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Separation: A Cure for Abuse of Platform Dominance?

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ABSTRACT

Political candidates, legislators, and academics have made proposals to separate services provided by dominant digital platforms from activities that rely on these services. Although the platforms have different economic and technical characteristics, common themes that motivate these proposals are the incentives of platforms to favor their own products and to suppress investment by imitating rivals. As has been shown in other contexts, this paper demonstrates that structural separation does not eliminate incentives for platforms to discriminate in the provision of service quality. Furthermore, the ability of vertically integrated platforms to imitate rivals does not necessarily harm consumers. Structural or functional separation can address some complaints lodged against activities by dominant platforms, but experience demonstrates that separation requirements are difficult to administer and can harm innovation. Public policy should rely on a mix of antitrust enforcement and regulation to address concerns about privacy, data security, and potential influence of major platforms in politics and the media, as well as the abuse of market power.

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1. Introduction

The ability of the major digital platforms to engage in conduct that can harm rivals and distort competitive outcomes has led to calls for major reforms. Senator Elizabeth Warren proposed that companies with an annual global revenue of $25 billion or more and that offer to the public an online marketplace, an exchange, or a platform for connecting third parties should be regulated as "platform utilities." These companies would be prohibited from owning participants on the platform. Platform utilities also would be required to meet a standard of fair, reasonable, and nondiscriminatory dealing with users and would not be allowed to transfer or share data with third parties.[2] This proposal would classify Amazon Marketplace, Google Search, and Google's ad exchange as platform utilities and would require them to operate as separate entities.[3]

Others, including legal scholars and Representative David Cicilline, the current head of the House Antitrust Subcommittee, have expressed concerns about anticompetitive conduct by vertically integrated platforms.[4] There are also calls for regulators to unwind acquisitions by the major platforms that have reinforced their dominance, such as Facebook's acquisitions of Instagram and WhatsApp and

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[2] Elizabeth Warren, "How we can break up big tech," available at https://elizabethwarren.com/plans/break-up-big-tech.

[3] Google's ad exchange enables automated sales of space for display advertisements on websites and mobile applications. See the discussion in Section 4.

[4] See, e.g., Khan (2019) and NPR, "Democratic Rep. David Cicilline Discusses Probe Into Big Tech Antitrust Regulations," June 6, 2019, available at https://www.npr.org/2019/06/06/730429586/democratic-rep-david-cicilline-discusses-probe-into-big-tech-antitrust-regulatio.

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Google's acquisition of YouTube and the ad manager DoubleClick. Courts have the power to dissolve mergers, but that has rarely occurred if the merging parties notified the antitrust authorities prior to the merger and cooperated with the authorities during the approval process (Patel, 2020).

My focus in this paper is on the economic arguments for and against structural or functional separation of services provided by the major digital platforms. I use the term "digital platform" loosely because companies that operate in the internet economy have different business models and provide different types of services. Some, such as Google and Facebook, are multi-sided platforms that generate revenues from advertisers and connect them with potential consumers. Others, such as Amazon, provide online merchant services that are analogous to services provided by traditional retailers. I apply the term "dominant" to a digital platform in this paper if it provides services for which there are no close substitutes that others rely on to develop or market their own products or services. The stylized models in this paper do not address interactions between different sides of a platform, although a more formal analysis should account for these effects if they are relevant to antitrust allegations.

Structural separation refers to the division of operations into separate companies. Functional separation allows for operations to be conducted by subsidiaries of the same company subject to restrictions on the transfer of information, intermediate products, or services between the subsidiaries. From the perspective of economic efficiency, there are three reasons to pursue structural or functional separation:[5]

1. To restore competition or innovation that has been harmed by conduct or a transaction;
2. To deter future anticompetitive conduct;
3. To open markets to competition and innovation, such as markets that have been foreclosed or impeded by regulation.

Antitrust authorities often condition approval of a merger or acquisition on an agreement to divest assets to restore competition and innovation lost by the proposed transaction. Divestiture is a preferred merger remedy because it breaks apart what should not have been joined together in the first place. In contrast, U.S. courts have been reluctant to dissolve existing entities to remedy the abuse of monopoly power (Waller, 2009). European Union antitrust law allows for structural remedies to address monopolization only when there is no equally effective behavioral remedy or where a behavioral remedy would be more burdensome.[6] Crandall (2001) identified 336 civil cases in which U.S. government antitrust enforcers secured judgments of unlawful monopolization between 1890 and 1996. Courts approved remedies that required structural or functional separation in 95 of these cases, but nearly all of them were mergers or acquisitions or they involved coordinated conduct. Only a handful of the cases that were resolved with a separation order solely addressed conduct by a single firm.[7]

In 1911 the U.S. Supreme Court held that the Standard Oil Trust was an unlawful monopoly and ordered the trust to be split into separate geographic companies.[8] In 1948 the Supreme Court affirmed an order to divorce the ownership of movie theaters by major producers of films.[9] The 1984 Modified Final Judgment (MFJ) that settled an antitrust case brought by the U.S. Department of Justice (DOJ) against AT&T split the company into separate geographic and functional units.[10] More recently, a district court approved a request by the DOJ and several states to separate Microsoft's Windows operating system from the company's personal computer applications to remedy the finding that Microsoft monopolized markets for personal computer operating systems and internet browsers. But the court of appeals ordered a re-hearing, which the parties preempted with a settlement that contained behavioral conditions and did not require divestiture.

Legislators have pursued divestitures to open regulated markets to competition, such as England did to separate electric power generation from regulated electricity transmission and distribution (Newbery, 2002). In the U.S. regulators ordered, but subsequently relaxed, separation requirements in several industries. The Glass-Steagall Act of 1933 required the separation of retail and investment banking, but the legislation was weakened over time and repealed in 1999. The Public Utility Holding Company Act of 1935 required interstate electricity and natural gas holding companies to re-organize as single integrated systems that served a limited geographic area,[11] but the restrictions were eased over time and eliminated in 2005.[12] In 1970 the Federal Communications Commission (FCC) promulgated financial interest and syndication rules that prevented the three major television networks from owning programming that they aired in prime time or syndicated programming in which they had a financial stake. The FCC abolished these restrictions in 1993.[13] The 1996 Telecommunications Act eliminated many of the restrictions imposed in the 1984 MFJ.

Section 2 of this paper explores whether a vertically integrated platform has incentives to favor its own prod-

[5] Antitrust remedies, such as structural or functional separation, also can be employed to compensate victims of unlawful conduct and to punish the perpetrators, without regard to beneficial effects for economic efficiency. See Melamed (2009).

[6] Council Regulation (EC) No. 1/2003, on the implementation of the rules on competition laid down in Articles 81 and 82 of the Treaty, 16 December 2002, at ¶12.

[7] Kovacic (1989) identified thirty-four monopolization cases in which courts ordered structural or functional separation over the period 1890-1988; however, his selection criteria caught allegations of coordinated conduct as well as single-firm monopolization.

[8] Standard Oil Co. of New Jersey v. United States, 221 U.S. 1 (1911).

[9] United States v. Paramount Pictures, Inc., 334 U.S. 131 (1948). Both Paramount Pictures and Standard Oil involved allegations of coordinated conduct in addition to single-firm monopolization.

[10] United States v. AT&T, 552 F. Supp. 131 (D.D.C. 1982). The court ordered the breakup of AT&T in 1982 and implemented the breakup in 1984 according to the terms specified in the MFJ.

[11] Energy Information Administration (1993).

[12] Congressional Research Service (2006).

[13] Khan (2019) reviews several significant examples of regulation and legislation that have imposed structural separation requirements.

ucts or services and whether separation eliminates such incentives. An online platform provides retail services to independent merchants and may offer its own products for sale. The platform can invest to lower the cost that consumers incur to find and purchase products on the platform. In a related paper, Brito et al. (2012) analyze the incentives of a vertically integrated monopoly supplier of an input to discriminate in the quality of service provided to downstream rivals. The input is supplied at a fixed price in their model and the monopoly supplier can degrade the quality of service offered to rivals. They show that vertical separation does not necessarily eliminate incentives for the input supplier to choose a quality that differs for downstream buyers. Section 2 shows that the platform has incentives to discriminate between firms that rely on its services even if it does not compete with these users and structural separation of a vertically integrated platform need not result in less discrimination.

Section 3 addresses the concern that online retail platforms such as Amazon can use information they collect in the course of business to imitate their rivals' products and more effectively promote sales of their proprietary private label products. Google or Apple can do the same for apps downloaded from their app stores. Google has been criticized for populating its own services, such as product reviews and travel sites, with information copied from competing websites. This section identifies the potential consumer harm and benefit from imitation with application to Amazon's private label sales.

Section 4 draws on experience with deregulation of the vertically integrated telecommunications giant AT&T to inform the likelihood that separation requirements imposed on the major digital platforms would have significant consumer benefits. The AT&T history identifies several conditions that are necessary, but not sufficient, for separation to promote competition and innovation. They include the ability to impose line-of-business restrictions that do not become obsolete with the progress of technology and the ability to define, monitor and enforce rules for access to separated services.

Many of the activities provided by the dominant digital platforms fail to satisfy these conditions. Moreover, there are economic incentives to re-establish the vertically integrated organizational structures that existed before separation. Industry regulation also was a factor in the breakup of AT&T that is absent for the digital platforms. The MFJ enabled competition in long distance telecommunications and equipment manufacturing that regulation had foreclosed. Furthermore, the deregulation of AT&T benefited from the support of a specialized regulatory body, which does not presently exist for the digital platforms.

Nonetheless, it is feasible to separate some platform activities. Amazon could be required to offer separate retail platforms for merchant and private label sales with a bar on the communication of information between the platforms. Google could be required to separate its Ad Manager from its other properties. However, separation can compromise benefits from vertical integration and separation would not eliminate the need for continued antitrust oversight to address anticompetitive conduct. It is also important to recognize that antitrust enforcement is not a substitute for regulation to address concerns such as privacy, data security, and the ability of the major platforms to influence public policy and the flow of information and disinformation (Moss, 2019). There is little in the way of theory or empirical evidence that establishes a clear connection between competition and protection against these other ills of the information economy or whether structural or functional separation would mitigate these concerns.[14] Section 5 concludes.

2. Incentives for platforms to discriminate against rivals

Calls to break up the major digital platforms implicitly assume:

A1: The platforms have the incentive and ability to discriminate or impose onerous terms on users of their services when they compete with these users; and

A2: The platforms would not have an incentive or ability to discriminate or impose onerous terms if they do not compete with users of their services.

It is well-known that a vertically integrated monopoly supplier of an input can profit by raising the price of the input to downstream competitors (Krattenmaker and Salop, 1986; Ordover et al., 1990). Amazon charges merchants that sell on its platform a commission that varies by product category and ranges from roughly 8% to 25% of their sales. In addition, sellers can choose to pay a per-unit fee or a monthly fee. The latter corresponds to Amazon's professional plan, which is the more economical choice for large sellers. Apple and Google charge app developers that distribute on their app stores a fixed fee and a share of app revenues (currently 30% for the first year). A sales commission effectively marks up the seller's cost, because the commission requires the seller to produce more to earn the same revenue, and is similar in this respect to charging the seller a price for an input.

There are allegations that the fees charged by some platforms have harmed competition. They include a complaint filed by Spotify with the European Commission[15] and a class action antitrust case in the U.S. that alleges excessive fees charged by Apple for listings on its App Store.[16] Apple and Google supply apps that compete with some of the apps available from independent developers, such as music streaming services and maps. Merchants have complained that Amazon's fees make it difficult to compete with Amazon's private label products.

The quantitative effect of vertical integration on a platform's profit-maximizing fees is not large if the platform charges uniform fees and earns a small fraction of revenues from its own products. In 2018, Amazon's sales of its pro-

[14] Acquisti et al. (2016) review the complex relationships between the demand for privacy, the effects of privacy regulations on competition, and the impacts of competition on incentives to supply desired levels of privacy. See also Marthews and Tucker (2019) and Shapiro (2019), but note a contrasting argument by Srinivasan (2019).

[15] Daniel Ek, "Consumers and Innovators Win on a Level Playing Field," March 13, 2019, available at https://newsroom.spotify.com/2019-03-13/consumers-and-innovators-win-on-a-level-playing-field.

[16] In re Apple iPhone Antitrust Litigation, U.S. District Court for the Northern District of California, December 2, 2013.

prietary products, excluding sales from Echo devices and Amazon-owned Whole Foods, accounted for less than one percent of total merchant sales on its retail platform.[17]

Platform vertical integration can create incentives for the platforms to harm rivals if sales of their proprietary products become a large share of total revenues, if they can choose price structures that discriminate against rival products, or if they can engage in other conduct such as a refusal to sell rival products. Several antitrust complaints have alleged discriminatory conduct by the major digital platforms. The class action that complains about high Apple App Store fees also alleges that Apple discriminates against apps that compete with Apple's proprietary apps, for example by refusing to approve apps that do not generate revenues for Apple and by preventing iPhone owners from downloading apps from other platforms. Russia's competition authority is investigating a complaint that Apple removed a parental control app sold by Kaspersky shortly after Apple released its own competing service.[18]

The U.S. Federal Trade Commission (FTC) and the European Commission (EC) investigated allegations that Google biased search results to promote its proprietary Google Shopping service and suppressed results for independent product comparison shopping websites such as Nextag, Shopping.com, and Shopzilla.[19] The FTC took no action with respect to the alleged display bias;[20] the EC fined Google € 2.4 billion and ordered the company to end the alleged discrimination.[21] The EC has on-going investigations of similar allegations that Google favors its proprietary services in responses to job queries and local search.[22]

Apple has been accused of favoring its proprietary apps in response to consumer queries. An investigation by the New York Times found that Apple frequently responded to consumer searches for a type of app, such as "music" or "podcast", with a list of its own apps before it displayed any rival apps, and sometimes included Apple apps that had little relevance to the search query.[23] There are complaints that Amazon favors its private label products in its responses to product searches.[24]

These allegations of discrimination relate to the service quality that a platform provides to rivals. Allain et al. (2016) show that the upstream subsidiary of a vertically integrated platform generally has an incentive to soften downstream competition by lowering the quality of the services that the platform's upstream subsidiary offers to its downstream rivals.[25] de Corniére and Taylor (2019) show that a vertically integrated platform has an incentive to steer consumers to its own product instead of a rival product sold on the platform. The next section explores the incentives of a platform to affect quality by biasing consumer costs to identify and purchase products sold on the platform. This section shows that the platform can have an incentive to discriminate even if it does not compete with its users, but separation does not necessarily eliminate the incentive to discriminate. Section 2.2 considers a platform owner's incentive to raise the cost of a competing product.

2.1. Incentives to bias consumer search

A concern that motivates proposals to break up the major vertically integrated platforms is their incentive to favor their own products with better service quality. Google can make it easier for consumers to find its proprietary product and local listings and Amazon can make it easier for consumers to purchase its private label products.

Suppose that a platform provides online retail services for two products. Product 1 may be sold by the platform if it is vertically integrated; otherwise it is sold by an independent merchant. Product 2 is sold only by an independent merchant. Consumers incur a search cost to identify and purchase products on the platform. I model consumer demand for sales on the platform by assuming that each product is located at point zero on a product-specific line of unit length and consumers with unit total mass are uniformly distributed on each line.

The products do not compete. For example, product 1 might be a 12-pack of AA batteries, which may or may not be sold by the owner of the platform, and product 2 might be a case for a smartphone that is sold by an independent merchant. This assumption eliminates the typical incentive for a vertically integrated firm to raise its rival's cost; nonetheless, the platform can have incentives to discriminate.

A merchant, or the platform owner if the platform is vertically integrated, chooses a uniform price p_1 for sales of product 1 on the platform, and a merchant chooses a uniform price p_2 for sales of product 2 on the platform. The products have constant marginal costs c_1 and c_2. Consumers have value v_1 for product 1 and v_2 for product 2. I allow search costs to differ for the two products to reflect the ability of a platform to favor a product. A consumer located at x_1 on the line for product 1 has net utility $v_1 - t_1 x_1 - p_1$ if she purchases product 1 on the platform. Similarly, a consumer located at x_2 on the line for product 2 has net utility $v_2 - t_2 x_2 - p_2$ if she purchases product 2 on the platform. The cost $t_1 x_1$ measures the cost to the consumer to find and purchase product 1 on the

[17] Marketplace Pulse, "Amazon Private Label Brands," https://www.marketplacepulse.com/amazon-private-label-brands.

[18] See Jack Nicas, "Russia Opens Antitrust Inquiry Into App Restriction at Apple," New York Times, August 9, 2019.

[19] See, e.g., Gilbert (2018).

[20] U.S. Federal Trade Commission (2013). Statement of the Federal Trade Commission Regarding Google's Search Practices, In the Matter of Google Inc. FTC File Number 111-0163, January 3, 2013.

[21] See European Commission (2017) and European Commission Press Release, Antitrust: Commission fines Google € 2.42 billion for abusing dominance as search engine by giving illegal advantage to own comparison shopping service, 27 June 2017.

[22] European Commission Press Release, Statement by Commissioner Vestager on Commission decision to fine Google € 1.49 billion for abusive practices in online advertising, 19 March 2019.

[23] Jack Nicas and Keith Collins, "How Apple's Apps Topped Rivals in the App Store It Controls," New York Times, September 9, 2019.

[24] Julie Creswell, "How Amazon Steers Shoppers to Its Own Products," New York Times, June 23, 2018.

[25] Concerns about the incentives of vertically integrated firms to degrade the quality of services they provide to independent rivals are particularly relevant for platforms that do not charge for services provided to one side of the platform. See, e.g. Buehler et al. (2006).

platform and t_2x_2 is the corresponding cost to find and purchase product 2. The parameter t_i in this model is a measure of the platform's service quality for product $i = 1, 2$.

The platform can invest to make it easier for consumers to find and purchase the product sold by Firm i. Specifically, suppose that the platform can determine $t_i = t - \delta_i$ at an irreversible cost $K(\delta_i)$ for $i = 1, 2$.

Assumption 1. $K(\delta_i) = \frac{1}{2}\theta\delta_i^2$.

The platform first makes irreversible investments $K(\delta_i)$ to lower search costs for products $i = 1, 2$. Subsequently, the platform chooses a fee structure for independent merchants, which can include a commission rate γ on sales and a fixed fee F.

Each product can be purchased on the platform or from an independent retailer. The latter is an outside option for which consumers have no search costs. Consumers can purchase product i from the independent retailer at a fixed price p_i^0. Firm i incurs a per-unit marketing cost d_i to sell at the independent retailer.

Assumption 2. $p_i^0 = c_i + d_i < v_i$.

Assumption 2 states that a firm breaks even on sales at the outside option. This assumption simplifies the analysis because it implies that a merchant's reservation profit for sales on the online platform, which is the minimum profit that the platform must provide to compensate for the outside retail option, is zero. Assumption 2 also implies that all consumers purchase each product either on the platform or at the independent retailer.

The share x_i of consumers that choose to purchase product i on the platform is

$$x_i = \frac{p_i^0 - p_i}{t_i} \quad \text{for } i = 1, 2, \tag{1}$$

provided that $0 < x_i < 1$.

The platform's incentives to bias search costs depend on the ownership structure. The next section considers investment incentives for a platform that owns one of the products. The following section considers investment incentives for a platform that does not own products sold on the platform.

2.1.1. Vertically integrated platform

Assume that the platform owns product 1. The platform's profit-maximizing commission is zero if there is only a single independent seller that does not compete with the product sold by the platform, which is the maintained assumption in this section.

Firm i (either an independent merchant or a vertically integrated platform owner) chooses the platform price p_i to maximize

$$\pi_i = (p_i - c_i)x_i.$$

From equation (1), if the platform's profit-maximizing share of sales is $0 < x_i^* < 1$, Firm i's profit-maximizing platform price is

$$p_i^* = \frac{1}{2}(p_i^0 + c_i),$$

where, from Assumption 2, $p_i^0 = c_i + d_i$.

The next assumption assures that a fraction $x_i^* < 1$ of consumers purchase product i on the platform.

Assumption 3. $0 < d_i < 2t_i$.

Assumptions 2 and 3 imply that

$$p_i^* = c_i + \frac{d_i}{2},$$

$$x_i^* = \frac{d_i}{2t_i},$$

and Firm i's profit from sales on the online platform is

$$\pi_i^*(t_i) = \frac{1}{4t_i}(d_i)^2.$$

The independent merchant chooses to sell on the platform if $\pi_2^*(t_2) - F \geq 0$. The vertically integrated platform maximizes its profit by charging the independent merchant the fixed fee[26]

$$F = \pi_2^*(t_2) = \frac{(d_2)^2}{4t_2},$$

and the platform's profit is

$$\Pi^V(\delta_1, \delta_2) = \sum_{i=1,2}\left[\frac{(d_i)^2}{4(t-\delta_i)} - K(\delta_i)\right].$$

The platform's profit-maximizing investments to lower search costs satisfy

$$\delta_1^V(t - \delta_1^V)^2 = \frac{1}{4\theta}(d_1)^2 \tag{2}$$

$$\delta_2^V(t - \delta_2^V)^2 = \frac{1}{4\theta}(d_2)^2, \tag{3}$$

provided that the second-order conditions are satisfied. These conditions require $\delta_i^V \leq \frac{1}{4}t$, which can be satisfied if θ is sufficiently large. In that case δ_i^V is an increasing function of Firm i's profit margin for online sales, which is proportional to d_i.

The platform favors the product with the larger opportunity cost for sales on the outside retail option. If $d_2 > d_1$, the platform would profit by making it easier for consumers to locate and purchase the product sold by the independent merchant: $\delta_2^V > \delta_1^V$. If, instead, $d_2 < d_1$, the platform would bias search costs to favor its own product.

Note that the welfare-maximizing platform price is $\hat{p}_i = c_i$, for which sales on the platform are

$$\hat{x}_i = \min\left[\frac{d_i}{t(\delta_i)}; 1\right] \quad \text{for } i = 1, 2.$$

This is twice the profit-maximizing share when $\hat{x}_i < 1$. As in the case of a profit-maximizing platform, investments to lower search costs that maximize consumer or total welfare would favor the product with the more costly outside option.

The appendix considers the platform's profit-maximizing prices and investments to lower search costs

[26] Some platforms also collect fees from consumers (e.g., Amazon Prime). This option does not change the main result in this section, which is that the platform has incentives to offer different service qualities to merchants.

in the absence of an outside retail option. When $x_i^* < 1$ for $i = 1, 2$, the platform would maximize its profit by investing more to lower search costs for the product with the larger net surplus, $v_i - c_i$. The platform owner does not have an incentive to discriminate if $x_i^* = 1$ for $i = 1, 2$. The platform also does not have an incentive to discriminate if there is an outside option but $d_i > 2t_i$, which implies that all consumers purchase on the platform.

2.1.2. Structural separation

Suppose the platform divests its ownership of product 1. Both products are supplied by independent merchants. The platform owner can choose between a commission and a fixed fee that accommodates both merchants and a larger fixed fee that excludes one of the merchants. As in the vertical integration scenario, before the platform determines its fee structure, it can make an irreversible investment $K(\delta_i) = \frac{1}{2}\theta\delta_i^2$ to lower t_i, the consumer search cost parameter for product i, from t to $t - \delta_i$.

Given a commission rate γ, Firm i's profit, excluding the fixed fee, is

$$\pi_i^*(\gamma, t_i) = \max_{p_i} \{[(1-\gamma)p_i - c_i]x_i\}.$$

Define $\widetilde{c}_i = c_i/(1-\gamma)$. If $0 < x_i^* < 1$, Firm i's profit-maximizing price is

$$p_i^* = \frac{1}{2}(p_i^0 + \widetilde{c}_i). \tag{4}$$

Replace Assumption 3 with the following.

Assumption 3′: $\gamma\widetilde{c}_i < d_i < \gamma\widetilde{c}_i + 2t_i$

Assumption 3′ assures that $0 < x_i^* < 1$ and Firm i's profit, excluding the fixed fee, is

$$\pi_i^*(\gamma, t_i) = \left(\frac{1-\gamma}{4t_i}\right)(p_i^0 - \widetilde{c}_i)^2,$$

where $p_i^0 = c_i + d_i$ for $i = 1, 2$.

The profit-maximizing commission is zero if the platform serves only one merchant. By charging a fixed fee that excludes merchant $j \neq i$, the platform can charge a fixed fee $F_1 = \pi_i^*(0, t_i)$ and earn

$$\Pi_1 = \max_{i=1,2}\left\{\max_{\delta_i}\left[\pi_i^*(0, t-\delta_i) - K(\delta_i)\right]\right\}. \tag{5}$$

By serving both merchants, the platform can earn

$$\Pi_2 = \max_{\gamma, \delta_i}\left[\sum_{i=1,2}[\gamma p_i x_i - K(\delta_i)] + 2F_2\right] \tag{6}$$

subject to

$$F_2 \leq \min[\pi_1^*(\gamma, t_1); \pi_2^*(\gamma, t_2)].$$

Suppose that $\Pi_1 > \Pi_2$ and $\pi_1^*(0, t_1) > \pi_2^*(0, t_2)$. Only Firm 1 would participate on the platform and the platform would invest to lower search costs for its former product to the same extent as a vertically integrated platform, given by the solution to equation (2). Firm 2 makes zero profit in this structural separation scenario. With vertical integration, the platform's fixed fee also would leave Firm 2 with zero profit, but the firm would be better off with vertical integration if participation on the platform has a benefit (for example, by increasing the product's visibility to potential customers). Structural separation would have no effect on Firm 2 compared to vertical integration if $\Pi_1 > \Pi_2$ and if $\pi_1^*(0, t_1) < \pi_2^*(0, t_2)$. The platform would invest to lower the search costs for product 2 by the amount given by the solution to equation (3) and the firm would participate on the platform and earn zero profits in both scenarios.

Suppose instead that $\Pi_2 > \Pi_1$ and assume that $\pi_1^*(\gamma, t_1) > \pi_2^*(\gamma, t_2)$. Substituting the expressions (1) and (4) for product sales and prices into equation (6) with $F_2 = \pi_2^*(\gamma, t_2)$, the platform's profit conditional on the commission rate γ and investments δ_1, δ_2 is

$$\Pi_2(\gamma, \delta_1, \delta_2) = \sum_{i=1,2}\left\{\frac{\gamma}{4(t-\delta_i)}\left[\left(p_i^0\right)^2 - (\widetilde{c}_i)^2\right] - K(\delta_i)\right\} + \frac{(1-\gamma)}{2(t-\delta_2)}\left(p_2^0 - \widetilde{c}_2\right)^2.$$

As in the vertical integration case, the platform's profit is a decreasing function of the search-cost parameters $t_i = t - \delta_i$ for $i = 1, 2$.

Let γ^* denote the platform's optimal commission. The platform's profit-maximizing investments to lower search costs satisfy

$$\delta_1^*(t-\delta_1^*)^2 = \frac{\gamma^*}{4\theta}\left[\left(p_1^0\right)^2 - (\widetilde{c}_1)^2\right] \tag{7}$$

$$\delta_2^*(t-\delta_2^*)^2 = \frac{1}{4\theta}\left\{\begin{matrix}\gamma^*\left[\left(p_2^0\right)^2 - (\widetilde{c}_2)^2\right] + \\ 2(1-\gamma^*)\left(p_2^0 - \widetilde{c}_2\right)^2\end{matrix}\right\}. \tag{8}$$

When the platform hosts sales of both products, the platform can have a larger incentive to lower search costs for the product sold by Firm 2, notwithstanding the assumption that $\pi_1^*(\gamma, t_1) > \pi_2^*(\gamma, t_2)$. Investments by the platform that lower product-specific search costs increase product revenues and the platform's commissions on total sales. This incentivizes the platform to invest more to lower the search costs for the product with the larger sales. However, a reduction in search costs for product 2 also allows the platform to charge a larger fixed fee, which the platform collects from both firms. The second term on the right-hand side of equation (8) reflects the benefit to the platform from charging a larger fixed fee. Consequently, the right-hand side of equation (8) can be greater than the right-hand side of equation (7). When the second-order conditions are satisfied, this implies that $\delta_2^* > \delta_1^*$.[27]

For example, suppose that $t_i = t$ and $c_i = c$ for $i = 1, 2$. The maintained assumption is that $\pi_1^*(\gamma, t) > \pi_2^*(\gamma, t)$, which implies that $p_1^0 > p_2^0$ when $c_1 = c_2$. The platform's profit-maximizing commission solves

$$\frac{\gamma^*}{(1-\gamma^*)^3} = \frac{\left(p_1^0\right)^2 - \left(p_2^0\right)^2}{4c^2}.$$

If p_1^0 is not much larger than p_2^0, the platform would collect nearly all of its profits from the fixed fee and the

[27] The second-order conditions require a tighter constraint on the search cost parameter θ relative to the necessary and sufficient conditions for profit-maximizing investments in the vertical integration scenario.

platform would have a larger incentive to lower search costs for product 2 compared to search costs for product 1. The opposite situation would prevail if $\pi_1^*(\gamma, t) < \pi_2^*(\gamma, t)$. Then the platform can have a larger incentive to lower search costs for product 1, because profits from the sale of that product on the platform determine the platform's profit-maximizing fixed fee. The direction of this inequality can depend on the commission rate, and the platform owner would take this into account when it determines its profit-maximizing fee structure. Whichever product constrains the platform's profit-maximizing fixed fee, the platform does not treat the products equally, even though it has no ownership interest in the products.

An additional complication is that investments by the platform to lower product search costs can reverse the relationship between π_1^* and π_2^*. For example, suppose that $\pi_1^*(\gamma, t_1) > \pi_2^*(\gamma, t_2)$ when $\delta_1 = \delta_2$, which implies that $\pi_2^*(\gamma, t_2)$ is the binding constraint for the fixed fee if the platform serves both products. However, the investments δ_1^* and δ_2^* that satisfy equations (7) and (8) may reverse this inequality because the platform invests more to lower the search costs for product 2. If this reversal occurs, the platform would have to charge a fixed fee that is no larger than $\pi_1^*(\gamma, t_1)$ to serve both products. The platform's owner would have to consider the possibility of such a reversal to determine the profit-maximizing fixed fee and commission rate and the corresponding investments to lower search costs.

Structural separation can cause the platform to provide better or worse service to the independent merchant that supplies product 2 compared to a vertically integrated platform. Post separation, service can improve for the supplier of product 2 if the platform hosts both products and $\pi_1^*(\delta, t_1) > \pi_2^*(\delta, t_2)$. If the platform can earn more profit by serving only one of the products, the platform may charge a fixed fee that excludes the independent merchant if $\pi_1^*(\delta, t_1) > \pi_2^*(\delta, t_2)$. If the platform accommodates both products after structural separation and if $\pi_1^*(\delta, t_1) < \pi_2^*(\delta, t_2)$, the platform can have an incentive to provide better service quality for sales of its former proprietary product 1 post-separation, even though it may have provided differentially better service quality to the independent merchant when the platform was vertically integrated.

2.2. Platform incentives to raise rivals' costs: the "buy box"

The previous section shows that a platform can have an incentive to provide different service qualities to its users even if the platform does not compete with products sold by independent firms that rely on its services. Structural separation does not eliminate the platform's incentives to bias service quality. Indeed, the platform can have an incentive to offer higher service quality to an independent merchant when the platform is vertically integrated compared to a platform that is not vertically integrated. With or without structural separation, discrimination allows the platform to extract greater revenues when merchants have different alternatives to the platform. The incentive to discriminate in the previous section is unrelated to the case in which a vertically integrated firm has an incentive to charge fees that raise its rivals' costs.

An online retail platform can compete intensely with merchants that sell on the platform if it offers similar products under its own label and search costs are low, which together imply that there is little vertical or horizontal product differentiation. An example of a platform service that offers products with little horizontal or vertical differentiation is the Amazon "buy box." Amazon often responds to a product query by displaying a product from a single seller, which may be the platform if it offers a proprietary product. Customers can purchase the same product from other sellers by navigating to another site, but the convenience of a single click on the buy box can be a valuable benefit for the featured seller. Approximately 80% of Amazon's customers purchase the product from the seller that occupies the buy box.[28] The buy box allows the platform to reduce search costs for similar products to almost zero. However, when the platform competes with other sellers, there is the potential for the platform to charge fees that raise its rivals' costs.

Assume that sellers offer identical products with the same marginal cost of production c for sale on a retail platform that reserves a buy box for a single featured seller. The platform charges a commission γ and selects either its own product, if it offers one, or an independent merchant with the lowest price for inclusion in the buy box.[29] If the buy box accounts for nearly all product sales on the platform, competition for selection in the buy box causes sellers that desire to sell on the platform to choose a price equal to their effective marginal production cost, which is $\tilde{c} = c/(1-\gamma)$. In effect, the buy box creates Bertrand competition between similar products.[30]

Suppose the product is available from an alternative sales channel at price p^0. The outside option determines the maximum price for sales of the product and assume that it is not profitable for a seller of the product on the platform to charge a lower price. Competition for selection in the buy box allows the platform to set a commission rate $\hat{\gamma}$ slightly less than

$$1 - \frac{c}{p^0}. \tag{9}$$

If the platform and independent sellers offer identical products with the same marginal production cost, the platform would be indifferent between allowing a sale by an independent firm and collecting the commission $\hat{\gamma} p^0 = p^0 - c$ or winning the sale with a price slightly below p^0. This prescription is analogous to the efficient component pricing rule (ECPR) for a price-regulated utility that

[28] See "How to Win the Amazon Buy Box in 2020," available at https://www.repricerexpress.com/win-amazon-buy-box/.

[29] Sellers that occupy Amazon's buy box typically offer the lowest price or close to the lowest price for a product. However, Amazon's algorithms for selection in the buy box also may give preference to sellers that opt for its professional plan, use its fulfillment service, and have excellent reputation scores, among other factors. Ibid.

[30] See Johnson et al. (2020) for a more general analysis of competition on a platform that displays a subset of otherwise similar products.

provides access services to rival sellers.[31] The ECPR specifies a per-unit access charge $\hat{a} = p^0 - c$, which generates the same per-unit revenue for the platform as the commission rate $\hat{\gamma} = 1 - c/p^0$. The access charge $\hat{a}$ is the utility's opportunity cost of a permitting a sale by a rival in place of its own sale of a unit of the downstream product.

Suppose the platform and independent merchants offer identical products but have different marginal costs. The platform's product has a marginal cost c_p and n independent merchants have costs $(c_1, ..., c_n)$. Let $\hat{c} = \min(c_1, ..., c_n)$. At the commission rate $\gamma^p = 1 - c_p/p^0$, the platform would be indifferent to collecting the commission $\gamma^p p^0$ from a sale by an independent merchant or selling its proprietary product. If $\hat{c} < c_p$, it would be profitable for the platform to charge a commission $\hat{\gamma} = 1 - \hat{c}/p^0 > \gamma^p$ and surrender the buy box to an independent merchant with the lowest marginal cost.

Online retail platforms typically charge a single commission rate for sales of many products on the platform, although the rate may differ by product category. Amazon has a menu of commission rates for sellers that subscribe to its professional plan; for example, the rate is 15% of sales for books and 8% of sales for consumer electronics.[32] Within a category, the platform's profit-maximizing commission depends on its expectations about the margins earned by merchants that use the platform.

Suppose the platform charges a commission rate γ_k for category k. Let $\hat{c}_{ik}$ denote the lowest-cost seller of product i in category k and p^0_{ik} the outside option price for this product. The most efficient independent seller of product i can profitably sell on the platform if $(1 - \gamma_k)p^0_{ik} - \hat{c}_{ik} \geq 0$. If the platform has a proprietary version of the product, the platform would prefer to sell its own product rather than collect commission revenues from sales by the independent merchant if its cost, c_{pi}, is such that $(1 - \gamma_k)p^0_{ik} - c_{pi} \geq 0$. A necessary condition for the platform to profit from sales by independent merchants is $\hat{c}_{ik} < c_{pi}$ and the platform's profit-maximizing commission for the category depends on its expectations of sales by independent merchants for which $(1 - \gamma_k)p^0_{ik} - \hat{c}_{ik} \geq 0$ and $(1 - \gamma_k)p^0_{ik} - c_{pi} < 0$.

All else equal, a larger commission rate allows the platform to collect greater revenue from merchants that sell on the platform. A larger commission rate also increases the platform's opportunity cost of sales of its proprietary products, which encourages the platform to substitute some merchant sales for sales of its own products. The cost of a larger commission is lower participation by merchants that can sell products profitably on the platform. Category-specific commission rates allow the platform to vary commissions in response to the platform's beliefs about merchant costs within a category and thereby extract greater profits from merchants that sell on the platform. However, given imperfect information, the platform cannot extract all of the producer surplus from sales on the platform because margins differ for products in the category.

[31] See, e.g., Baumol and Sidak (1994). Laffont and Tirole (1994) describe necessary and sufficient conditions for optimality of the ECPR, which are satisfied in this example.

[32] See "Selling on Amazon Fee Schedule," available at https://sellercentral.amazon.com/gp/help/external/200336920.

3. Misuse of information by platforms

Vertical integration can raise additional concerns related to the use of information that the integrated firm may obtain from dealings with independent rivals. The major digital platforms collect vast amounts of data that they can use to profit from their own services. Google was accused of copying information from website publishers to populate its specialized services, such as rating reviews for hotels and restaurants[33] and Apple was accused of copying popular apps offered on its app store.[34] A New York Times article reported that "Amazon is utilizing its knowledge of its powerful marketplace machine — from optimizing word-search algorithms to analyzing competitors' sales data to using its customer-review networks — to steer shoppers toward its in-house brands and away from its competitors, say analysts."[35] The EC opened a formal antitrust investigation to assess whether Amazon has been exploiting its data troves to imitate products sold on its Marketplace, including whether Amazon unfairly uses data collected from its merchant sales to select the seller that is featured in its buy box.[36]

Consider a highly simplified model as an initial exploration of the effects of imitation on consumer welfare. A manufacturer incurs a cost K to develop a product with a constant marginal cost c. The manufacturer can choose to sell the product on either of two platforms A or B (but not both). The platforms charge a percentage γ_k of product sales and a fixed fee F_k for $k = A, B$. Absent imitation, the manufacturer anticipates sales $q_k(p)$ on platform $k = A, B$ at price p. The manufacturer's expected profit from sales on platform k is

$$\pi_k = \max_p \{[(1 - \gamma_k)p - c]q_k(p)\} - F_k.$$

Absent imitation, the manufacturer would choose to sell the product on platform A:

$$\pi_A > \pi_B \quad \text{and } \pi_A - K > 0.$$

Suppose that sales on platform A allow the platform to imitate the product at a cost θK with $0 < \theta < 1$ and the platform will imitate if it is profitable. Let π^d_A be the manufacturer's duopoly profit if it sells the product on platform A and the platform imitates. Let Π^d_A be the platform's profit if it imitates and Π_A the platform's profit from sales by the manufacturer on its platform if it does not imitate. Platform A does not imitate if $\Pi^d_A - \theta K \leq \Pi_A$. There is no risk of imitation on platform B.

[33] See, e.g., Vezzoso (2018) and Conor Dougherty, "Inside Yelp's Six-Year Grudge Against Google," New York Times, July 1, 2017, available at https://www.nytimes.com/2017/07/01/technology/yelp-google-european-union-antitrust.html.

[34] See, e.g., "US: Apple accused of patent infringement by developer," Competition Policy International, October 7, 2019, available at https://www.competitionpolicyinternational.com/us-apple-accused-of-patent-infringement-by-developer/.

[35] Julie Creswell, "How Amazon Steers Shoppers to Its Own Products," New York Times, June 23, 2018.

[36] See European Commission Press Release, Antitrust: Commission opens investigation into possible anti-competitive conduct of Amazon, 16 July 2019.

The manufacturer has perfect foresight about the profits on the different platforms and the risk of imitation and will develop the product if it can make a positive profit on one of the platforms. Let S_A, S_B denote consumer surplus when the product is sold by the manufacturer without imitation on platform *A, B* respectively, and let S_A^d be the consumer surplus with sales and imitation on platform A. Competition with the imitating platform implies $S_A^d > S_A$ and assume that $S_A > S_B > 0$. Imitation, if it occurs, benefits consumers, but the risk of imitation can harm consumers if it causes the manufacturer to abandon the product or sell the product on the inferior platform *B*.

There are four cases to consider:

1. $\Pi_A^d - \theta K \leq \Pi_A$. The manufacturer develops the product and sells the product on platform *A*. The platform does not imitate. Consumer surplus is S_A.
2. $\Pi_A^d - \theta K > \Pi_A$, $\pi_A^d - K > 0$ and $\pi_A^d > \pi_B$. The manufacturer develops the product and sells the product on platform *A*. The platform imitates. Consumer surplus is $S_A^d > S_A$.
3. $\Pi_A^d - \theta K > \Pi_A$, $\pi_B - K > 0$ and $\pi_B > \pi_A^d$. The manufacturer develops the product and, given the threat of imitation on platform *A*, sells the product on platform *B*. Consumer surplus is S_B.
4. $\Pi_A^d - \theta K > \Pi_A$, $\max\left(\pi_A^d, \pi_B\right) - K < 0$. The manufacturer does not develop the product.

The costs and benefits from imitation depend on the resulting scenario. Imitation may be an empty threat which has no effect on market outcomes (case 1). Innovation can enhance competition and make consumers better off (case 2). Or the threat of imitation can cause the manufacturer to choose an inferior platform to sell her product (case 3), or not develop the product at all (case 4). The threat of imitation harms consumers in these latter two cases.

This simple model does not consider whether platforms might adjust their fees to compensate users for the risk of imitation, erect firewalls to reduce the flow of information about products sold on their platforms, or otherwise commit not to imitate.[37] Milliou (2004) addresses firewalls in the context of an industry with a vertically integrated firm that supplies and competes with a downstream firm. Firms can invest in cost-reducing R&D and investments by the independent downstream firm can have spillover benefits for the integrated firm. The net effects on total welfare of firewalls that restrict information flows can be positive or negative. The effects depend on many factors, including the R&D technology and the degree of downstream product differentiation.

Allain et al. (2011) analyze the implications of vertical integration for competition and innovation when firms can choose between platforms and the platforms adjust their fees to compensate for the risk of imitation. In their model an independent upstream firm and a vertically integrated upstream firm compete to supply an input to an independent downstream firm. The inputs are close substitutes from the perspective of the downstream firm. Vertical integration allows the integrated supplier to imitate a discovery by a downstream firm with a positive probability. Imitation does not occur as an equilibrium outcome in their model because the independent downstream firm chooses not to transact with the vertically integrated upstream supplier. Nonetheless, the threat of imitation has real effects. The threat of imitation by the integrated firm allows the independent supplier to charge more for its services, which harms consumers by softening competition in the downstream market.

In contrast, Hughes and Kao (2001) show that consumers can be better off with vertical integration that facilitates the flow of information compared to separation when downstream rivals can negotiate price concessions to compensate for information leakages. The relevant information in their model is about a downstream rival's demand, which allows the integrated firm to compete more effectively. Vertical integration benefits consumers by strengthening competition and by lowering prices for the upstream good. The latter effect occurs because the upstream division of the integrated firm must offer the downstream rival a discount to elicit information about its demand.

Consistent with the simple model in this section, these models demonstrate that information flows between divisions of a vertically integrated firm have complicated welfare effects. By transacting with a downstream rival, a vertically integrated firm can obtain information that increases its ability to develop a new or improved product or compete more effectively, which can benefit consumers. The risk of imitation also can harm consumers by discouraging competition or by making suppliers willing to accept higher prices from platforms that are unlikely to imitate their products. Policies that attempt to prevent imitation can have unintended consequences by reducing competition or by encouraging platforms to specialize in their proprietary products.

Presently, it is difficult to make a case that Amazon has harmed consumers by imitating and displacing innovative products. Most of Amazon's private label sales are for commodities sold under its Amazon Basics and Amazon Essentials brands. Excluding its Kindle and Echo products and groceries, two of Amazon's most successful private label products are batteries and diapers. These are not products for which access to proprietary data provides a significant competitive advantage.[38]

Amazon is known for entering new markets and ramping up sales quickly, so today's statistics need not be indicative of Amazon's future proprietary sales. Even if Amazon becomes a more formidable competitor for merchants that use its platform, private label sales confer important consumer benefits if the risk of imitation is not a significant deterrent, so that firms continue to invest to develop

[37] Antitrust authorities sometimes condition approval of a vertical merger on the implementation of a firewall to prevent the communication of competitively sensitive information. See, e.g., US Federal Trade Commission press release, "FTC accepts proposed consent order in Broadcom Limited's $5.9 billion acquisition of Brocade Communications Systems, Inc.," July 3, 2017.

[38] Áine Cain, "Amazon's private brands lag behind the competition on the retailer's own website, except for 2 unexpected products," Business Insider, May 31, 2019, available at https://www.businessinsider.com/amazon-private-label-brands-batteries-diapers-2019-5.

new products and sell them on the platform (corresponding to case 2 above). Globally, private label sales average about 17 percent of total sales for all retailers. In the U.S., products branded by the retailer account for more than 25% of total sales at Costco, Kroger, Kohl's and JC Penny, among others.[39] Walmart sells about 30,000 private label products across 300 brands in 20 categories.[40] Private labels allow retailers to promote products to consumers that do not have strong brand preferences, often with support from the brand manufacturers who benefit from more effective price discrimination and the utilization of excess production capacity. Private labels also allow retailers to bargain more effectively with suppliers and fill in product gaps by selling products that consumers desire, but are not available from the brand manufacturer. Furthermore, private labels can encourage brand manufacturers to differentiate their products to better compete with store brands.

If antitrust enforcers address concerns that Amazon imitates products sold on its merchant platform, they would have to determine whether Amazon has harmed consumers by exploiting competitively sensitive proprietary information that is protected by intellectual property laws. Allegations that Amazon harms competition by displaying misleading product information raise issues addressed in the Google Shopping cases and would encounter similar difficulties to craft effective remedies. The next section considers challenges for structural remedies informed by experience from the telecommunications industry.

4. Lessons from telecommunications

The U.S. telecommunications industry offers an instructive case study that highlights the difficulties of employing separation requirements to address competition concerns in a dynamic technological environment. I briefly review the history of telecommunications deregulation in this section and draw relevant lessons from this experience for structural or functional separation of services provided by the major digital platforms.

The telecommunications industry developed as a regulated service that was confined to basic voice communications. By the mid-1960s the use of computerized switches to route telephone calls began to blur the distinction between voice communications and the unregulated activity of data processing. The regulated telephone companies sought to employ excess computing capacity for data processing applications, while computer manufacturers in the rapidly expanding computer industry sought to avoid competition by enforcing strict limits on the permitted activities of the regulated companies. Furthermore, some new services, such as the communication of stock prices stored in computer files, did not fit neatly into either voice communications or data processing (Cannon, 2003).

The Federal Communications Commission first addressed these tensions in a 1971 ruling called Computer I, which allowed regulated telecommunications companies, other than AT&T, to offer data processing through separate facilities.[41] A 1956 consent decree that resolved an antitrust case brought by the U.S. Department of Justice against AT&T barred the company from engaging in any business other than the provision of regulated common carrier communications services.[42] Computer I also created new hybrid categories to address services that integrated data processing and communications. The ruling exempted from common carrier regulation "hybrid data processing" services in which message-switching was incidental to data processing. Services in which data processing was incidental to message-switching were classified as "hybrid communications" and were subject to common carrier regulation (Zarkin, 2003).

The Computer I order classified services according to the technologies employed to deliver them. By the mid-1970s, advances in distributed computing made it impossible to clearly identify many hybrid services as supplied primarily by data processing or communications technologies. In 1980 the FCC issued an order (Computer II) that instead designated services for the purpose of regulatory oversight according to their functions. The order defined basic service as transmission capacity for the movement of information (without regard to whether the information is voice, video, or data or the technology used to move the information) and enhanced services as those that employ computer applications that process or alter transmitted information or involve subscriber interaction with stored information. Some examples of services that the FCC classified as enhanced include e-mail, voice mail, World Wide Web, and audiotext information services (Cannon, 2003). Common carrier regulation continued to apply to the provision of basic service. The Computer II order allowed regulated telecommunications companies to provide enhanced as well as basic service under conditions that governed the sharing of regulated facilities, but the order retained a separate subsidiary requirement for AT&T and GTE.[43]

The FCC Computer I and II decisions took years to develop from initial proposals to final orders. During that time the Commission attempted to respond to a flood of petitions by interesting parties. Regulated telecommunications companies complained that existing regulations hamstrung their ability to compete and to develop innovative services. Other parties insisted that existing limits were necessary to prevent unfair competition from the regulated companies (Zarkin, 2003).

A third development that substantially altered the contours of regulation and competition in the U.S. telecommunications industry was the 1984 Modified Final Judgment that resulted from antitrust litigation against AT&T.

[39] Nielson, "The state of private label around the world," November 2014, available at https://www.nielsen.com/wp-content/uploads/sites/3/2019/04/state-of-private-label-around-the-world-nov-2014.pdf.

[40] ScrapeHero, "Walmart and the Power of Private Labels," available at https://www.scrapehero.com/walmart-and-the-power-of-private-labels/.

[41] Reg. and Policy Problems Presented by the Interdependence of Computer and Communications Services, Final Decision, 28 FCC 2d 267, 21 Rad. Reg.2d (P & F) 1561 (1971).

[42] Report of the Antitrust Subcommittee of the Committee of the Judiciary, House of Representatives, Eighty-Sixth Congress, First Session, on the consent decree program of the Department of Justice, at 29.

[43] Second Computer Inquiry, Final Decision, 77 F.C.C.2d 384, 19, 47 Rad. Reg.2d (P & F) 669 (1980).

The basis of the MFJ was the perception that local telephone service is a natural monopoly that should be separated from potentially competitive activities such as long distance telecommunications, value-added information services, and manufacturing. The MFJ branded the AT&T local exchanges as Regional Bell Operating Companies (RBOCs). The decree initially prohibited the RBOCs from competing in these non-regulated activities, but allowed the companies to petition the court that supervised the decree for waivers.

The MFJ is a major victory for antitrust enforcement in many respects. The decree facilitated new competition that had been foreclosed by regulatory barriers, particularly in long distance communications and customer premises equipment. Consumers benefited from lower prices and the new competition promoted some innovations, such as fiber optic transmission and modems. However, the line-of-business restrictions imposed by the MFJ on the RBOCs arguably raised costs and slowed other innovation in the telecommunications industry. Temin (1995) concluded that the arbitrary division of local and long distance telecommunications service imposed by the MFJ created massive impediments to efficient operation of the network. Prieger (2002) exploits a brief episode of light regulation to demonstrate that the line-business-restrictions delayed the introduction of many information services. Hausman (1997) focuses on one of these services, voice messaging, and estimates that regulation caused delays that incurred significant consumer costs.

Some types of innovations require coordination between complementary businesses, which is impeded if the businesses are confined to separate companies. This adverse effect for investment parallels the Cournot complements effect for prices.[44] The MFJ compelled the independent operation of complementary activities such as local and long distance telecommunication services and likely deterred or slowed innovations that would have benefited from the integration of these complementary services. Moreover, some have argued that a behavioral remedy that emphasized interoperability could have achieved the procompetitive benefits from the MFJ without the disincentive effects from line-of-business restrictions.[45]

Administration of the MFJ encountered many of the same types of difficulties that plagued the FCC's attempts to respond to technological developments with its Computer I and II orders. The distinctions between many RBOC services that were allowed or prohibited by the MFJ, such as local and long distance telecommunications, evaporated as technology matured, yet the MFJ decree confined the RBOCs to narrowly defined local services. The court that administered the MFJ received over nine hundred waiver requests from these limitations (Shelanski and Sidak, 2001). Each request required extensive judicial review and by 1994 the average age of pending waiver requests had grown to more than four years. The review process harmed consumers because only a small fraction of the requests were ultimately denied by the court, but the process delayed the introduction of many services that had procompetitive benefits (Rubin and Dezhbakhsh, 1995).

The new AT&T and the RBOCs created by the MFJ continued to be subject to the separate subsidiary requirement for the provision of enhanced services imposed by the FCC's Computer II decision. The FCC responded to concerns that this structural separation reduced efficiency and innovation with its Computer III order in 1986.[46] The order abandoned the separate subsidiary requirement for advanced services provided that the RBOCs provide equal access to their regulated facilities. This required the RBOCs to unbundle their network elements and offer the unbundled elements at regulated wholesale rates.

The 1996 Telecommunications Act was a backlash to the line-of-business restrictions imposed by the MFJ and the burden that the decree imposed to evaluate waivers from its injunctions. The 1996 Act sought to facilitate local telecommunications competition along with competition for other services by continuing the equal access obligation established by Computer III, but the access conditions proved difficult to administer (Crandall, 2005). Furthermore, attempts to use the antitrust laws to compel RBOCs to offer assets necessary for rivals to compete at cost-based prices failed at the U.S. Supreme Court.[47]

The 1996 Telecommunications Act unleashed a merger wave with the result that the industry is now dominated by a few vertically integrated companies. It is conceivable that there would have been greater competition in telecommunications if the 1996 Telecommunications Act had preserved the structural separations in the 1984 Modified Final Judgment. Despite its many difficulties, the MFJ did succeed in opening the telecommunications industry to new competition that benefited consumers. But maintaining the separations mandated by the MFJ would have slowed innovation and continued the regulatory burden required to administer the decree's line-of-business restrictions.

What can we learn from regulation and deregulation of the telecommunications industry that is relevant to proposals to restructure the major digital platforms? Any analogy is necessarily flawed because the industries in which they operate are very different. AT&T clearly possessed durable monopoly power in local telecommunications services. The Bell System was an attractive target for

[44] The Cournot complements effect refers to equilibrium prices determined by independent suppliers of complements that exceed profit-maximizing prices chosen by an integrated firm. The underinvestment effect is not as general because it depends on the interaction between prices and the demand for product improvements. See Farrell and Katz (2000).

[45] Crandall (2001) notes that some countries successfully deregulated telecommunications monopolies without requiring structural divestitures. Weiser (2009) observes that interconnection agreements with the RBOCs facilitate wireless competition without excluding RBOCs from wireless services.

[46] Amendment of Sections 64.702 of the Comm'n's Rules and Regs. (Third Computer Inquiry), Report and Order, 104 F.C.C.2d 958, 24, 60 Rad. Reg.2d (P & F) 603 (1986).

[47] In Verizon Communs., Inc. v. Law Offices of Curtis V. Trinko, LLP, 540 U.S. 398 (2004), the U.S. Supreme Court held that an alleged refusal by an incumbent local exchange carrier to provide services to its rivals did not violate antitrust law under existing refusal-to-deal precedents. In Pac. Bell Tel. Co. v. linkLine Communs., Inc., 555 U.S. 438 (2009), the Court held that a local exchange provider was not obligated to set wholesale and retail prices that allowed rival service providers to operate profitably.

divestiture because the source of monopoly power (local exchange service) was relatively easy to identify and regulators had allowed AT&T to foreclose competition for potentially competitive products and services such as long distance telecommunications and customer premise equipment. In contrast, the digital platforms have not been shielded from competition by the actions of an industry regulator. Although some of the platforms have substantial market power in important sectors of the economy, whether they are durable monopolies on par with the pre-divestiture AT&T is less clear.

A determination of antitrust liability for monopolization would have to identify a market that has been monopolized – or has a high probability of becoming monopolized – and conduct that is an abuse of monopoly power. If antitrust liability can be established for a digital platform, the experience from telecommunications deregulation has useful lessons for the value of structural or functional separation to remedy the alleged abuse of market power. First, the telecommunications industry demonstrates that it is difficult to separate activities neatly into categories that are monopoly services and categories that are amenable to competition. Technological dynamics, such as those that operate in the internet economy, make this classification a daunting exercise without regard to whether it is based on the technologies that provide services or the functions provided by the services.

Second, technological developments can change line-of-business restrictions from apparently sensible protections against unfair competition to archaic rules that impede competition and innovation. Many regulatory interventions in telecommunications were motivated by concerns that existing line-of-business restrictions prevented the regulated firms from employing efficient practices and investing in new technologies or services. These interventions ultimately failed to accommodate new technological developments, which led to additional appeals to address regulatory failures. There is no reason to believe that it would be easier to justify line-of-business restrictions for the digital platforms or to expect that such restrictions would not require continuing modifications to avoid significant costs for competition and innovation.

Third, separation would require the definition and administration of terms under which firms that rely on monopoly services can gain access to those services. Experience with telecommunications deregulation demonstrates the difficulties associated with defining, monitoring, and enforcing conditions for equal access to facilities controlled by local telephone exchanges. It would not be any easier to determine fair, reasonable, and non-discriminatory access terms for monopoly services provided by digital platforms. Structural separation can facilitate the enforcement of non-discriminatory access; however, the models in this and other papers show that non-discriminatory access does not necessarily maximize consumer or total economic welfare.

Finally, the telecommunications industry ultimately re-established vertically integrated suppliers with substantial market power, despite efforts to lower barriers to new competition. It is likely that efforts to separate monopoly digital services from competitive activities that rely on these services would encounter similar forces to re-create vertically integrated digital platforms

The lessons from deregulation of the telecommunications industry teach that there are potential economic benefits from separating monopoly services from services that can be supplied in competitive markets, but there are also formidable obstacles to creating durable boundaries that do not interfere with competition and innovation. If policymakers advance a program to separate functions supplied by the dominant digital platforms, these lessons emphasize the importance of limiting structural or functional separation to services that: (a) are clearly defined monopoly bottlenecks that are unlikely to become disrupted by the advance of technology; (b) allow rules to be defined, monitored, and enforced for access to these bottlenecks that facilitate competition and innovation; (c) do not compromise incentives for competition or innovation as a consequence of the structural or functional separation; and (d) do not create incentives for dominant platforms to re-establish the organizational structures that created the competition concerns that motivated separation in the first place.

The dominant digital platforms have acquired products and services in the past that could be separated from their core activities. Examples include Google's acquisition of YouTube, Facebook's acquisition of Instagram, and Amazon's acquisition of Whole Foods. The platforms would have incentives to imitate some of these services if they were divested. Such imitation can be a source of innovation and product development that benefits consumers along with innovation and development by the divested entities.[48] Imitation can also result in wasted duplication, and it would have been easier and more effective to prevent these acquisitions in the first place than to divest them now. This emphasizes the importance of vigilant merger enforcement for the digital economy.

Amazon's private label sales could be separated from sales on its Merchant platform, but that would sacrifice benefits from private label competition and possibly stimulate reactions by Amazon that would harm independent merchants as well as consumers. Separation requirements such as firewalls can harm consumers by reducing competition that would otherwise occur between products sold by Amazon and independent merchants. Moreover, the cost of maintaining separate platforms for merchant and private label sales could cause Amazon to abandon sales of merchant products that compete with its proprietary products, which would have negative consequences for consumers and the excluded merchants (Hovenkamp, 2020).

The European Commission is at the vanguard of efforts to use antitrust law to enforce non-discriminatory access to digital platforms. In its Google Shopping enforcement decision, the Commission noted that "the Commission does not object to Google applying rich features to certain [search] results but to the fact that Google applies such rich features only to its own comparison shopping service and not competing comparison shopping ser-

[48] See, e.g., Caffarra et al. (2020).

vices."[49] The Commission ordered Google to devise a behavioral remedy that would give equal attention to rival shopping services in search results. Just as regulators struggled with RBOCs to determine equal access to local exchanges, the EC and Google have struggled with a remedy to give rival shopping services equal access to Google's search results. More than two years after the EC published its Google Shopping decision, its chief enforcer reported that Google's proposal to create a level playing field for rival comparison shopping services has not led to more traffic for its competitors.[50]

Structural separation of Google's search product from products that rely on search results is unlikely to be a more effective policy to address the conduct challenged by the EC in its Google Shopping decision. Separation would require a determination of the types of search results that Google may or may not provide, including specialized results such as product listings, maps, reviews, job notices, and travel information, and how and where they may be displayed on search engine results pages. Hashing out these distinctions would be a major task for the courts and would be further complicated as search engines and other platforms evolve in response to technological developments. An authority would have to monitor and enforce compliance with restrictions on Google's search platform. Courts are ill-suited to perform this type of industry management and oversight. The Federal Communications Commission aided the court in the administration of line-of-business restrictions for telecommunications imposed by the MFJ. Presently, there is no comparable body with the expertise and staff to perform a similar function for the digital platforms.

More recently, antitrust authorities and regulators have focused on Google's market power and conduct in the complex chain of services that link the demand to display advertisements on websites and apps to the supply of available spaces to display these ads.[51] Supply-side ad exchanges enable content publishers to offer available space in real time on the their websites or mobile applications to advertisers that bid for the rights to display ads on their properties.[52] Google dominates the business of automating the provision of inventory for display ads on third-party websites and apps and the company has a large presence in other online advertising services.[53]

Google's market power in display advertising intermediation services gives the company the ability to steer advertisers to its proprietary products, such as YouTube, which it has an incentive to do because then it does not have to share advertising acquisition fees with content publishers or other advertising intermediaries. Google allegedly has the incentive and ability to engage in conduct – including the design of its services, access to data and proprietary products, and bidding rules – that excludes or raises the cost of rivals in the digital advertising space.[54] As a consequence, competitors allegedly face obstacles to attracting business from advertisers or content publishers, advertisers and consumers pay higher prices, and publishers receive less revenue from their display ads.

It would be feasible to structurally or functionally separate Google's ad serving business for publishers of websites and apps from its other activities without undermining the company's internet business model. Google relies on revenues from advertisers to fund services that allow consumers to search the internet and view content without a financial charge. Google does not have to dominate the supply-side business of the automated management of available space for display advertising in order to generate advertising revenues for its proprietary products.

Although it is feasible to separate supply-side ad serving from other Google properties and services, separation could sacrifice significant efficiencies. The integration of supply-side ad serving with other Google activities gives the company the ability to monitor and add value to advertising services and Google's ownership of an extensive portfolio of digital advertising services can avoid or mitigate markups that would occur if independent firms offer these complementary services. Moreover, structural or functional separation would likely require restrictions to prevent Google from competing in these services and using its market power in search and video to exclude rivals. Even if separation were pursued to remedy anticompetitive conduct related to online advertising, antitrust oversight would continue to be necessary to address alleged abuses of market power, possibly reinforced by a specialized regulatory authority.

5. Conclusions

A handful of platforms wield substantial market power in the digital economy. A theme that resonates with legislators and antitrust enforcers is the ability of the platform owners to advantage their own products or services by distorting the information they display to consumers or by misusing information they obtain from firms that utilize their services. Key questions are whether these concerns can and should be addressed by antitrust enforcement or regulation and, if they should be addressed, whether remedies should require structural or functional separation or be limited to behavioral conditions.

There is no single formula to address concerns about the alleged abuse of market power by these platforms. Separation is an alternative to behavioral remedies of the type imposed by the European Commission in the Google Shopping case. These behavioral remedies have

[49] European Commission, Google Search (Shopping), CASE AT.39740, 27 June 2017, at ¶ 538.

[50] Foo Yun Chee and Victoria Waldersee, "EU's Vestager says Google's antitrust proposal not helping shopping rivals," Reuters, November 7, 2019, available at https://www.reuters.com/article/us-eu-alphabet-antitrust/eus-vestager-says-googles-antitrust-proposal-not-helping-shopping-rivals-idUSKBN1XH2I8.

[51] See Competition and Markets Authority (2019) and Geradin and Katsifis (2019) for a description of the services involved in the programmatic execution of online display advertising.

[52] Publishers also can contract directly with advertisers.

[53] The UK Competition and Markets Authority found that Google controls a share in excess of 90% of the UK ad server segment and has large shares of other supply-side and demand-side digital advertising services. Competition and Markets Authority (2019) at ¶ 53. Google disputes the CMA report's findings.

[54] See, e.g., Scott-Morton and Dinielli (2019).

accomplished little to restore competition that the EC alleged was harmed by Google's search algorithms. Separation has the potential to be a more effective remedy to restore competition allegedly harmed by the conduct of a platform owner, but separation raises many questions, including the platforms that require separation, the services that must be separated, the terms and governance of separation requirements, and procedures to evaluate appeals from line-of-business restrictions.

Structural separation is administratively feasible for some platform activities, such as the sale of merchant and proprietary products on Amazon's online retail platform or the separation of Google's Ad Manager from its other products and services. Some past acquisitions could be unwound. Functional separation is another alternative for some services. Amazon could establish an ethical wall between its proprietary sales and sales by independent merchants. However, structural or functional separation does not necessarily eliminate incentives for discrimination and Amazon's use of non-confidential information obtained from sales of products on its platform can benefit consumers. For many other platform services, it is unlikely that structural or functional separation would prove to be more consumer-friendly than the line-of-business restrictions imposed on AT&T by FCC regulation and the 1984 Modified Final Judgment, which ultimately collapsed under the weight of numerous waiver requests and were replaced by the 1996 Telecommunications Act.

Courts have avoided structural remedies in part because they are difficult to implement and potentially harm corporate, shareholder, and labor interests (Waller, 2009). Yet the threat to dissolve a corporate structure can deter some future anticompetitive conduct precisely because it has disruptive consequences. For separation to serve this deterrence function, it should punish conduct that has clear and substantial anticompetitive effects and is likely to be repeated in the future absent the threat of dissolution. However, the deterrence benefit from structural or functional separation is limited for digital platforms. There is disagreement about the conduct by digital platforms that warrants harsh punishment and about effective remedies for allegedly harmful conduct. Although antitrust liability and remedy are separate concepts, it is questionable whether conduct should be liable for antitrust enforcement if enforcers cannot fashion a workable remedy for the challenged conduct (Melamed, 2009). Furthermore, many of the alleged concerns related to conduct by the major digital platforms are specific to particular business models and therefore punishments would not necessarily deter other types of conduct by the platforms.

Antitrust is a critical enforcement tool despite the difficulties of crafting effective remedies to restore or deter anticompetitive conduct. Merger enforcement can and should prevent platforms from increasing their market power or using acquisitions to eliminate nascent competitors. Monopolization law can address abuses of monopoly power, which can occur at many different levels in the chain of activities engaged by digital platforms. Along with antitrust oversight from properly designed consent decrees, the threat of monetary penalties can be an effective deterrent for anticompetitive conduct, but they must be large enough to make the conduct unprofitable, which is not the case today.

Antitrust enforcement cannot solve all of the problems raised by the concentration of market power in the digital economy. Public policy for the digital economy requires a mix of institutional approaches, including regulations, to promote competition in ways other than structural or functional separation, such as by requiring platforms to share data that create a barrier to new competition, along with stronger antitrust enforcement to address abuses of market power.

The most important lesson for structural separation of the major digital platforms gained from the history of telecommunications deregulation and other reforms is the trade-off between encouraging competition and innovation. The breakup of AT&T into separate functional and geographic units imposed by the 1984 MFJ promoted competition in some sectors of the industry that had been highly regulated. The decree arguably also stifled some innovations by erecting a wall between local telecommunications services, long distance, and enhanced information services when technology was eroding the distinctions between these services. There are no simple structural solutions that both preserve the incentive and ability of platforms to innovate and protect rivals from the consequences of that innovation.

Appendix A. Discrimination without an outside retail option

As in Section 2.1, suppose that a platform serves two products and consumer search costs can be represented by the distance to the location of each product weighted by the factor t_i for $i = 1, 2$. To simplify, assume that the platform owns both products. Results are similar with partial vertical integration or structural separation. There are two cases to consider:

Case 1: $0 < v_i - c_i < 2t_i$ for $i = 1, 2$.

Given p_i, platform sales of product i correspond to

$$x_i = \frac{v_i - p_i}{t_i}$$

and the platform's profit-maximizing price is

$$p_i = \frac{1}{2}(v_i + c_i) \text{ for } i = 1, 2.$$

The platform's profit from both products is

$$\Pi = \sum_{i=1,2} \left[\frac{1}{4t_i}(v_i - c_i)^2 - \frac{1}{2}\theta\delta_i^2 \right]$$

where $t_i = t - \delta_i$. The platform's profit-maximizing investments to lower search costs satisfy

$$\delta_i(t - \delta_i)^2 = \frac{1}{4\theta}(v_i - c_i)^2 \text{ for } i = 1, 2.$$

The platform would bias search costs in favor of the product that has the larger net surplus, $v_i - c_i$.

Case 2: $v_i - c_i > 2t_i$ for $i = 1, 2$.

Under this assumption that platform sells to all consumers at prices $p_i = v_i - t_i$ for $i = 1, 2$. The platform's

profit is

$$\Pi = \sum_{i=1,2} \left[v_i - t_i - c_i - \frac{1}{2}\theta\delta_i^2 \right]$$

and its profit-maximizing investments to lower search costs satisfy

$$\delta_i = \min\left[\frac{1}{\theta}, t\right] \text{ for } i = 1, 2.$$

The platform invests to lower search costs by the same amount for both products in this case. A similar result would apply if, contrary to Assumption 3, $p_i^0 - c_i = d_i > 2t_i$. The platform would sell to all consumers at prices $p_i = p_i^0 - t_i$ and earn

$$\Pi = \sum_{i=1,2} \left[d_i - t_i - \frac{1}{2}\theta\delta_i^2 \right].$$

As in the case without an outside retail option, the platform would invest to lower search costs at the level $\delta_i = \min\left[\frac{1}{\theta}, t\right]$ for both products.

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