a procompetitive explanation and inconsistent with a promonopoly conclusion. This conjecture is supported by the observation of yet another failed smartphone incumbent, Motorola. Motorola claimed the initial patents for cellular telephone technology in the 1970s and as late as 2006 accounted for 21 percent of the world mobile phone market. But it too quickly faded in the face of the Apple and Google innovations. In 2011 it sold its handset division to Google for \$12.5 billion. This transaction is listed as another prominent example of a GAFAM acquisition, presumably because it is possibly an anticompetitive combination. As with Android, the merger provided Google with assets that its mobile venture would use to support its rivalry with Apple. The Motorola Mobility merger could not plausibly have shielded Google from the rise of a competing platform. Google soon stripped its new subsidiary of its wireless patent portfolio (which it retained to protect Android's foray from the threat of infringement lawsuits) and sold the remainder for a net loss of about \$4 billion (Kopytoff 2014). That process buttressed Google for future rivalry, while repurposing the assets of a vanquished ex-incumbent. The merger was evidently also an efficient, procompetitive event.

Such narratives are important for evaluating arguments about GAFAM mergers, both for what is commonly argued and what may be alternatively omitted. In hindsight, it may be that, had Facebook not acquired Instagram, for example, the independent start-up would have evolved more or less as it did (integrated with Facebook) into a large social media platform and, with perhaps fewer economies of scale and scope (but competing with a Facebook having fewer of either as well), it would have created additional choices for social media users at modest efficiency cost. That very proposition is currently under consideration in a federal antitrust case filed by the Federal Trade Commission in 2020, presumably prompted in some measure by the arguments of scholars who cite the Facebook acquisitions as representative of a detrimentally lax merger policy (Scott Morton and Dinielli 2020).

In their paper on nascent competitors, Hemphill and Wu (2020, pp. 1883–86) present three market episodes to explain the problem at hand. The first of these involves Netscape triggering the browser wars of the mid-1990s, supplying a potential threat to Microsoft's dominant position in OS software for personal computers. While the interaction between the firms did not culminate in a merger,¹⁶

¹⁶ While not noted in Hemphill and Wu (2020), Microsoft did make an offer to buy Netscape in late 1994. The price was considered too low by Netscape and was rejected (Rosoff 2011).

it focused on methods used by incumbents when challenged by start-ups (Jenkins et al. 2021).

While Navigator, Netscape's web browser, was a complement to Windows, it might have evolved into a substitute. It was designed, in significant part, to do this, as its developers strategically embedded Java in the software. This programming language allowed third-party software to interact directly with applications developed for computers running Windows or another OS. Java, a product of SUN Microsystems, a partner of Netscape's, thus performed some of the functions of an OS. Microsoft executives feared, and the DOJ antitrust experts hoped, that if Microsoft were constrained in its actions to limit adoption of Java, a more competitive OS market would emerge.¹⁷

The other two examples in Hemphill and Wu (2020) of nascent competitors threatened by incumbent actions are Illumina's proposed merger with PacBio (in 2018) in DNA sequencing technology and Facebook's acquisitions of Instagram (in 2012) and WhatsApp (in 2014). The Illumina merger was effectively blocked by regulators, and the acquisition never occurred. In the Facebook examples, the mergers were extensively reviewed by antitrust authorities in the United States, the United Kingdom, and elsewhere when proposed (and consummated) but are currently at issue in litigation brought by the Federal Trade Commission (*Federal Trade Commission v. Facebook, Inc.*, 1:20-cv-03590-JEB [D.D.C. filed December 9, 2020]). In sum, in none of the three examples has antitrust enforcement been moot; in all three instances regulators have actively sought (or are yet seeking) to prevent the elimination of nascent competitors.

A complete analysis of each of the proffered early-stage mergers is far beyond the scope of this (or any) study. That is the consideration driving proposals to institute bright-line rules limiting mergers or various forms of vertical integration (Khan 2019) or aiding enforcement by designating a new expert agency (Stigler Committee on Digital Platforms 2019). But, given that the debate over antitrust policy relies in some considerable measure on implications drawn from the episodes listed, it is appropriate to move this discussion forward by examining relevant facts that are readily available. The exercise undertaken herein is to surmise, from basic aspects of the relevant markets' evolution after the events cited, what the examples are likely to suggest in terms of competitive consequences and/or antitrust remedies to improve consumer welfare outcomes. We offer judgments describing merger impacts of the following form:

1. competitive: improvements in market performance appear after acquisition, as when products are improved, or at least two major rivals compete for multiple years after a merger—excluding killer acquisitions;¹⁸

¹⁷ As described in Hemphill and Wu (2020, pp. 1883–84), “Netscape and Sun posed a nascent competitive threat. Neither were plausibly, at the time, substitutes for Windows. Netscape's offering did not compete with Windows. However, Microsoft feared that over time they would evolve into substitutes, and acted to neutralize the competitive threat.”

¹⁸ In killer acquisitions, start-ups are bought by incumbent platforms to preclude future competition. The products of many if not most start-ups are, when acquired by such enterprises, discon-

2. benign: no anticompetitive consequences appear plausible—say, when the acquisition is revealed to be unsuccessful and is sold (or abandoned) in a situation in which the acquirer has no other competing line of business;
3. ambiguous: further research is desired to draw clear competitive implications; and
4. monopolistic: monopoly power, reducing consumer welfare, appears to result from the transaction.

To apply this simple taxonomy, the arguments made by the DOJ against Microsoft in 1998 embed a useful example of the nascent-competitor issue.¹⁹ As noted above, Hemphill and Wu (2020, pp. 1883–84) cite this litigation as demonstrative of the market preemption problem: a firm with dominant market share, on being challenged by an upstart rival, sought to nip the future competition in the bud. Whether this attempt was by predation or merger is beside the immediate point. The anticompetitive conduct was seen in a pattern in which the incumbent possessed dominance, responded to potential competition by deterring an upstart, and then succeeded in protecting its dominance. We look for similar patterns in discerning promonopoly mergers with nascent competitors.

Our review of the outcomes of the 23 events is elaborated in Table 4. We find the following numbers for each assessment category: competitive, 10; benign, seven; ambiguous, six; monopolistic, zero.

Competitive. Google/Android facilitated competition to the Apple iPhone in smartphone ecosystems. Google/YouTube pushed rivalry in what were formerly called cable TV services and have now evolved into online video. Microsoft/Nokia was an effort, if soon to fail, to create an additional smartphone platform to rival those sponsored by Apple and Google. Microsoft/Apple was a horizontal investment in a failing competitor that helped enable enormous innovation in the smartphone revolution to come, and Microsoft/Skype advanced intermodal rivalry that caused “telecommunications companies to lose a large amount of long-distance revenues” (Winston 2021a, p. 273).

tinued. This can happen for many efficient reasons: the transaction was an “aqui-merger,” intended to obtain expertise and/or intellectual property, not the products already being manufactured; the new products were blended into existing products or given makeovers to fit into product lines more efficiently produced by the acquiring platform; circumstances changed after the merger (including the information known to the acquirer now faced with the challenge of producing and marketing the acquisition’s outputs); and preclusionary value is achieved by taking out a potential rival. It is the latter that deserves scrutiny under antitrust laws (Gautier and Lamesch 2021). Yet, for it to be a plausible strategy, successfully executed, it must also be the case that the target firm’s product space is highly concentrated. If paying to buy out rivals is a competition-reducing strategy, and multiple viable independent rivals remain able to compete, or entrants emerge, the preclusionary buyout will transfer rents away from the strategic platform to the independent firms it seeks to vanquish. Cabral (2021) characterizes digital platform markets as generally too fluid and dynamic to support the necessary entry barriers, contrasting these conditions with those found in the pharmaceutical industry, where long field trials, regulatory approvals, and patent rights alter merger strategies.

¹⁹ There continues to be controversy, with competing assessments of the effectiveness of the antitrust remedy in the 1998 case of *United States v. Microsoft* (Hylton 2019; Rubinfeld 2020). We abstract from such arguments, accepting the 1998 browser wars case against Microsoft as defining a paradigmatic anticompetitive scenario, or a settled case (Greenstein 2022).

Table 4
 First-Approximation Outcomes for Large Technology Platform Mergers

Acquirer	Target	Category	Market Outcome	Source
2006 Google	YouTube	Competitive	Enhancing video streaming spurred intermodal rivalry with cable, satellite, and broadcast TV	Noam (2021, p. 373); Hanssen and Hazlett (2021–22)
2007 Google	DoubleClick	Ambiguous	Pending state and federal antitrust suits against Google may shed light on this issue	Molla and Estes (2020)
2013 Google	Waze	Ambiguous	Google Maps and Waze were combined market leaders	Ceci (2022)
2011 Google	ITA Software	Ambiguous	Licensing was imposed, but charges swirl	Lerman (2020)
2014 Google	Nest	Competitive	Nest was ranked fourth after Ring, Arlo, and Wyze in the in-home security market	Strategy Analytics (2021)
2011 Google	Motorola Mobility	Competitive	Delivered patents and assisted in Android competition against Apple and Microsoft/Nokia	Gillmor (2011)
2011 Google	Zagat	Benign	Zagat was sold to an independent website in 2018	Heater (2018)
2016 Microsoft	LinkedIn	Competitive	Competed with Facebook	Cheung (2022)
2011 Microsoft	Skype	Competitive	Helped disrupt telecommunications networks	Winston (2021a)
2013 Microsoft	Nokia	Competitive	Attempted to gain market share over Samsung devices and iPhones	Wadhwa, Amla, and Salkever (2020)
2012 Facebook	Instagram	Ambiguous	Federal Trade Commission case against Facebook to be decided	Srinivasan (2019); Hazlett (2022)
2014 Facebook	WhatsApp	Ambiguous	Federal Trade Commission case against Facebook to be decided	

2014	Facebook	Oculus	Ambiguous	Branded Oculus headsets led virtual reality sales, and the Federal Trade Commission is still probing the Facebook platform	Buchholz (2021); Statt (2022)
1998	Amazon	IMDb	Benign	Branded movie database competed with Rotten Tomatoes, Metacritic, and others	Stegner (2020); Inder and Goyal (2020)
2008	Amazon	Audible	Benign	Audible had the largest market share (48 percent) and competed with Apple, Google, Spotify, and others	Steele and Trachtenberg (2022)
2009	Amazon	Zappos	Benign	Zappos remained popular and competed against numerous online shoe sellers	Consumer Affairs (2017)
2017	Amazon	Whole Foods	Benign	“Amazon’s sales through Whole Foods have been stagnant”	Lee and Gallagher (2021)
2018	Apple	Shazam	Benign	Shazam went ad free after the merger, and Apple Music holds a 15 percent share versus Spotify’s 31 percent share	Cross (2018); Porter (2022)
1999	Apple	Akamai	Competitive	Partnership helped launch content delivery network to compete with caching rivals	Noam (2021, pp. 131–33)
2017	Facebook	Ozlo	Benign	Acquisition improved Facebook’s digital assistant and competed with Amazon Echo and Apple HomePod	Johnson (2017)
2005	Google	Android	Competitive	Developed into a rival of Apple iOS, iPhone, and App Store	Vogelstein (2013)
2009	Amazon	Quidsi	Competitive	Start-up capital gains led to Jet.com launch and Walmart e-commerce rivalry	Hazlett (2021)
1997	MSFT	Apple	Competitive	Funded Apple and enabled survival for innovations including iTunes, iPhones, and App Store	Clifford (2017); Reich, Sahami, and Weinstein (2021, p. 257)

We also rate Amazon's acquisition of Quidsi as procompetitive. The acquisition is widely cited as being part of a predatory scheme by Amazon to eliminate competing retailers (Khan 2017, p. 768), but this characterization does not stand up to scrutiny (see Hazlett 2021, pp. 1272–73). Quidsi, founded by two young entrepreneurs in 2005, entered the retail marketplace on the Amazon platform and became the largest online seller of diapers by 2010—at which point it became the target of a bidding war between Walmart and Amazon. Amazon won, paying \$545 million for the firm (which implies that there were capital gains for the start-ups' backers of about \$400 million). Both founders then worked for Amazon but soon exited. One of them, Marc Lore, launched online retailer Jet.com to compete directly with Amazon. That company was then acquired by Walmart for \$3.3 billion in 2016, at which point Lore was installed as Walmart's director of e-commerce. Amazon had enabled the start-up (to launch on its platform), and the merger had rewarded, rather than punished, a daring start-up. Retail diaper prices after the merger do not appear to have increased, with a wide variety of retailers continuing to supply the market.

Benign. The combination of Google and Zagat was unsuccessful that was soon undone by the sale of the restaurant ratings service to an independent owner. Google ownership did not overpower Zagat rivals or prove profitable for the search engine. “Google's strategy was apparently to make Zagat into Yelp Lite . . . [but an] *LA Weekly* article complaining about the proliferation of lame new restaurant apps cites Yelp, Google, and OpenTable as useful, and doesn't even mention Zagat” (Rosenblatt 2018).

The merger of Amazon and Whole Foods has not led to increased online market share for the parties, although it has apparently provoked competitive reactions by rivals. In 2019, an article in the *Harvard Business Review* noted that, “although Amazon/Whole Foods looms large, the e-commerce giant is far from the decided winner. In the past year Walmart, Kroger, Costco, and Target have driven down costs and introduced delivery capabilities in new regions, cutting into Amazon's market share. Meanwhile, new business models are thriving. Six-year-old Instacart, for example, has secured a \$7.6 billion valuation and a loyal following by building a platform for grocery delivery and partnering with more than 300 retailers” (Sharma 2019). Through 2020, market shares had not moved in favor of the merged enterprise, according to the *Wall Street Journal* (Lee and Gallagher 2021), and an industry trade association ranked Amazon as the 10th largest grocery chain in the United States with sales of equal to just 5 percent of Walmart's (FoodIndustry.com 2020).

Ambiguous. Facebook/Instagram and Facebook/WhatsApp are judged to remain ambiguous. The antitrust suit filed by the Federal Trade Commission in 2020 alleges that the mergers, despite previous approvals, ultimately reduced competition and allowed Facebook to perform, in terms of service quality, less advantageously for users. The implication of that supposition is abuse of market power, as argued by Srinivasan (2019) and Scott Morton and Dinielli (2020). But there is empirical disagreement. For instance, scholars have used laboratory ex-

periments to deduce that Facebook generates extremely large consumer surplus for users, presumably in part because of the expansion of its platform services through merger (Brynjolfsson, Collis, and Eggers 2019). Wadhwa, Amla, and Salkveer (2020, p. 88) characterize the acquisitions as procompetitive because an “epochal shift in communication has come about through expansion in volume, style, and substance” of digital platforms. This pending case should shed additional light on the matter.

Google/DoubleClick exhibits similar trade-offs and policy questions. The combination has allowed the leading search engine to improve its business model, but the high market share achieved is now targeted by antitrust actions from federal and (two) state-level antitrust cases (Molla and Estes 2020). It seems prudent to assign this to the ambiguous category.

Whatever the path of these developments, the selected episodes do not appear to create a *prima facie* case for reform. Overall, the relatively large number of benign or competitive outcomes among transactions selected by reform advocates as supporting the view that antitrust is too lax further suggests that it is difficult for regulators or other experts to identify nascent firms as future blockbusters. This cataloging suggests that excessive type I errors are highly likely to result from ratcheting up merger enforcement policy to make acquisitions of nascent competitors more difficult. We do not identify a single case to rival *United States v. Microsoft Corp.* (253 F.3d 34 [D.C. Cir. 2001]). We do note that efforts to identify illegal vertical mergers were aggressively undertaken in *United States v. AT&T Inc.* (310 F. Supp. 3d 161 [2018]) in which the AT&T/Time Warner transaction was challenged by the DOJ in a 2017 suit that was rejected by the federal courts. The foreclosure following merger alleged in that case has already been shown to be based on an unconvincing theory in the 2020–21 AT&T divestitures of DirecTV and Time Warner (Carlton et al. 2022). As Judge Richard J. Leon wrote in his opinion, the DOJ case “falls far short of establishing the validity of its . . . theory” (310 F. Supp. 3d 161, 200).

3. Conclusion

Our judgments are clearly open to dispute. The question is whether there is something that is being indisputably missed by antitrust authorities under current merger policy, particularly in the mergers commonly cited as acquisitions by nascent competitors by GAFAM firms. We reiterate that we do not have sufficient evidence allowing us to produce definitive verdicts for each of the cases considered. However, we stress that those who advocate stronger antitrust enforcement toward mergers have not provided compelling empirical evidence that current merger policy has been too lax.

Future research is clearly desirable. But as of this date, the case that a stronger merger enforcement policy will benefit consumers is dubious on the two counts that apply to every effort by policy makers to ameliorate an alleged market failure (Winston 2021b): Are there serious inefficiencies to be addressed (in this case

from alleged anticompetitive mergers)? And are policy makers (in this case, antitrust authorities) capable of implementing policies that will do more good than harm?

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