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Abstract

This paper develops a novel theory of harm for conglomerate mergers, grounded on a key feature of ecosystems – demand-side synergies from product integration or one-stop shopping. Generating heterogeneous synergies can soften competition and generate higher stand-alone prices, thereby harming consumers with limited synergies and possibly reducing total consumer surplus and social welfare. In contrast to traditional foreclosure theories, precommitment to tying may raise rivals' prices and profits. Furthermore, when markets are concentrated and products are highly differentiated, tying and pure bundling can emerge as de facto best-responses, even in the absence of precommitment.

Keywords: conglomerate mergers, consumption synergies, one-stop shopping benefits, tying and bundling, ecosystems.

JEL Classification Codes: D43, L13, L44

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1 Introduction

The past decade has seen a wave of high-profile conglomerate mergers, where the parties supply complementary or independent products to the same customer base.[1] This trend has been especially pronounced in the digital sector, as exemplified by Facebook's acquisition of WhatsApp for $22 billion in 2014, Google's merger with Motorola Mobility for $12.5 billion the same year, Dell's purchase of EMC for $67 billion in 2015, the 2019 merger between Nvidia and Mellanox for $6.9 billion and Microsoft's acquisition of Actvision for $75 billion launched in 2022.[2]

Historically, conglomerate mergers have been treated quite differently on the two sides of the Atlantic: in Europe, the European Commission (EC) blocked several transactions and imposed stringent remedies on others;[3] by contrast, U.S. antitrust agencies have not challenged a single one for nearly half a century.[4] More recently, however, the emergence of Big Tech giants and digital ecosystems has prompted revived interest around the world.[5]

The historical divergence between U.S. and E.U. treatments, as well as the recent revived interest, raise the question of identifying relevant theories of harm. Prompted by the Chicago critique of the monopoly leverage theory, the economic literature has developed a solid theory of horizontal foreclosure;[6] however, in practice antitrust agencies have often been unable to demonstrate parties' incentive and capability to foreclose.[7] The digital era moreover triggered calls for new approaches, accounting for key features

[1] These mergers are neither horizontal (the parties are not in the same markets) nor vertical (they are not at different levels of a supply chain). In antitrust circles, they are commonly referred to as conglomerate mergers – see, e.g., the European Non-Horizontal Merger Guidelines 2008 at para. 5. [In finance, "conglomerate" is a broader concept, which includes firms engaged in unrelated activities.]

[2] Some significant conglomerate mergers – e.g., Luxottica/Essilor (2018, €46 billion, frames and lenses) – have taken place outside the digital realm as well.

[3] The EC expressed concerns that so-called "portfolio effects" could reinforce the merging parties' market power to the detriment of rivals and consumers; see, e.g., the EC decisions in Coca-Cola/Amalgamated Beverages (IV/M.794, 1997), Coca-Cola/Carlsberg (IV/M.833, 1997), Guinness/Grand Metropolitan (1997), and Tetra Laval/Sidel (COMP/M.2416, 2001).

[4] This divergence is well illustrated by the 2001 General Electric/Honeywell merger, approved with minor adjustments in the U.S. but blocked by the European Commission.

[5] In the U.S., the F.T.C launched in 2020 an investigation of Facebook's past acquisitions (an intervention however dismissed in 2025 by a District Court); the 2023 revision of the agencies' merger guidelines moreover expands their scope to include conglomerate mergers. In the E.U., the EC blocked in 2023 the Booking/eTraveli merger; see EC decision in Booking Holdings / eTraveli Group (M.10615, 2023).

[6] See the discussion of the related literature.

[7] For example, the European Court of First Instance upheld the prohibition of the GE/Honeywell merger on appeal, but criticized the Commission's analysis of vertical and conglomerate effects. The European courts also overturned the prohibition of the Tetra Laval/Sidel merger.

of ecosystems.[8] We propose a step in that direction, based on one such feature, namely, the additional value that customers may enjoy when procuring multiple goods and services from the same supplier.[9] For instance, technological integration or commercial packaging may generate *consumption synergies*, and *one-stop shopping* may reduce transaction costs. Such synergies were for example a core motivation for AT&T's acquisition of DIRECTV,[10] and Nvidia's acquisition of Mellanox.[11] Other acquisitions by Big Tech giants, such as those of Instagram or WhatsApp by Facebook (now Meta), have also been portrayed as motivated by the desire to keep users within the ecosystem (or preventing rivals from doing so), by offering them the convenience of a wide portfolio of services.[12]

While these synergies create value for customers, they may also confer a competitive advantage on the merged entity at the expense of its rivals.[13] Our analysis confirms this tradeoff and puts it into perspective: when markets are initially competitive, these synergies generate Pareto improvements; by contrast, in less competitive markets they give rise to a novel theory of harm, which moreover does not require any precommitment to tying or bundling.[14]

We first consider a baseline setting featuring two markets with independent demands and single-product firms offering perfect substitutes.[15] A cross-market merger gives rise to a conglomerate that can offer a bundle generating consumption synergies. A key feature

[8]See, e.g., Stigler Committee (2019) and U.S. House Judiciary (2020) for the U.S., EC (2019), UK (2019) and Germany (2019); see, also, ACCC (2019) and OECD (2022).

[9]Supply-side synergies are often put forward as as a source of merger-specific efficiency gains; we focus instead on demand-side synergies.

[10]See FCC (2015) at §§ 146-150, which moreover discusses why "synthetic" bundles, based on independent firms' offerings, could not provide similar benefits. For instance, combining broadband and TV services enable consumers to rely on a single installation – a form of technical integration – a single bill – a form of commercial integration – and a single point of contact for customer service – a one-stop shopping benefit; see Katz (2014) for a detailed discussion.

[11]See the discussion in Section 2.1.

[12]In September 2011, before the acquisision of Instagram, Mark Zuckerberg expressed the concern that "[it] could easily add pieces [...] that copy what we're doing now"; see FTC (2021) at §84. In May 2018, after the acquisition, he called for cross-network bridges enabling the apps to "increasingly function as a single network in more respects"; see *TechCrunch* (April 21, 2025), reporting an internal memo introduced as trial exhibit in *FTC v. Meta Platforms* (2025).

[13]This trade-off was central to the first prohibition decision issued by the European Commission following the adoption of the European merger regulation in 1989; see Section 5.

[14]Almost all the classic horizontal foreclosure theories rely on precommitment. A notable exception is Choi, Jeon and Whinston (2025), who develop a novel theory of harm based on another feature of ecosystems, namely network effects; see the discussion of the related literature.

[15]Focusing on independent demands allows for a clear exposition of the analysis, which however applies as well to complementary products. It also carries over when one of the markets is monopolized.

is that, unlike supply-side synergies, these consumption synergies are customer-specific.[16] As a result, these synergies enable the conglomerate to sell the bundle at a premium, but also create product differentiation, which softens competition between the bundle and stand-alone offerings.

In the absence of tying or pure bundling, or if there remains multiple rivals in both markets, Bertrand competition among stand-alone offerings ensures that mix-and-match consumers can still buy at pre-merger prices. By revealed preferences, the merger thus benefits consumers who choose the bundle.

By contrast, in markets where the conglomerate faces a single rival *and* precommits itself to stop selling on a stand-alone basis, differentiation between the bundle and the stand-alone baskets confers market power on the rival, who becomes the sole alternative for mix-and-match consumers. This results into higher stand-alone prices, which harms mix-and-match consumers and can reduce total consumer surplus. This *raising rivals' prices* effect is exacerbated when both markets are concentrated, as a stand-alone rival then gains market power in each market. Furthermore, even with independent demands, the creation of consumption synergies and the resulting competition between the bundle and the stand-alone basket effectively generate a complementarity, not only for the conglomerate firm but also for its rivals. This, in turn, creates a double marginalization problem that further contributes to raising rivals' prices. Interestingly, and contrary to established theories of harm, rivals here *benefit* from the conglomerate's precommitment to tying or bundling, as this eliminates competition for mix-and-match consumers.

In this baseline setting with perfect substitutes, prohibiting tying or pure bundling constitutes an effective remedy. This is no longer the case, however, if the merging parties offer differentiated products. To see this, we progressively introduce product differentiation in three successive variants. In the first variant, one market is perfectly competitive whereas the other features a differentiated firm facing a competitive fringe – this setting can alternatively be interpreted as a monopolist facing an elastic demand, with the competitive fringe representing consumers' outside option. Post-merger, the conglomerate has an incentive to raise the stand-alone margin for its differentiated product, to foster the sales of the more profitable bundle. This harms mix-and-match consumers – and some of those opting for the bundle – even in the absence of any tying. The harm stems here purely from exploitation – the conglomerate cannot influence its rivals, which all keep offering their products at cost. Furthermore, as competition becomes less intense,

[16] The synergies generated by the AT&T/DIRECTV merger were empirically quantified by Berry and Haile (2014), who emphasize their heterogeneity.

the conglomerate increases its stand-alone price more rapidly than the bundle price, and eventually ceases to sell its differentiated products on a stand-alone basis. This shift to *de facto* tying or pure bundling emerges as an optimal response, even in the absence of any precommitment.

In the second variant, the first market remains competitive whereas the other features a differentiated duopoly. The increase in the conglomerate's stand-alone price prompts the rival to raise its price as well, further amplifying consumer harm. This effect is even stronger in the third variant, which features a differentiated duopoly in both markets. The merger then creates double marginalization – and can reduce total consumer surplus and social welfare – even in the absence of any precommitment.

When stand-alone products are themselves differentiated, the conglomerate merger has mixed effects on rivals. Higher stand-alone prices benefit rivals, but the introduction of the bundle attracts high-synergy consumers and thus reduces rivals' market shares. When the conglomerate continues to offer stand-alone products, the demand-shifting effect dominates, lowering rivals' profits. By contrast, when the conglomerate sells only the bundle and faces strategic rivals in both markets, the price-increasing effect can dominate and raise rivals' profits.

We then revert to our baseline setting of perfect substitutes to study situations in which consumers derive one-stop shopping benefits rather than consumptions synergies. A key difference is that the conglomerate can no longer charge a premium for the bundle, as consumers can obtain these benefits by buying (from the same supplier) on a stand-alone basis. Yet, the insights of the analysis of consumption synergies carry over – , with two notable exceptions in the absence of any precommitment to tying: (i) when one (and only one) market is duopolistic, the conglomerate now achieves the same outcome (and, thus, generates the same harm to consumers) as with precommitment; and (ii) when both markets are duopolistic, the conglomerate does not achieve the same outcome (the equilibrium is actually in mixed strategies) but the merger nevertheless raises (expected) prices and thus harms consumers. Thus, in both instances, the merger harms consumers even in the absence of *any* precommitment to tying or bundling, including mixed bundling.

The analysis yields clear policy implications for conglomerate mergers. Although such mergers can generate substantial consumption synergies, the conglomerate's ability to exploit these synergies can harm consumers. Prohibiting tying and pure bundling constitute an effective remedy as long as the conglomerate has an incentive to keep competing on a stand-alone basis; unfortunately, this is not the case when stand-alone offerings are themselves substantially differentiated.

Related literature

Horizontal foreclosure. The theories of harm primarily associated with conglomerate mergers rely on horizontal foreclosure, whereby a firm dominating one market seeks to exclude rivals in adjacent markets through practices such as tying or degraded interoperability.[17] Whinston (1990) shows that tying independent products allows a monopolistic incumbent to commit to a more aggressive response to entry, thereby deterring potential competitors. Additionally, with heterogeneous preferences for the tying product, commitment to tying can also remain an optimal strategy in the event of entry, as it increases the incumbent' profit at the expense of the entrant (see also Nalebuff, 2004). Carlton and Waldman (2002) show that tying complementary products can be optimal for an incumbent if entry into a secondary market facilitates subsequent entry into the primary market. Similarly, Choi and Stefanadis (2001) argue that tying can discourage rivals from investing and innovating. A common feature in this literature is that the ability to foreclose critically depends on a precommitment to tying.

Our analysis highlights a very different theory of harm, based on the exploitation of consumption synergies or one-stop shopping benefits, in which *de facto* tying or pure bundling can arise even in the absence of any precommitment. Furthermore, when tying or pure bundling does arise (either through a precommitment, or as an ex post optimal strategy), it *benefits* rivals whenever products are initially sufficiently differentiated.

Portfolio effects. Another strand of the literature focuses on double-marginalization issues in the pricing of complements (Cournot, 1838).[18] A merger of monopolized complements can eliminate double-marginalization, thereby reducing prices. When the merging firms operate in oligopolistic markets, however, the merger confers a pricing advantage on the conglomerate. Nalebuff (2000) and Choi (2008) respectively study the implications of pure and mixed bundling in this context. In both instances, the merger eliminates double marginalization for the bundle, which is priced more aggressively and gains market share at the expense of the rivals. This intensifies competition and results in lower prices both for the bundle and for the rivals' products,[19] but also into higher stand-alone prices for the conglomerate. As a result, mix-and-match consumers can be harmed. Furthermore, the reduction in rivals' market share may induce exit or weaken their investment incentives, thereby weakening competition in the future.

[17] For a detailed survey of the foreclosure literature, see, e.g., Rey and Tirole (2007).

[18] These issues were at the core of the portfolio effects underlying EC decisions in the late 90s and early 2000s. See, e.g., Church (2008) for a detailed survey.

[19] Matutes and Regibeau (1988) analyze firms' incentives to provide compatible components. They show that incompatibility – leading to de facto pure bundling – intensifies competition.

Our analysis departs from this strand of literature both in its theoretical findings and the policy implications. First, it does not rely on product complementarity and thus applies as well to mergers involving independent products. Rather than eliminating double marginalization, the merger then creates it – for the rivals – by transforming independent stand-alone products into complements. Second, although consumption synergies enable the conglomerate to gain market share, they also soften competition between the bundle and stand-alone offerings, potentially benefiting rivals. The policy implications differ as well. Choi (2008) finds that prohibiting *any* form of bundling may enhance consumer surplus and total welfare, by incentivizing the conglomerate to lower its stand-alone prices. Our analysis highlights instead a distinction between mixed and pure bundling. This is because offering a bundle – alongside stand-alone products – can benefit consumers with significant synergies. By contrast, a precommitment to tying or pure bundling can weaken competition and harm mix-and-matchers. Furthermore, while prohibiting pure bundling may alleviate these negative effects, such prohibition becomes ineffective when products are substantially differentiated, as the merged entity may still engage in *de facto* pure bundling by charging prohibitively high stand-alone prices.

Chen (1997) shows that a firm can benefit from a commitment to bundle its product with a good for which consumers have heterogeneous valuations, so as to differentiate itself from its rival and soften competition.[20] In our setting, differentiation stems instead from consumption synergies or one-stop shopping benefits, rather than bundling per se. Indeed, the merger can reduce consumer surplus or social welfare without any precommitment to pure bundling – and in the case of one-stop shopping benefits, this can arise even without mixed bundling.

Platforms and ecosystems. In the digital era, competition for consumer attention and data, combined with direct and indirect network effects, have prompted many platforms to expand the range of goods and services offered by their ecosystems, thereby contributing to a surge in conglomerate mergers. Our analysis highlights a theory of harm based on the resulting consumption synergies and one-stop shopping benefits. Several recent papers have started to develop theories of harm relying on other key features of digital platforms and ecosystems.

Rhodes and Zhou (2019) examine a conglomerate merger that allows the merged entity to influence *consumers' search* behavior (by forcing them to search all products or none).[21]

[20] Carbajo, de Meza, and Seidmann (1990) similarly demonstrate that bundling can soften competition, with its profitability depending on the nature of product-market competition.

[21] Nocke and Rey (2024) show that a monopolistic platform may also encourage consumers to search more products than they would wish by garbling the information provided to them.

They find that such mergers occur when search frictions are relatively low, leading to market segmentation and ultimately harming consumers. Heidhues, Köster, and Kőszegi (2024) show that a digital ecosystem's ability to *steer* consumers can harm innovation and consumers.

Cross-market *data* collection may also allow ecosystems to leverage their market power and exploit consumers.[22] Rhodes, Zhou, and Zhou (2025) show that cross-market data synergies can encourage a multiproduct ecosystem to innovate at the expense of its single-product rivals, and study in this context the impact of different data policies.

Choi, Jeon, and Whinston (2024) show that, when a monopolist in one market cannot fully extract consumer surplus, tying enables it to obtain an installed base advantage, at the expense of its rivals, in markets characterized by (direct) *network effects*. Interestingly, as in our paper, *de facto* tying can arise as an optimal strategy even in the absence of precommitment.

The remainder of the paper is organized as follows. Section 2 presents the baseline analysis. Section 3 examines the impact of product differentiation, whereas Section 4 turns to one-stop shopping benefits. Section 5 provides policy implications and Section 6 concludes the paper.

2 Baseline analysis

2.1 Setting

There are two markets, A and B, in which a cross-market merger may create a conglomerate.

• **Supply.** Pre-merger, each market $i = A, B$ is served by $n_i \geq 1$ identical single-product firms with constant unit cost $c_i \geq 0$. We focus on situations in which there exists *some* competition: $\max\{n_A, n_B\} \geq 2$. In what follows, A_h interchangeably refers to the h^{th} firm in market A, for $h = 1, \ldots, n_A$, or to that firm's specific offering; the same applies to B_k, for $k = 1, \ldots, n_B$, and we denote by $\{A_h, B_k\}$ the basket combining both stand-alone offerings. For exposition purposes, we use margins as strategic variables, and denote by ρ_i the lowest stand-alone margin charged in market i.

• **Demand.** There is a unit mass of consumers, each with a unit demand for each product. Specifically, consumers derive a homogeneous utility $u_i > c_i$ from consuming product $i =$

[22] See, for example, the analysis of data-driven mergers in Chen et al. (2022) and de Corniere and Taylor (2024).

A, B. For expository clarity, we focus on the case of independent demands: the aggregate utility obtained from consuming both products is $u = u_A + u_B$; however, the analysis also applies to the case of partial substitution (i.e., $u < u_A + u_B$) or complementarity (i.e., $u > u_A + u_B$).[23] Let $w_i \equiv u_i - c_i$ denote the welfare generated by product $i = A, B$ and $w = w_A + w_B$ total welfare.

• **Pre-merger benchmark**. Initially, Bertrand competition drives prices down to cost in non-monopolized markets; by contrast, a monopolist fully appropriates consumers' utility and thus obtains all the surplus generated by its product. The benchmark margin (and, thus, profit) in market $i = A, B$ is therefore:

$$\rho_i^* = \begin{cases} 0 & \text{if } n_i \geq 2, \\ w_i & \text{if } n_i = 1. \end{cases}$$

• **Conglomerate merger**. We will study the impact of a merger between two firms active in different markets, referred to as A_1 and B_1. The merger creates a conglomerate, denoted by M, which may keep offering products A_1 and B_1 on a stand-alone basis, but can also combine them into a bundle, denoted by $A_1 - B_1$. As a monopolist is necessarily involved in the merger, and all other firms initially obtain zero profit, the joint initial profit of the merging firms is equal to $\Pi_M^* = \rho_A^* + \rho_B^*$.

• **Consumption synergies**. The bundle generates consumption synergies — for example, through technological integration or commercial packaging. Specifically, a consumer's utility remains equal to u when purchasing products A and B separately from firm M, but increases to $u + s$ when purchasing the bundle. To illustrate, the stated motivation of the Nvidia/Mellanox merger was to integrate Nvidia's GPUs and Mellanox' interconnects to create new products such as the HGX, an integrated AI supercomputer platform.[24] We show in Section 4 that our main insights carry over to situations where purchasing both products from the same supplier may generate one-stop shopping benefits, even absent any technological integration or commercial packaging.

Consumption synergies vary among consumers and are distributed over $[0, \bar{s}]$, where $\bar{s} > 0$, according to a cumulative distribution function $F(s)$ with continuous density function $f(s)$ and monotone hazard rates. That is, the inverse and inverse reverse hazard rates,

$$h(s) \equiv \frac{1 - F(s)}{f(s)} \quad \text{and} \quad k(s) \equiv \frac{F(s)}{f(s)},$$

[23] Consumption synergies are, however, less likely to arise in the case of substitutes.

[24] See https://www.datagravity.dev/p/nvidias-10b-revenue-networking-business.

are respectively decreasing and increasing. These assumptions ensure that profit functions are quasi-concave; they are satisfied by most commonly used distributions.[25]

• **Bundling and tying**. M always offers the bundle,[26] but may stop offering any product on a stand-alone basis. The following bundling strategies are therefore available:

- mixed bundling: M continues to offer A and B on a stand-alone basis;
- tying: M stops offering the tying product on a stand-alone basis.
- pure bundling: M stops offering A and B on a stand-alone basis;

We will consider two policy regimes: under *laissez-faire*, M can adopt any bundling strategy; under a *ban* on tying (and, thus, pure bundling), M is instead required to continue offering A and B on a stand-alone basis, alongside the bundle. To be clear, in both regimes, M remains free to set its prices as desired. Hence, the ban prevents M from *precommitting* itself to a specific bundling strategy, but does not prevent it from engaging in *de facto* tying or pure bundling through prohibitively high stand-alone prices.

• **Timing**. Pre-merger, firms compete à la Bertrand: they set their prices simultaneously in the two markets, and consumers then observe all prices and make their purchasing decisions. Post-merger, two situations can be distinguished:

- under a ban on tying, firms compete again in prices, except that M now sets a price for the bundle in addition to the stand-alone prices for its two products;
- under laissez-faire, this price competition stage is preceded by a bundling stage in which M commits to one of the bundling strategies described above.

• **Notation**. Let δ denote the *additional* margin charged for the bundle, relative to the sum of pre-merger stand-alone margins $\rho_A^* + \rho_B^*$. Also, for $m = 0, 1, 2$, let $\hat{\sigma}_m$ denote the unique solution to $\phi_m(\hat{\sigma}_m) = 0$, where:

$$\phi_m(\sigma) \equiv h(\sigma) - \sigma - mk(\sigma). \tag{1}$$

The monotonicity of the hazard rates ensures that $\phi_m(\sigma)$ is decreasing in σ, from $\phi_m(0) = h(0) > 0$ to $\phi_m(\bar{s}) = -\bar{s} - mk(\bar{s}) < 0$; it is moreover decreasing in m for $\sigma > 0$. It follows

[25] See, for example, Bagnoli and Bergstrom (2005).

[26] If M did not offer the bundle, the conglomerate merger would have no effect. However, as we will see, M always benefits from offering the bundle.

that the thresholds are uniquely defined and satisfy:

$$0 < \hat{\sigma}_2 < \hat{\sigma}_1 < \hat{\sigma}_0 < \bar{s}. \tag{2}$$

2.2 No tying

We first consider the case where a ban prevents M from precommitting itself to tying or pure bundling. The following proposition characterizes the equilibrium outcome:

Proposition 1 (no tying) *In the absence of tying:*

(*i*) *Both products remain offered at pre-merger prices on a stand-alone basis:* $\rho_i^{**} = \rho_i^*$ *for* $i = A, B$*; the bundle is instead offered with an additional margin equal to* $\delta^{**} = \hat{\delta}_0 \equiv h(\hat{\sigma}_0)$.[27]

(*ii*) *Consumers with* $s > \sigma^{**} = \hat{\sigma}_0$ *purchase the bundle, whereas the others opt for stand-alone offerings.*

Proof. See Appendix A. ■

The underlying intuition is straightforward. When M enjoys a monopoly position, it has an incentive to maintain the maximal acceptable margin, as this not only appropriates consumer surplus but also relaxes the competitive pressure on the bundle; hence, $\rho_i^{**} = \rho_i^* = w_i$ whenever $n_i = 1$. Conversely, when M faces competition, the standard Bertrand argument ensures that every stand-alone firm has an incentive to undercut any positive margin charged by its rivals in order to attract consumers. Furthermore, due to the homogeneity among stand-alone product offerings, this argument applies to M as well: *slightly* undercutting rivals suffices to capture the stand-alone consumer segment and has only a negligible impact on bundle sales. It follows that stand-alone margins remain driven down to zero: $\rho_i^{**} = \rho_i^* = 0$ whenever $n_i > 1$.

Hence, regardless of the number of competitors in the two markets, M continues to earn the total pre-merger margin $\rho_A^* + \rho_B^*$ from mix-and-match consumers. In addition, it can charge a premium for the bundle. Specifically, if it charges an *additional* margin δ, then consumers with $s < \sigma = \delta$ adhere to stand-alone offerings, whereas those with $s > \sigma$ opt for the bundle. M's profit is therefore:

$$\Pi_M = \rho_A^* + \rho_B^* + \delta\left[1 - F\left(\sigma\right)\right] = \Pi_M^* + \pi\left(\sigma\right), \tag{3}$$

[27] By construction, $h(\hat{\sigma}_0) = \hat{\sigma}_0$. The adopted expression however facilitates the comparison with the outcome under laissez-faire. A similar comment applies to the use of $\hat{\Pi}_M\left(\sigma\right)$ in Corollary 1.

where

$$\pi(\sigma) \equiv \sigma [1 - F(\sigma)] . \tag{4}$$

The monotonicity of the hazard rate $h(\cdot)$ ensures that $\pi(\sigma)$ is strictly quasi-concave in σ and maximal at $\sigma = \hat{\sigma}_0$, the unique solution to the first-order condition $\phi_0(\sigma) = 0$.

It follows from Proposition 1 that the merger is both socially and privately beneficial. Let us define

$$\hat{\Pi}_M(\sigma) \equiv h(\sigma) [1 - F(\sigma)] ,$$

which is decreasing in σ. We have:

Corollary 1 (no tying or pure bundling) *In the absence of tying or pure bundling:*

(*i*) *mix-and-match consumers are unharmed, and all other consumers benefit from the merger;*

(*ii*) *M obtains a profit $\Pi_M^{**} = \Pi_M^* + \hat{\Pi}_M(\hat{\sigma}_0) > \Pi_M^*$, whereas its rivals continue to obtain zero profit.*

Proof. See Appendix B. ■

The merger is therefore strictly Pareto-improving: no consumer or rival is harmed, and the conglomerate shares the benefit of the synergies generated by the bundle with the consumers who purchase it. The impact on total consumer surplus, industry profit, and welfare (defined as the sum of consumer surplus and profits) is respectively given by:

$$\Delta S_0 \equiv \int_{\hat{\sigma}_0}^{\bar{s}} (s - \hat{\sigma}_0)\, dF(s) > 0, \;\; \Delta\Pi_0 \equiv \hat{\Pi}_M(\hat{\sigma}_0) > 0, \;\text{ and }\; \Delta W_0 \equiv \int_{\hat{\sigma}_0}^{\bar{s}} s dF(s) > 0.$$

2.3 Laissez-faire

We now turn to the case where M can precommit itself to no longer selling either product on a stand-alone basis. We will say that market $i = A, B$ is *monopolistic* if $n_i = 1$, *duopolistic* if $n_i = 2$, and *dispersed* if $n_i \geq 3$. The following proposition characterizes the equilibrium outcome:

Proposition 2 (laissez-faire) *Under laissez-faire:*

(*i*) *If no market is duopolistic, then M has no incentive to engage in any tying; both products remain offered at pre-merger prices on a stand-alone basis (i.e., $\rho_i^{**} = \rho_i^*$ for $i = A, B$), and M charges an additional margin $\delta^{**} = \hat{\delta}_0$ on the bundle.*

(*ii*) *If, instead, market i is duopolistic and market j is not, for some $i \neq j \in \{A, B\}$, then M stops selling product i on a stand-alone basis; as a result, the rival charges a margin $\rho_i^{**} = \hat{\rho}_1 \equiv k(\hat{\sigma}_1) > \rho_i^* = 0$, and M charges an additional margin $\delta^{**} = \hat{\delta}_1 \equiv h(\hat{\sigma}_1) > \hat{\delta}_0$ on the bundle. Specifically:*

a. *if market j is monopolized, then M ties product j to product i and continues charging the full margin on j;*

b. *if, instead, market j is dispersed, then M is indifferent between tying product j to i or engaging in pure bundling; either way, product j remains offered at cost on a stand-alone basis (i.e., $\rho_j^{**} = \rho_j^* = 0$).*

(*iii*) *Finally, if both markets are duopolistic, then M engages in pure bundling; in each market $i = A, B$, the rival charges a margin $\rho_i^{**} = \hat{\rho}_2 \equiv k(\hat{\sigma}_2) \in (\hat{\rho}_1/2, \hat{\rho}_1)$, and M charges a margin $\delta^{**} = \hat{\delta}_2 \equiv h(\hat{\sigma}_2) > \hat{\delta}_1$ on the bundle.*[28]

In each case, consumers with $s > \hat{\sigma}_m$ buy the bundle, whereas the others stick to stand-alone offerings, where m denotes the number of duopolistic markets.

Proof. See Appendix C. ■

The intuition is as follows. If M has a monopoly in some market $i = A, B$, then it continues to offer the stand-alone product and charges the full margin (i.e., $\rho_i = w_i$), as doing so captures all the surplus without exerting any competitive pressure on the bundle. If, instead, M faces a competitive fringe, then stand-alone prices remain driven down to cost (i.e., $\rho_i = 0$), regardless of M's bundling strategy. Thus, if neither market is duopolistic, the equilibrium coincides with that under a ban on tying.

Consider now a duopolistic market. If M continues to offer the product on a stand-alone basis, prices are again driven down to cost, which yields zero profit and exerts an intense competitive pressure on the bundle. By committing itself not to offer the product on a stand-alone basis, M can instead confer market power on its rival, who becomes the only supplier available to mix-and-match consumers and can therefore raise its price above cost. This *raising rival's price* effect, in turn, relaxes the competitive pressure on the bundle. Hence, in equilibrium, M stops selling the product on a stand-alone basis.

If both markets are duopolistic, M engages in *pure bundling*. If only one market is duopolistic, M withdraws from that market but may remain active in the other. Specifically, if M enjoys a monopoly in the other market, it is profitable – by the argument

[28]When both markets are duopolistic, $\rho_A^* = \rho_B^* = 0$; hence, the additional margin $\delta^{**} = \hat{\delta}_2$ constitutes here the total margin on the bundle.

above – to continue offering that product on a stand-alone basis, making tying the unique optimal strategy. If instead the other market is served by a competitive fringe, M is indifferent between withdrawing from that market (pure bundling) and remaining active (tying the competitive product to the duopolized one).

It follows that, in equilibrium, stand-alone prices rise whenever at least one market is duopolistic, and they rise more sharply as the number of duopolistic markets increases: $2\hat{\rho}_2 > \hat{\rho}_1 > 0$. Taking advantage of the relaxed pressure on the bundle, M increases both its market share ($\hat{\sigma}_2 < \hat{\sigma}_1 < \hat{\sigma}_0$, from (2)) and the additional margin it charges on the bundle ($\hat{\delta}_2 > \hat{\delta}_1 > \hat{\delta}_0$, where the inequalities follow from $\hat{\delta}_i = h(\hat{\sigma}_i)$ and the monotonicity of the hazard rate $h(\cdot)$).

From Proposition 2, the merger remains Pareto-improving as long as no market is duopolistic. By contrast, in any duopolistic market, M stops selling on a stand-alone basis, thereby conferring market power on its rival. As a result, prices and profits rise at the expense of consumers. Let us define

$$\hat{\Pi}_R(\sigma) \equiv k(\sigma) F(\sigma),$$

which is increasing in σ (as $k(\cdot)$ and $F(\cdot)$ are both positive and increasing). We have:

Corollary 2 (laissez-faire) *Under laissez-faire, the merger remains Pareto-improving if no market is duopolistic. If, instead, $m \in \{1,2\}$ markets are duopolistic, then:*

(i) Consumers with synergies $s < \hat{\delta}_m$ are harmed, whereas those with $s > \hat{\delta}_m$ benefit from the merger.

(ii) M obtains a profit equal to $\Pi_M^{**} = \Pi_M^* + \hat{\Pi}_M(\hat{\sigma}_m) > \Pi_M^*$, whereas its rivals continue to obtain zero profit in any dispersed market; by contrast, in any duopolistic market, M's rival obtains $\Pi_R^{**} = \hat{\Pi}_R(\hat{\sigma}_m) > 0$.

Proof. See Appendix D. ■

Whenever M faces a single rival in some market (i.e., $m \in \{1,2\}$), it withdraws from that market, which enables the rival to raise its price and harms mix-and-match consumers. By continuity, some consumers who purchase the bundle are also harmed: as $\hat{\delta}_m = \hat{\sigma}_m + m\hat{\rho}_m > \hat{\sigma}_m$, all consumers with $s \in (\hat{\sigma}_m, \hat{\delta}_m)$ are worse off despite choosing the bundle. Moreover, as the number of duopoly markets increases, all consumers face higher prices – mix-and-match consumers face $2\hat{\rho}_2 > \hat{\rho}_1$, and those opting for the bundle face a larger additional margin $\hat{\delta}_2 > \hat{\delta}_1$. As a result, more consumers are harmed, those who are harmed lose more, and those who benefit gain less. The effect on total consumer surplus can be written as:

$$\Delta S_m \equiv \int_{\hat{\sigma}_m}^{\bar{s}} (s - \hat{\delta}_m) dF(s) - m\hat{\rho}_m F(\hat{\sigma}_m) = \int_{\hat{\sigma}_m}^{\bar{s}} (s - \hat{\sigma}_m) dF(s) - m\hat{\rho}_m,$$

which satisfies

$$\Delta S_2 < \Delta S_1 < \Delta S_0.$$

Withdrawing from a duopolistic market enables the rival to earn a positive profit; it moreover allows M to increase its own profit, through the raising rivals' prices effect. Furthermore, when both markets are duopolistic, rivals face a double-marginalization problem: because consumers choose between the basket of stand-alone products and the bundle, rivals' offerings become complements. As a result, as the number of duopolistic markets increases, M enjoys higher profits whereas rivals' individual profits fall (but remain positive):

$$\hat{\Pi}_M(\hat{\sigma}_2) > \hat{\Pi}_M(\hat{\sigma}_1) > \hat{\Pi}_M(\hat{\sigma}_0) \quad \text{and} \quad \hat{\Pi}_R(\hat{\sigma}_1) > \hat{\Pi}_R(\hat{\sigma}_2) > 0,$$

where the inequalities stem from (2) and the monotonicity of $\hat{\Pi}_M(\cdot)$ and $\hat{\Pi}_R(\cdot)$.

Interestingly, however, the merger's positive impact on total industry profit, $\Delta\Pi_m \equiv \hat{\Pi}_M(\hat{\sigma}_m) + m\hat{\Pi}_R(\hat{\sigma}_m)$, increases with the number of duopolistic markets m:

$$\Delta\Pi_2 > \Delta\Pi_1 > \Delta\Pi_0 \,(> 0).$$

That $\Delta\Pi_1 = \hat{\Pi}_M(\hat{\sigma}_1) + \hat{\Pi}_R(\hat{\sigma}_1) > \Delta\Pi_0 = \hat{\Pi}_M(\hat{\sigma}_0)$ follows directly from $\hat{\Pi}_M(\hat{\sigma}_1) > \hat{\Pi}_M(\hat{\sigma}_0)$ and $\hat{\Pi}_R(\hat{\sigma}_1) > 0$. To see that $\Delta\Pi_2 > \Delta\Pi_1$, note that every consumer pays a higher price when both markets are duopolistic.[29] Consumers with $s < \hat{\sigma}_2$ pay $2\hat{\rho}_2 > \hat{\rho}_1$ for stand-alone products; those with $s > \hat{\sigma}_1$ face a higher additional margin $\hat{\delta}_2 > \delta_1$ on the bundle; and consumers with $s \in (\hat{\sigma}_1, \hat{\sigma}_2)$, who pay $\hat{\rho}_1$ for a stand-alone product when only one market is duopolistic, instead pay $\hat{\delta}_2 > \hat{\rho}_1$ for the bundle when both are duopolistic.[30]

Finally, the impact on total welfare, $\Delta W_m \equiv \Delta S_m + \Delta\Pi_m$, is positive and can be expressed as

$$\Delta W_m \equiv \Delta S_m + \Delta\Pi_m = \int_{\hat{\sigma}_m}^{\bar{s}} s dF(s) > 0,$$

[29] Because the market is fully covered (as $\hat{\sigma}_m < \bar{s}$), industry profits are strictly increasing in prices.

[30] The inequality stems from the definitions of $\hat{\rho}_1$ and $\hat{\delta}_2$, which together imply $\hat{\delta}_2 = h(\hat{\sigma}_2) > h(\hat{\sigma}_1) = \hat{\sigma}_1 + k(\hat{\sigma}_1) > k(\hat{\sigma}_1) = \hat{\rho}_1$ (where the first inequality stems from (2) and the monotonicity of $h(\cdot)$).

which satisfies $\Delta W_2 > \Delta W_1 > \Delta W_0$. Because demand is inelastic, total welfare increases with the number m of duopoly markets, as more consumers are induced to switch to the bundle. Conversely, welfare could be reduced if demand were elastic.

The above analysis can be summarized as follows. If none of the markets is duopolistic, the merger is Pareto-improving, benefiting both consumers and the industry. By contrast, in duopolistic markets, M stops selling on a stand-alone basis, which induces its rivals to raise their prices and harms consumers with low synergies. Depending on the distribution of synergies, total consumer surplus may decrease, as illustrated by the following example.

• *Illustrative examples.* When synergies are uniformly distributed (i.e., $F(s) = s/\bar{s}$), for instance, the equilibrium outcome under pure bundling is such that:[31]

$$\begin{aligned}
\hat{\sigma}_0 &= \frac{\bar{s}}{2},\ \hat{\delta}_0 = \frac{\bar{s}}{2},\ \hat{\rho}_0 = 0 \text{ and } \Delta S_0 = \frac{\bar{s}}{8} > 0, \\
\hat{\sigma}_1 &= \frac{\bar{s}}{3},\ \hat{\delta}_1 = \frac{2\bar{s}}{3},\ \hat{\rho}_1 = \frac{\bar{s}}{3} \text{ and } \Delta S_1 = -\frac{\bar{s}}{9} < 0, \\
\hat{\sigma}_2 &= \frac{\bar{s}}{4},\ \hat{\delta}_2 = \frac{3\bar{s}}{4},\ \hat{\rho}_2 = \frac{\bar{s}}{4} \text{ and } \Delta S_2 = -\frac{7\bar{s}}{32} < \Delta S_1.
\end{aligned}$$

Suppose now that synergies are distributed over $[0, 1]$ according to $F(s) = s^\alpha$. To ensure the monotonicity of the hazard rates, we restrict attention to $\alpha \geq 1$ (the boundary case $\alpha = 1$ corresponds to a uniform distribution).[32] As α decreases, the distribution puts more weight on low synergies, making it more likely that the total impact on consumers is negative. Indeed, in the admissible range $\alpha \geq 1$, we have:

$$\Delta S_1 < 0 \iff \alpha < \hat{\alpha}_1 \simeq 3.02 \text{ and } \Delta S_2 < 0 \iff \alpha < \hat{\alpha}_2 \simeq 13.02.$$

Remark 1 (merger dynamics) *We have focused on a single conglomerate merger and ignored the possibility of subsequent counter-mergers. It is however straightforward to check that a second conglomerate merger would not be profitable: it would replicate the product portfolio of the first conglomerate and trigger Bertrand competition among bundles as well; hence all profits would drop to zero.*

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[31] See Online appendix A.

[32] The reversed hazard rate $k(\cdot)$ is increasing for any $\alpha > 0$; by contrast, the hazard rate $h(\cdot)$ is *not* decreasing for $\alpha < 1$ and small values of s (specifically, for $s < (1-\alpha)^{1/\alpha}$).

3 Differentiated products

In the baseline analysis, in the absence of tying a conglomerate merger has no anti-competitive effects, even when markets are concentrated. This finding however relies critically on the assumption that competing firms offer perfect substitutes: to win the competition for mix-and-matchers, the conglomerate thus only needs to slightly undercut its rivals, which has no material impact on the sales of its bundle. The standard Bertrand unraveling argument then ensures that stand-alone prices remain at cost in all non-monopolized markets. By contrast, when firms offer differentiated products, gaining market share on a stand–alone basis requires more substantial price cuts; it follows that the conglomerate cannot compete for mix-and-matchers without cannibalizing the sales of the bundle. As the bundle is more profitable, the merger limits the conglomerate's incentive to compete for mix-and-matchers, and stand-alone prices may increase even in the absence of any precommitment to tying.

To see this, we analyze three variants of the baseline setting, in which we progressively account for product differentiation and market concentration. For the sake of exposition, we focus on non-monopolized markets: $n_A, n_B \geq 2$ in all variants. For tractability, we moreover assume that consumption synergies are uniformly distributed over $[0, \bar{s}]$: $F(s) = s/\bar{s}$.

In variants V_1 and V_2, we introduce horizontal differentiation in market A: consumers are uniformly distributed along a unit-length Hotelling segment, with A_1 located at one end and rival(s) A_2 at the other end. Specifically, in V_1, A_1 faces a competitive fringe whereas in V_2 it faces a single strategic rival.

In variant V_3, we introduce horizontal differentiation in market B as well; specifically, both markets feature a similar Hotelling duopoly, with $\{A_1, B_1\}$ located at one end of the segment and $\{A_2, B_2\}$ at the other end, and consumer preferences perfectly correlated across markets. When studying this variant, we moreover focus on equilibria that are symmetric across markets, namely, in which stand-alone firms charge the same margins in both markets, and the conglomerate's own stand-alone margins are also the same in both markets.[33]

[33] To be clear, we consider "true" equilibria, which resist unilateral deviations as well as multilateral asymmetric deviations by the conglomerate.

3.1 No tying

We first consider the case in which the conglomerate cannot commit itself to any form of tying. We provide a detailed analysis in Online appendix B and only present here the main insights.

Let $\tau \equiv t/\bar{s}$ denote the ratio of horizontal to vertical differentiation parameters. The following proposition summarizes the equilibrium outcomes:

Proposition 3 *In the absence of tying, in variants V_1 and V_2, there exists a unique equilibrium, and in variant V_3 there exists a unique symmetric equilibrium, which moreover converges to the baseline outcome as τ tends to zero.*[34] *Furthermore, there exists $\hat{\tau}_1 > \hat{\tau}_2 > \hat{\tau}_3 > 0$ such that, for every variant V_i:*

(i) if $\tau < \hat{\tau}_i$, then M engages in true mixed bundling: it remains active on a stand-alone basis, but raises the stand-alone price of its differentiated product(s) above the pre-merger level;

(ii) if, instead, $\tau \geq \hat{\tau}_i$, then M engages in de facto pure bundling: it charges prohibitively high stand-alone margins and effectively sells only the bundle.

The underlying intuition is most easily illustrated using V_1, in which market B is perfectly competitive, whereas in the other market a differentiated A_1 faces a competitive fringe A_2. As products A_2 and B remain always available at cost on a stand-alone basis, this variant can be interpreted as a monopolist (A_1 pre-merger and M post-merger) facing an elastic demand (with A_2 and B reflecting consumers' outside option).

Pre-merger, A_1 charges $\alpha_1^b \equiv t/2$, serves consumers located at a distance $x \leq \hat{x}^b \equiv 1/4$, and earns a profit equal to $\pi^b \equiv t/8$. Post-merger, M offers the bundle $A_1 - B$ with a margin μ, as well as A_1 on a stand-alone basis with a margin α_1. Consumers thus face three options: the bundle, yielding a net utility $w + s - \mu - tx$ for a consumer located at distance x from A_1, the basket $\{A_1, B\}$, yielding $w - \alpha_1 - tx$, and the competitive basket $\{A_2, B\}$, yielding $w - t(1 - x)$. It follows that consumers with

$$x < \hat{x} \equiv \frac{1}{2} - \frac{\alpha_1}{2t}$$

[34] Uniqueness refers here to the prices of those products that are indeed sold in equilibrium. In the case of *de facto* pure bundling, any high enough stand-alone margins can be supported in equilibrium.

favor $\{A_1, B\}$ on a stand-alone basis, but opt for the bundle if the associated synergy is sufficiently high, namely, if

$$s \geq \sigma_1 \equiv \mu - \alpha_1.$$

In contrast, consumers with $x > \hat{x}$ favor $\{A_2, B\}$ on a stand-alone basis and opt for the bundle if $s \geq \sigma_2(x) \equiv \sigma_1 + 2t(x - \hat{x})$.

As long as $\sigma_1 > 0$, M remains active on a stand-alone basis (true mixed bundling); the resulting market segmentation is illustrated by Figure 1.

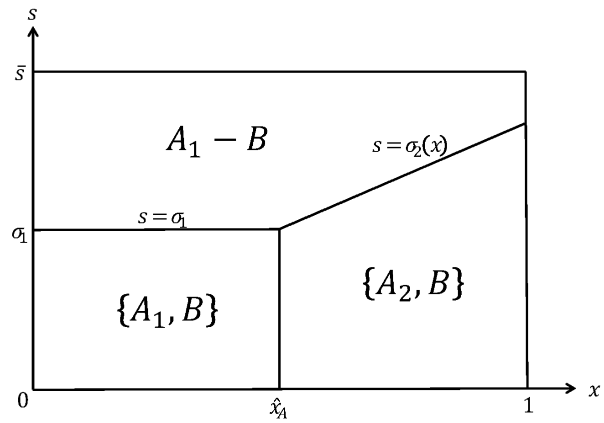

Figure 1: Mixed bundling

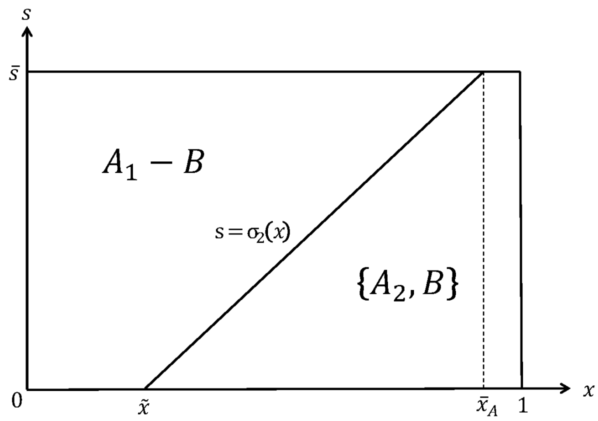

Figure 2: Pure bundling

When setting its stand-alone margin, α_1, M faces two issues: competing for mix-and-matchers and fostering the sales of the bundle, which benefits from a margin premium $\mu - \alpha_1 \, (= \sigma_1)$. While the first issue involves a classic trade-off between margin and volume, the second one creates an additional incentive to raise the stand-alone margin, so as to encourage consumers who favor M on a stand-alone basis to switch to the bundle. As a result, M sets a higher stand-alone margin than pre-merger: $\alpha_1^* = 2t/3 > \alpha_1^b = t/2$.

As t increases, the incentive to raise the stand-alone margin is exacerbated, as the loss of market share among mix-and-matchers is more limited. As a result, the impact of the merger on the stand-alone margin is itself increasing in t. By contrast, the bundle margin μ^* is primarily driven by the magnitude of the synergies, reflected by the upper bound $\bar{s}$: $\mu^* = \bar{s}/2 + t/24$. It follows that, for t sufficiently large, namely $\tau > \hat{\tau}_1 = 3/2$, the equilibrium margin α_1^* exceeds μ^*, implying that no consumer buys A_1 on a stand-alone basis (as $\sigma_1^* = \mu^* - \alpha_1^* < 0$). That is, M then charges a prohibitively high stand-alone margin and *de facto* engages in pure bundling, leaving consumers to choose between the bundle $A_1 - B$ and the rivals' basket $\{A_2, B\}$, as illustrated by Figure 2.

It is worth noting that *de facto* pure bundling is solely driven by the cannibalization concern; in particular, it constitutes M's optimal pricing strategy (i) without any pre-commitment to tying or pure bundling, and (ii) without any strategic consideration about the rivals, whose behavior remains unchanged – they price at cost, no matter what.

In V_2, M faces more limited competition in market A, which encourages it to raise further the stand-alone margin α_1. And in V_3, M not only faces more limited competition in both markets, but its rivals moreover face a double marginalization problem,[35] which results into even higher stand-alone margins. As a result, as markets become more concentrated, *de facto* pure bundling emerges for lower values of τ: $\hat{\tau}_3 < \hat{\tau}_2 < \hat{\tau}_1$.

The welfare effects of the conglomerate merger are summarized below:

Corollary 3 *In all three variants, the merger increases M's profit and total industry profit but harms some consumers. In Variants V_1 and V_2, it nevertheless increases total consumer surplus and social welfare. By contrast, in Variant V_3, where the merger raises all stand-alone prices:*

(i) *in case of mixed bundling (i.e., for $\tau < \hat{\tau}_3$), it increases consumer surplus and total social welfare but reduces rivals' profits;*

(ii) *in case of pure bundling (i.e., for $\tau \geq \hat{\tau}_3$), there exists $\tau_W > \tau_R > \tau_S\,(> \hat{\tau}_3)$ such that that the merger:*

- *reduces consumer surplus if and only if $\tau > \tau_S$;*
- *increases rivals' profits if and only if $\tau > \tau_R$;*
- *reduces social welfare if and only if $\tau > \tau_W$.*

In all variants, the merger raises A_1's stand-alone margin; it thus harms all consumers favoring A_1 pre-merger and sticking to stand-alone baskets post-merger; by continuity, it also harms some consumers favoring A_1 pre-merger and switching to the bundle (namely, those with limited synergies). In V_3, M's desire to foster the sales of the bundle, together with limited competition in both markets and rivals' double marginalization problem, lead to higher stand-alone prices for all products. As a result, more consumers are harmed and, when competition is already limited (i.e., for t large, for a given $\bar{s}$), the merger reduces total consumer surplus.

[35] Unlike the baseline setting, double marginalization arises here even when M sticks to (true) mixed bundling.

The merger is always profitable, as it enables M to offer the more attractive bundle, and by construction it has no impact on fringe rivals, who always price at cost. The impact on strategic rivals is more ambiguous. On the one hand, they benefit from M's higher stand-alone prices; on the other hand, the bundle attracts away consumers with high synergies. In V_2, the latter effect always dominates: the merger always reduces A_2's profit. In V_3, the same holds true as long as M remains active on a stand-alone basis (true mixed bundling, for $\tau < \hat{\tau}_3$). By contrast, when M focuses on the bundle, the latter effect is more limited, and the price-increasing effect dominates for τ high enough (i.e., $\tau > \tau_R$) – hence, this occurs when the impact on stand-alone prices is particularly strong, implying that consumers are harmed (i.e., $\tau_R > \tau_S$).

Finally, it can be checked that, in all three variants, the merger increases total industry profit, even when it harms rivals. Hence, whenever it also increases total consumer surplus, it increases social welfare as well. By contrast, in V_3, for τ large enough, the negative impact on consumers dominates and the merger reduces social welfare. This is all the more remarkable that we assume throughout the analysis that the market remains entirely covered, implying that all consumers keep buying both products. Hence, the only welfare distortion comes from inducing consumers to switch away from their preferred stand-alone product – as a result, this occurs for a particularly high values of τ, namely, $\tau > \tau_W$ $(> \tau_R, \tau_S, \hat{\tau}_3)$. The impact on social welfare would more likely to be negative if total demand were elastic.

Corollary 3 shows that a conglomerate merger can harm consumers or society even in the absence of any precommitment to tying. First, M's desire to foster the sales of the bundle suffices to raise its own stand-alone margin(s), even in the absence of any strategic motive. This is indeed the case in V_1, in which M faces a competitive fringe in market A and market B is perfectly competitive. Second, when competition is already initially weak, the merger raises all stand-alone margins, and can then reduce total consumer surplus as well as social welfare. This is indeed the case when both markets are concentrated (as in V_3) and τ is large enough, that is, products are substantially differentiated (t large) or synergies are limited ($\bar{s}$ small). Interestingly, this occurs only when M engages in *de facto* pure bundling. This echoes the findings of the baseline setting, with the important difference that remedies prohibiting tying or pure bundling would be ineffective, as, even in the absence of any precommitment, the conglomerate has here the ability *and* the incentive, *ex post*, to charge prohibitively high stand-alone margins (a form of constructive refusal).

3.2 Pure bundling

We now consider the case in which M is allowed to precommit itself. This is relevant only for variants V_2 and V_3, in which such precommitment may affect the behavior of strategic rival(s),[36] and for τ sufficiently small – otherwise, from Proposition 3, M has anyway an incentive to charge prohibitively high stand-alone margins. Furthermore, in V_2, the relevant options are tying B to A and pure bundling, and they are equivalent– not offering B on a stand-alone basis is meaningless, as fringe rivals keep offering B at cost anyway. And in V_3 we have seen that in the absence of precommitment – as well as in the baseline setting for the same double duopoly market structure, when allowing for precommitment – the relevant bundling strategy is pure bundling. Building on these observations, for exposition purposes we study here the scenario in which M commits to pure bundling. We provide a complete analysis in Online Appendix C and briefly summarize the main insights here.

Proposition 4 *Under a precommitment to pure bundling, in Variants V_2 and V_3 there exists a unique equilibrium, which moreover converges to the baseline outcome as τ tends to zero. Furthermore, in the relevant range $\tau < \hat{\tau}_i$, where mixed bundling would arise in the absence of precommitment, M always find it profitable to commit to pure bundling in V_3, whereas in V_2 it finds it profitable only for $\tau < \tilde{\tau}_M$, where $\tilde{\tau}_M \in (0, \hat{\tau}_2)$. In addition, whenever profitable, precommitment increases social welfare and:*

(i) in V_3, it raises all prices, which benefits rivals at the expense of all consumers;

(ii) in V_2, there exists $\tilde{\tau}_S$ and $\tilde{\tau}_R$, satisfying $0 < \tilde{\tau}_S < \tilde{\tau}_R \simeq \tilde{\tau}_M$, such that total consumer surplus is reduced if and only if $\tau < \tilde{\tau}_S$, whereas the rival is better-off as long as $\tau < \tilde{\tau}_R$.

From Proposition 3, for low values of τ, M has an incentive to remain active on a stand-alone basis. By precommitting itself to pure bundling, M confers additional market power on any strategic rival, thereby encouraging it to raise its stand-alone price and reducing in this way the competitive pressure on the bundle. This, however, comes at the cost of foregoing the profit from stand-alone sales, stemming from mix-and-match consumers with low synergies from the bundle. When τ is very small, competition for mix-and-matchers is intense and the resulting profit is therefore quite low. As a result, the benefit from raising rivals' price outweighs the loss from foregone stand-alone sales. Consequently,

[36] In V_1, M cannot benefit from precommitting itself, as all other firms keep pricing at cost anyway.

precommitment increases the profits of both M and its rivals while reducing consumer surplus, as in the baseline setting. By contrast, for larger values of τ, competition for mix-and-matchers is less intense, and the cost of foregoing stand-alone sales may prevail.

The net effect differs across the two variants. In V_2, precommitment confers market power on the rival in only one market; in V_3, it does so in both markets, and moreover creates a double marginalization problem among the rivals. It follows that the raising rivals' prices effect is more pronounced in the latter variant, to the point that precommitment is always profitable. Rivals moreover always benefit as well, whereas consumers are all harmed. By contrast, in V_2, where the raising rivals' price effect is more limited, precommitment is profitable only for τ low enough, and it reduces total consumer surplus only for τ particularly low – i.e., for environments close to our baseline setting.

In our full participation setting, precommitment always increases social welfare; this is because it fosters the sales of the bundle and thus generates more synergies. In environments with elastic participation, the raising rivals' prices effect may however limit consumer participation and generate a loss of welfare.

4 One-stop shopping benefits

Our analysis has so far focused on consumption synergies arising from technological or commercial integration, which require consumers to purchase the bundle. In many situations, procuring multiple products or services from the same supplier reduces transaction costs, even on a stand-alone basis. A key distinction is that, when consumption synergies are specifically derived from the bundle, the conglomerate can charge a premium. By contrast, in the case of one-stop shopping benefits, the conglomerate cannot charge more to one-stop shoppers.[37] Yet, merger can still harm consumers – even in the absence of *any* tying or bundling, including mixed bundling.

To see this, we consider the same setting as in Section 2, but now assume that, when purchasing A and B from the same supplier, even on a stand-alone basis, consumers derive a one-stop shopping benefit b, distributed according to the same distribution $F(\cdot)$ as before. The stand-alone basket $\{A_1, B_1\}$ thus constitute a perfect substitute for the bundle, which can no longer be sold at a premium. Pre-merger, no firm can offer one-stop shopping benefits, and the analysis thus coincides with that of the baseline setting. We now examine the effect of a merger between A_1 and B_1. We start with a strict regulatory

[37] Loyalty programs may indirectly target one-stop shoppers, but do not enable the conglomerate to charge a premium either.

regime in which even mixed bundling is prohibited, before turning to a laissez-faire regime in which M may commit to tying or (mixed or pure) bundling.[38]

4.1 No tying or bundling

Suppose that M is prohibited from engaging in any form of tying or bundling, including mixed bundling. The following proposition characterizes the equilibrium outcome:

Proposition 5 (one-stop shopping benefits – no tying or bundling) *In case of one-stop shopping benefits and in the absence or any tying or bundling:*

- (i) *If at least one market is dispersed (i.e., $n_i \geq 3$ for some $i = A, B$), both products continue to be offered at pre-merger margins on a stand-alone basis (i.e., $\rho_j^{**} = \rho_j^*$ for $j = A, B$), whereas M's basket $\{A_1, B_1\}$ entails an additional margin $\delta^{**} = \hat{\delta}_0$; consumers with $b > \hat{\sigma}_0$ opt for one-stop shopping, and the others for multi-stop shopping.*
- (ii) *If one market is duopolistic and the other is monopolistic, M continues to charge the full margin in the latter market and, in the former one, the rival charges $\rho^{**} = \hat{\rho}_1 (> \rho^* = 0)$, whereas M adds an additional margin $\delta^{**} = \hat{\delta}_1 (> \max\{\hat{\delta}_0, \hat{\rho}_1\})$; consumers with $b > \hat{\sigma}_1$ opt for one-stop shopping and the others for multi-stop shopping.*
- (iii) *If both markets are duopolistic, there is no pure-strategy equilibrium but a mixed-strategy equilibrium exists; furthermore, in equilibrium, all firms charge positive expected margins and obtain positive expected profits.*

Proof. See Appendix E. ■

In dispersed markets, Bertrand competition among stand-alone firms drives prices to cost. Therefore, if both markets are dispersed, multi-stop shoppers can still obtain w. However, raising its stand-alone prices enables M to charge a premium δ to one-stop shoppers. By doing so, it attracts consumers with $b > \sigma = \delta$ and earns a profit $\pi(\sigma)$, given by (4). This leads M to charge $\delta = \hat{\delta}_0 (= \hat{\sigma}_0)$, as in the case of consumption synergies – any pair $(\rho_A^{**}, \rho_B^{**}) \geq 0$ satisfying $\rho_{A_1}^{**} + \rho_{B_1}^{**} = \hat{\delta}_0$ can be supported in equilibrium.

If one market, say market i, is more concentrated (i.e., $n_i \leq 2$), M maintains its stand-alone margin in that market. Specifically, if $n_i = 1$, M keeps charging $\rho_i^{**} = \rho_i^* = w_i$, which captures the full consumer value and does not affect the demand for one-stop

[38] The conglomerate cannot benefit from mixed bundling, which would require charging less to one-stop shoppers. Focusing on a strict regime, rather than prohibiting only tying and pure bundling, emphasizes the possibility of harm even in the absence of any form of bundling.

shopping (which depends solely on M's margin in the competitive market). If $n_i = 2$, M has an incentive to slightly undercut its rival's positive margin, as doing so wins the competition for multi-stop shoppers without significantly affecting the demand for one-stop shopping. The standard Bertrand competition argument thus again applies, leading to $\rho_i^{**} = \rho_i^* = 0$ for both firms. In both cases, M exploits the demand for one-stop shopping by charging a margin δ in the more competitive market; this attracts consumers with $b > \delta$ and generates a profit equal to $\Pi_M^* + \pi(\sigma)$, leading again to $\delta = \sigma = \hat{\delta}_0$.

In the above situations, multi-stop shoppers can keep buying at pre-merger prices; by revealed preferences, multi-stop shoppers are therefore better-off. Furthermore, the merger is profitable and has no impact on rivals. It thus generates a Pareto improvement. This is no longer the case when both markets are concentrated (i.e., $n_A, n_B \leq 2$). If $n_i = 1 < n_j = 2$, it remains optimal for M to charge $\rho_i^{**} = \rho_i^* = w_i$ and appropriate the full consumer value in the monopolistic market but, in the duopolistic market, M has now an incentive to impose a margin δ to capture part of the synergies enjoyed by one-stop shoppers. This, in turn, confers market power on the stand-alone rival, who can charge a margin $\rho_j > 0$ to multi-stop shoppers; consumers with $b > \sigma = \delta - \rho_j$ then opt for M's basket, $\{A_1, B_1\}$, whereas the others mix-and-match and buy from the rival in the duopolistic market. It follows that, in equilibrium, just as in the case of consumption synergies and explicit tying, the rival charges $\rho_j^{**} = \hat{\rho}_1 \left(> \rho_j^* = 0\right)$, allowing M to charge an even higher margin to one-stop shoppers, namely, $\delta^{**} = \hat{\delta}_1 (> \max\{\hat{\delta}_0, \hat{\rho}_1\})$. As a result, multi-stop shoppers are harmed and, among the one-stop shoppers, only those with sufficiently high benefits (namely, exceeding $b > \hat{\sigma}_1$) are better-off.

Finally, when both markets are duopolistic (i.e., $n_A = n_B = 2$), competition for multi-stop shoppers would drive prices down to cost in any pure-strategy equilibrium. But this cannot be an equilibrium, as M would then profitably deviate by charging a positive margin in at least one market, to capture part of the one-stop shoppers' benefits. Therefore, any equilibrium involves mixed strategies.[39] Moreover, as no firm has an incentive to charge negative margins, equilibrium expected margins and profits are strictly positive. Once again, multi-stop shoppers are harmed, and only one-stop shoppers with sufficiently large benefits are better-off.

It is worth noting that, in every pure-strategy described above, M de facto engages in tying or pure bundling. Specifically, whenever one market, say i, is more concentrated than the other, M *de facto* ties i to j: it keeps selling i on a stand-alone basis at pre-merger prices (appropriating the consumer value in case of a monopoly, and pricing at cost

[39] Existence follows from Simon and Zane (1990).

otherwise), but raises its margin in the *less* concentrated market, implying that the only consumers buying from M in that market are one-stop shoppers, who buy both products from M. When, instead, both markets are dispersed, M can indifferently *de facto* tie either product to the other (this occurs if M chooses to charge the full margin $\hat{\delta}_0$ in one market) or de *facto* engage in pure bundling (by distributing the margin $\hat{\delta}_0$ across the two markets, in which case M only serves one-stop shoppers).

It follows from Proposition 5 that, when both markets are concentrated, the merger harms some consumers – and can even reduce total consumer surplus – even in the absence of any precommitment to tying or (pure or even mixed) bundling:

Corollary 4 (one-stop shopping benefits – no tying or bundling) *Suppose the merger creates one-stop shopping benefits. In the absence of any form of tying or bundling:*

(i) If at least one market is dispersed (i.e., $\max\{n_A, n_B\} > 2$*), the merger benefits* M *and one-stop shoppers without harming any rival or consumer.*

(ii) If both markets are concentrated (i.e., if $\max\{n_A, n_B\} \leq 2$*), the merger benefits all firms but harms all multi-stop shoppers and some of the one-stop shoppers, and can reduce total consumer surplus.*[40]

4.2 Laissez-faire

When M can precommit itself to tying or bundling, the equilibrium outcomes and welfare implications mirror those under consumption synergies. However, under one-stop shopping benefits, M's incentives to tie or bundle differ, as described in the following proposition:

Proposition 6 *Under laissez-faire, the equilibrium outcome for one-stop shopping benefits is the same as for consumption synergies. However, in case of one-stop shopping benefits,* M *has strict incentives to precommit itself only when it cannot already replicate these outcomes in the absence of precommitment, namely, when* $n_i = 2 \leq n_j$ *for some* $i \neq j \in \{A, B\}$*, in which case:*

(i) If $n_i = 2 < n_j$ *,* M *ceases to offer product* i *on a stand-alone basis and is indifferent between offering* j *stand-alone or tying* i *to* j*.*

[40] Noting that, when a single market is dispersed, the equilibrium is similar to that characterized by Proposition 2 for the case of consumption synergies and precommitment, the illustrative example mentioned at the end of Section 2 can be used to show that, with one-stop shopping benefits distributed according to the distribution $F(b) = b^{\alpha}$, the merger reduces total consumer surplus whenever $\alpha < \hat{\alpha}_1 \simeq 3.02$.

(ii) *If $n_A = n_B = 2$, M may choose to engage in pure bundling.*

Proof. See Appendix F. ■

From Proposition 5, for all market structures other than those featuring $n_i = 2 \leq n_j$, for some $i \neq j \in \{A, B\}$, M obtains the same profits as those characterized by Proposition 2 for the case of consumption synergies and precommitment. As precommitment would lead again to the same outcomes, M has no strict incentive to do so.

By contrast, when $n_i = 2 < n_j$ for some $i \neq j \in \{A, B\}$, M has an incentive to precommit to not selling product i on a stand-alone basis, to confer market power on its rival in market i – it is then indifferent between offering j or not on a stand-alone stand-alone (i.e., between tying j to i or engaging in pure bundling); either way, precommitting itself enables M to increase the margin charged to one-stop shoppers, from $\hat{\delta}_0$ to $\hat{\delta}_1 (> \hat{\delta}_0)$, and leads the stand-alone rival in market i to increase its own margin, from 0 to $\rho_i^{**} = \hat{\rho}_1 (> 0)$.

Finally, when $n_A = n_B = 2$, absent precommitment a mixed-strategy equilibrium arises. By precommitting itself to pure bundling, M can instead replicate the equilibrium outcome characterized by Proposition 2, which enables it to benefit from the "raising rivals' prices" effect in both markets.[41]

5 Policy implications

As noted in the introduction, following the emergence of Big Tech giants and digital ecosystems, conglomerate mergers have recently prompted growing concerns in antitrust policy circles, which has led competition agencies to start taking actions. The economics literature has also started to develop novel theories of harm (beyond classic horizontal foreclosure) capturing key features of these ecosystems (such as data or direct and indirect network effects). Our analysis focuses on one of these features, namely demand-side efficiency gains such as consumption synergies and one-stop shopping benefits.

Interestingly, consumption synergies and one-stop shopping benefits have been central to many conglomerate mergers – even before the emergence of digital ecosystem. While merging parties often highlight the potential gains for consumers, competition agencies have expressed concerns that they may reinforce the parties' market power, particularly when some of the relevant markets are already concentrated. For example, following the

[41] As characterizing mixed-strategy equilibrium profits proves challenging, we cannot establish that the pure-strategy equilibrium stemming from precommitment is indeed more profitable for M, but expect it to be so. However, conditional on precommitment, pure bundling is always more profitable than tying.

adoption of the European merger regulation in 1989, the first prohibition decision concerned a proposed merger between Aerospatiale-Alenia and de Havilland, which would have created the only manufacturer covering all three relevant markets (namely, small, mid-size and large commuter aircraft),[42] thereby enabling airlines to benefit from fleet commonality and reduce the costs of maintenance and spare parts, as well as of pilot certification and training. The European Commission (EC) recognized this as "one of the stated main strategic objectives of the [merging] parties" (para. 32), but expressed concerns that "the ability of competitors to compete with the combined entity would lessen to a certain extent given the overall advantages [arising from the] coverage of all the markets" (para. 42).[43]

Yet, the role of consumption synergies and one-stop shopping benefits in conglomerate mergers has largely been overlooked in the economics literature, which so far has focused on horizontal foreclosure (based on practices requiring some form of precommitment, e.g., to tying or degraded interoperability) or double marginalization issues (based on practices such as mixed or pure bundling). Our analysis provides a first step towards bridging this gap between theory and practice, and helps identifying the circumstances in which the creation of consumption synergies or one-stop shopping benefits can enhance market power to the point of harming consumers.

We find that these synergies or benefits are unlikely to raise concerns when markets are initially competitive. A merger then benefits customers with high synergies without negatively impacting those who favor stand-alone offerings. By contrast, caution is warranted when competition is already weak, due to market concentration or strong product differentiation. In such a case, prohibiting tying or pure bundling can constitute an effective remedy if the conglomerate remains incentivized to compete on a stand-alone basis.[44] Otherwise, the merger risks harming consumers and even reducing overall social welfare. Notably, the theory of harm is based here on exploitation rather than exclusion – while

[42] See EC Decision No IV/M.053 — Aerospatiale-Alenia/de Havilland (1991). The merger had both horizontal and conglomerate dimensions: the parties overlapped in the second market, whereas de Havilland (resp., Aerospatiale-Alenia) was the only party present in the first (resp., third) market.

[43] Consumption synergies were also a key factor, for instance, in the AT&T/DirecTV merger (discussed below) and in the merger between Eurotunnel (the rail company operating the tunnel under the Channel) and SeaFrance (a ferry company operating between the U.K. and the continent). Rail transport being more reliable but more costly than the ferries, the merged entity could offer a better option for freight operators having an urgent load in one way and a less time-sensitive one in the return way.

[44] Bundling restrictions have indeed been imposed in some cases. For example, in the Eurotunnel/Sea France merger (see footnote 43), the French Autorité de la Concurrence approved the merger but required a remedy that prohibited bundling of rail and ferry services. British authorities, including the Office of Fair Trading and the Competition Appeals Tribunal (later supported by the newly formed Competition and Markets Authority), disagreed with the merger's clearance but agreed on the necessity to ban bundling.

some consumers are harmed, rivals may actually benefit from the merger. Furthermore, when the parties offer sufficiently differentiated products, the merger can harm consumers even in the absence of any precommitment to tying or pure bundling – and in the case of one-stop shopping benefits, this can occur even in the absence of mixed bundling as well.

6 Conclusion

We develop a new theory of harm for conglomerate mergers, centered on consumption synergies and one-stop shopping benefits that customers may derive when procuring multiple goods and services from the same supplier. Unlike supply-side synergies, these demand-side synergies are typically customer-specific. The resulting product differentiation between the conglomerate's and stand-alone firms' offerings tends to soften competition, potentially leading to higher prices for mix-and-match consumers. Consequently, a merger may benefit consumers who derive high synergies but harm those with more limited ones. Furthermore, in concentrated markets, tying and pure bundling (either through precommitment or as part of an ex post optimal response) can confer additional market power on stand-alone rivals, who become the only suppliers available to mix-and-match consumers, and contribute in this way to raising rivals' prices.

We explore these issues in two related settings: one characterized by Bertrand competition, which we use to study both consumption synergies and one-stop shopping benefits, and the other by varying degrees of product differentiation. We find that mergers enhance total consumer surplus as long as the conglomerate continues to compete actively with stand-alone offerings, all the more so as stand-alone products are close substitutes. However, mergers can reduce total consumer surplus when the conglomerate either precommits itself to tying or pure bundling or, even without precommitment, optimally ceases to sell on a stand-alone basis (by charging prohibitively high prices). This occurs in highly concentrated markets in the first setting and in markets with high product differentiation in the second. Our analysis thus calls for caution when markets are already imperfectly competitive and suggests that, while banning tying or pure bundling may constitute an effective remedy when products are close substitutes, they may no longer be so in case of strongly differentiated products.

We conclude this discussion with a few avenues for future research. First, the above analysis is eminently static. While we do note that consecutive mergers are never profitable in our baseline setting, a counter merger may become profitable in the case of product differentiation, particularly when the conglomerate cannot commit to tying or pure bundling. Analyzing merger dynamics in such environments is beyond the scope of the present paper but constitutes a promising direction for future research.

Second, we have focused on markets in which firms derive their profits by charging customers for their goods or services. In the digital era, some firms do not charge customers but instead rely on ad revenue, or charge a commission for the transactions made on their platforms.[45] Studying the implication of consumption synergies and one-stop shopping benefits for alternative business models is another promising research avenue.

Third, the above analysis hinges on a single key feature associated with digital platforms and ecosystems, namely, the convenience benefits derived from relying on a single supplier to access a variety of goods and services. While accounting for this feature alone already gives rise to a novel theory of harm, several other characteristics are also relevant, including the role of data, consumers' information and search behavior, behavioral biases, and both direct and indirect network effects. Although some progress has been made in incorporating these elements, much remains to be done to develop a comprehensive theory of competition among ecosystems.

[45] The above analysis is therefore more readily applicable to conglomerate mergers such as Nvidia's acquisition of Mellanox or Microsoft's acquisition of Activision, than Facebook's acquisition of Instagram of WhatsApp.

Appendix

A Proof of Proposition 1

• Part (i). Consider first a market $i \in \{A, B\}$ in which M has a monopoly position. If M were to charge a stand-alone margin $\rho_i > w_i$ in that market, it would only sell the bundle. However, reducing ρ_i slightly below w_i would enable M to earn a positive margin from mix-and-matchers and have a negligible impact on the sales of the bundle (as they would still derive almost no surplus from product i). Conversely, if M were to charge a stand-alone margin $\rho_i < w_i$, slightly raising ρ_i would increase the profit derived from mix-and-matchers *and* reduce the competitive pressure on the bundle. Hence, without loss of generality, we can restrict attention to candidate equilibria in which $\rho_i = \rho_i^* = w_i$, and mix-and-matchers buy product i from M.

Consider now a market i in which M faces at least one stand-alone rival. Suppose initially that all consumers buy the bundle. If M were to charge $\mu < 0$, it would incur a loss, which could be avoided by raising μ. Likewise, starting from $\mu = 0$, which would yield zero profit, a small increase in μ would generate a positive profit. Hence, $\mu > 0$. Then, any stand-alone firm could profitably attract some consumers (specifically, those with very low synergies) by offering a sufficiently low positive margin. Consequently, in equilibrium, some consumers must buy on a stand-alone basis. However, as long as $\rho_i > 0$, any firm that supplies in the stand-alone consumer segment has an incentive to slightly undercut its rivals. This is obvious for the stand-alone firms, but also applies to M because product homogeneity among stand-alone offerings ensures that *slightly* undercutting rivals suffices to capture the entire stand-alone segment and has only a negligible impact on the sales of the bundle. Hence, in equilibrium, stand-alone margins are driven down to zero: $\rho_i^{**} = \rho_i^* = 0$.

It follows that, regardless of the number of competitors in the two markets, M continues to earn the total pre-merger margin $\rho_A^* + \rho_B^*$ from mix-and-matchers. Furthermore, consumers can still obtain $w - (\rho_A^* + \rho_B^*)$ on a stand-alone basis; opting instead for the bundle yields an additional synergy value s but entails an additional expense $\delta = \mu - (\rho_A^* + \rho_B^*)$. Hence, only those consumers with synergies exceeding $\sigma = \delta$ purchase the bundle. M's profit can therefore be expressed as:

$$\Pi_M = (\rho_A^* + \rho_B^*) F(\sigma) + \mu [1 - F(\sigma)] = \rho_A^* + \rho_B^* + \delta [1 - F(\sigma)] = \Pi_M^* + \pi(\sigma),$$

where $\pi(\sigma) = \sigma[1 - F(\sigma)]$ satisfies:

$$\pi'(\sigma) = 1 - F(\sigma) - \sigma f(\sigma) = f(\sigma)[h(\sigma) - \sigma].$$

The monotonicity of the hazard rate ensures that the bracketed term is strictly decreasing in σ, implying that $\pi(\sigma)$ is strictly quasi-concave in σ and maximal at $\mu = \sigma = \hat{\sigma}_0$, the unique solution to the first-order condition $h(\sigma) = \sigma$ (i.e., $\phi_0(\sigma) = 0$, where $\phi_0(\cdot)$ is defined by (1)).

• Part (ii). From the above analysis, consumers with $s > \mu^{**} - (\rho_A^* + \rho_B^*) = \hat{\sigma}_0$ buy the bundle, whereas those with $s < \hat{\sigma}_0$ still buy on a stand-alone basis.

B Proof of Corollary 1

• Part (i). From Proposition 1, it follows that stand-alone prices remain unchanged (i.e., $\rho_i^{**} = \rho_i^*$ for $i = A, B$). Hence, mix-and-matchers are unharmed; moreover, by revealed preferences, those who opt for the bundle are better off.

• Part (ii). From Proposition 1, M earns a total margin $\rho_A^* + \rho_B^*$ from consumers with $s < \hat{\sigma}_0$ and a greater margin $\mu^{**} = \rho_A^* + \rho_B^* + \hat{\sigma}_0$ from those with $s > \hat{\sigma}_0$; its profit can therefore be expressed as:

$$\Pi_M^{**} = \rho_A^* + \rho_B^* + \hat{\sigma}_0[1 - F(\hat{\sigma}_0)] = \Pi_M^* + h(\hat{\sigma}_0)[1 - F(\hat{\sigma}_0)] = \Pi_M^* + \hat{\Pi}_M(\hat{\sigma}_0) > \Pi_M^*,$$

where the second equality stems from $\hat{\sigma}_0 = h(\hat{\sigma}_0)$. Furthermore, in any market where there is one or more rivals, the stand-alone price remains at cost; hence, stand-alone rivals (if any) continue to obtain zero profit.

C Proof of Proposition 2

• Part (i). As before, if market $i \in \{A, B\}$ is monopolized (i.e., $n_i = 1$), M has an incentive to keep offering product i on a stand-alone basis and charge a full margin (i.e., $\rho_i^{**} = \rho_i^* = w_i$), thereby appropriating all consumer surplus without exerting competitive pressure on the bundle. Conversely, when M faces multiple rivals (i.e., $n_i \geq 3$), competition drives stand-alone prices down to cost (i.e., $\rho_i^{**} = \rho_i^* = 0$), making M indifferent between offering or not product i on a stand-alone basis. In both scenarios, the equilibrium mirrors that in the absence of tying or bundling: stand-alone prices remain unchanged (i.e., $\rho_i^{**} = \rho_i^*$

for $i = A, B$), and M imposes an additional margin on the bundle equal to $\hat{\sigma}_0 = h(\hat{\sigma}_0)$, enticing consumers with $s > \hat{\sigma}_0$ to purchase it.

• Part (ii). Suppose now that M faces a single rival, R, in market $i \in \{A, B\}$ (i.e., $n_i = 2$), and either no rival or multiple rivals in market $j \in \{A, B\} \setminus \{i\}$ (i.e., $n_j \neq 2$). From the above reasoning, product j remains offered on a stand-alone basis at pre-merger prices: $\rho_j^{**} = \rho_j^*$. If M continues to offer product i on a stand-alone basis, then, as demonstrated in the proof of Proposition 1, competition with R drives prices down to cost. If, however, M ceases offering product i on a stand-alone basis, R can then charge a positive margin. Consumers then face two relevant choices: combining stand-alone offerings, yielding a net utility of $w - \rho_i - \rho_j^*$, or opting for the bundle, which yields $w + s - \mu$. It follows that consumers with $s > \sigma = \mu - \rho_i - \rho_j^*$ buy the bundle, whereas those with $s < \sigma$ mix-and-match. The synergy threshold can alternatively be expressed as

$$\sigma = \delta - \rho_i, \tag{5}$$

where $\delta = \mu - \rho_i^* - \rho_j^* = \mu - \rho_j^*$ represents M's additional margin on the bundle, compared with pre-merger stand-alone margins.

Noting that M earns a margin ρ_j^* in market j, the profits of M and the rival in market i can then be expressed as:

$$\Pi_M = \rho_j^* F(\sigma) + \mu [1 - F(\sigma)] = \rho_j^* + \pi_M(\delta, \rho_i) \text{ and } \Pi_R = \rho_i F(\sigma) = \pi_R(\delta, \rho_i),$$

where

$$\pi_M(\delta, \rho) \equiv \delta [1 - F(\delta - \rho)] \text{ and } \pi_R(\delta, \rho) \equiv \rho F(\delta - \rho)$$

are strictly quasi-concave in δ and ρ respectively. To see this, note that

$$\frac{\partial \pi_M(\delta, \rho)}{\partial \delta} = f(\delta - \rho)[h(\delta - \rho) - \delta] \text{ and } \frac{\partial \pi_R(\delta, \rho)}{\partial \rho} = f(\delta - \rho)[k(\delta - \rho) - \rho],$$

where $f(\cdot) > 0$ and the bracketed terms are strictly decreasing in δ and ρ respectively. It follows that the best responses of M and R are uniquely characterized by their respective first-order conditions, which are $\delta = h(\sigma)$ and $\rho_i = k(\sigma)$. Together with (5), this yields:

$$\sigma = h(\sigma) - k(\sigma).$$

Consequently, $\sigma = \hat{\sigma}_1$, the unique solution to $\phi_1(\sigma) = 0$. Hence, there exists a unique equilibrium in which R charges a margin $\hat{\rho}_1 = k(\hat{\sigma}_1)$ and M charges an additional margin for the bundle equal to $\hat{\delta}_1 = h(\hat{\sigma}_1)$.

Furthermore:

a. If $n_j = 1$, then, as stated previously, M has an incentive to continue offering product j on a stand-alone basis and charge a full margin (i.e., $\rho_j^{**} = \rho_j^* = w_j$). Since M ceases to offer product i on a stand-alone basis, this arrangement effectively ties product j (the tied product) to product i (the tying product).

b. If, on the other hand, $n_j \geq 3$, competition among M's rivals drives the stand-alone prices down to cost in market j. M is therefore indifferent between withdrawing from this market, thereby engaging in pure bundling, or remaining active in it, thereby merely tying product j to product i.

• Part (iii). Suppose now that M faces a single rival, R_i, in each market $i = A, B$ (i.e., $n_A = n_B = 2$). If M remains active in market i, competition with R_i drives stand-alone prices down to cost. By withdrawing, M enables R_i to charge a positive margin, which in turn relaxes the competitive pressure on the bundle. It follows that pure bundling is the uniquely optimal bundling strategy for M. Combining R_A and R_B's offerings then gives consumers a net utility $w - \rho_A - \rho_B$, whereas opting for the bundle yields $w + s - \mu$. It follows that the synergy threshold σ, above which consumers favor the bundle, is now given by:

$$\sigma = \mu - \rho_A - \rho_B. \tag{6}$$

The profit of M and each R_i are therefore:

$$\Pi_M = \mu \left[1 - F(\sigma)\right] = \pi_M(\mu, \rho_A + \rho_B) \text{ and } \Pi_{R_i} = \rho_i F(\sigma) = \rho_i F(\mu - \rho_A - \rho_B).$$

We have seen in part (ii) that $\pi_M(\mu, \rho_A + \rho_B)$ is strictly quasi-concave in μ and maximal for $\mu = h(\rho_A + \rho_B)$. It is straightforward to verify that R_i's profit is also strictly quasi-concave in R_i's own margin:

$$\frac{\partial \Pi_{R_i}}{\partial \rho_i} = f(\sigma)\left[k(\mu - \rho_A - \rho_B) - \rho_i\right].$$

It follows that all firms' best responses are uniquely characterized by first-order conditions. These amount to $\mu = h(\sigma)$ and $\rho_i = k(\sigma)$, which, together with (6), yields:

$$\sigma = h(\sigma) - 2k(\sigma).$$

It follows that $\sigma = \hat{\sigma}_2$, the unique solution to $\phi_2(\sigma) = 0$. Hence, there exists a unique equilibrium, in which each stand-alone rival charges a margin $\hat{\rho}_2 = k(\hat{\sigma}_2)$ and M charges a margin for the bundle equal to $\mu = \hat{\delta}_2 = h(\hat{\sigma}_2)$.

Finally, to see that $2\hat{\rho}_2 > \hat{\rho}_1$, it suffices to note that, from the definition of $\hat{\sigma}_1$ and $\hat{\sigma}_2$, $2\hat{\rho}_2 = 2k(\hat{\sigma}_2) = h(\hat{\sigma}_2) - \hat{\sigma}_2 > h(\hat{\sigma}_1) - \hat{\sigma}_1 = k(\hat{\sigma}_1) = \hat{\rho}_1$, where the inequality stems from $\hat{\sigma}_2 < \hat{\sigma}_1$ and the monotonicity of the reversed hazard rate $h(\cdot)$.

D Proof of Corollary 2

If no market is duopolistic, the equilibrium under laissez-faire is the same as in the absence of tying or pure bundling; hence, the merger remains Pareto-improving. We now focus on the case in which a number $m \geq 1$ of markets are duopolistic.

• Part (i). Pre-merger, consumers could obtain $w - \rho_A^* - \rho_B^*$ from stand-alone firms' offerings. Post-merger, those who mix-and-match face higher stand-alone prices and are thus harmed. Those opting for the bundle obtain $w + s - \mu^{**} = w + s - \left(\rho_A^* + \rho_B^* + \hat{\delta}_m\right)$; it follows that those consumers are harmed if $s < \hat{\delta}_m$, and benefit instead from the merger if $s > \hat{\delta}_m$. Furthermore, by construction, $\hat{\delta}_m = h(\hat{\sigma}_m) = \hat{\sigma}_m + m\hat{\rho}_m > \hat{\sigma}_m$.

• Part (ii). From Proposition 2, M charges $\mu^{**} = \rho_A^* + \rho_B^* + \hat{\delta}_m$ for the bundle, where $\hat{\delta}_m = h(\hat{\sigma}_m)$, and in any duopolistic market, the rival charges $\hat{\rho}_m = k(\hat{\sigma}_m)$. It follows that consumers with $s > \hat{\sigma}_m = \hat{\delta}_m - m\hat{\rho}_m$ purchase the bundle, whereas those with $s < \hat{\sigma}_m$ opt for stand-alone offerings. M's profit is therefore equal to

$$\begin{aligned}\Pi_M^{**} &= (\rho_A^* + \rho_B^*) F(\hat{\sigma}_m) + \left(\rho_A^* + \rho_B^* + \hat{\delta}_m\right)[1 - F(\hat{\sigma}_m)] \\ &= \rho_A^* + \rho_B^* + h(\hat{\sigma}_m)[1 - F(\hat{\sigma}_m)] = \Pi_M^* + \hat{\Pi}_M(\hat{\sigma}_m),\end{aligned}$$

and in any duopolistic market i, the rival's profit is:

$$\Pi_R^{**} = \rho_i^{**} F(\hat{\sigma}_m) = k(\hat{\sigma}_m) F(\hat{\sigma}_m) = \hat{\Pi}_R(\hat{\sigma}_m).$$

E Proof of Proposition 5

We suppose here that all forms of bundling and tying are prohibited. As before, for each market $i = A, B$, let ρ_{i_h} denote the stand-alone margin charged by firm $h \in I_i \equiv \{1, ..., n_i\}$, $\rho_i = \min_{h \in I_i}\{\rho_{i_h}\}$ denote the lowest margin, and $\delta = \rho_{A_1} - \rho_A + \rho_{B_1} - \rho_B$ now denote the *total* additional margin charged by M on its stand-alone basket $\{A_1, B_1\}$.

• *Case (i): at least one market is dispersed.* In any dispersed market, Bertrand competition among stand-alone firms drives margins down to zero. The exact outcome depends on the degree of concentration in the less competitive market. Specifically, suppose that market i is dispersed (i.e., $n_i \geq 3$), implying $\rho_j^{**} = \rho_j^* = 0$, and let j denote the other market.

Subcase $(i) - a$: market j is also dispersed: $n_j \geq 3$. In this case, $\rho_j^{**} = \rho_j^* = 0$ for $j = A, B$, and multi-stop shoppers obtain w. Purchasing both products from M yields an additional benefit b from one-stop shopping, but incurs an extra expense δ. Therefore, only those consumers with $b > \sigma = \delta$ opt for one-stop shopping of $\{A_1, B_1\}$. M's profit is equal to $\delta [1 - F(\delta)]$, leading it to charge $\delta = \hat{\delta}_0 > 0$, where, as before, $\hat{\delta}_0 = h(\hat{\sigma}_0) = \hat{\sigma}_0$. Thus, in equilibrium, consumers with $b > \hat{\delta}_0 = \hat{\sigma}_0$ favor one-stop shopping, whereas those with $b < \hat{\sigma}_0$ mix and match. M's individual margins, ρ_{A_1} and ρ_{B_1}, are not uniquely determined; any (ρ_{A_1}, ρ_{B_1}) satisfying $\rho_{A_1} \geq 0$, $\rho_{B_1} \geq 0$, and $\rho_{A_1} + \rho_{B_1} = \hat{\delta}_0$ can be supported in equilibrium.

Subcase $(i) - b$: market j is duopolistic: $n_j = 2$. The Bertrand unraveling argument applies similarly to the duopolistic market: by slightly undercutting its stand-alone rival, M can attract all mix-and-matchers while having a negligible impact on the demand from one-stop shoppers. Hence, $\rho_j^{**} = \rho_j^* = 0$ for $j = A, B$, and consumers obtain w from mix-and-matching. However, M can still charge an additional margin in the dispersed market to capture part of the one-stop shopping benefits. As in subcase $(i) - a$, M's profit is given by $\delta [1 - F(\delta)]$, leading to $\delta = \hat{\delta}_0 > 0$. In this case, however, M's individual margins are uniquely defined: M prices at cost in the duopolistic market, and charges the entire margin $\hat{\delta}_0 > 0$ in the *less concentrated* market.

Subcase $(i) - c$: market j is monopolistic: $n_j = 1$. In market j, M continues to charge the full margin, as this strategy captures all the value from mix-and-matchers while relaxing competitive pressure on one-stop shoppers: $\rho_i^{**} = \rho_i^* = w_i$. Furthermore, M can impose the additional margin δ on one-stop shoppers in market i, while leaving mix-and-matchers to its rivals. A consumer with benefit b obtains w_j from mix-and-matching and $w_j + b - \delta$ from one-stop shopping, meaning that only those with $b > \sigma = \delta$ will choose the latter. M's profit is thus $w_i + \delta [1 - F(\delta)]$, leading once again to $\delta = \hat{\delta}_0 = h(\hat{\sigma}_0) = \hat{\sigma}_0$.

• *Case (ii): one market is monopolistic and the other is duopolistic: $n_i = 1 < n_j = 2$, for some $i \neq j \in \{A, B\}$.* Following the same reasoning, in equilibrium M charges the full margin in the monopolistic market to capture the value from multi-stop shoppers and ease competitive pressure on the demand from one-stop shoppers: $\rho_i^{**} = \rho_i^* = w_i$. In the duopolistic market, M has an incentive to impose an additional margin δ on one-stop shoppers to capture some of their benefits; this allows M's rival to cater to multi-stop shoppers by charging them a positive margin ρ. Consumers with $b > \delta - \rho$ will buy from M, whereas the others purchase from its rival. M's and its rival's profits are thus $\Pi_M = w_i + \delta\left[1 - F(\delta - \rho)\right]$ and $\Pi_R = \rho_j F(\delta - \rho)$ respectively, leading to $\rho_j^{**} = \hat{\rho}_1 = k(\hat{\sigma}_1) > \rho_j^* = 0$ and $\hat{\delta}_1 = h(\hat{\sigma}_1) > \hat{\delta}_0$.

- *Case (iii): both markets are duopolistic:* $n_i = n_j = 2$. Post-merger, M faces a single rival in each market. In any candidate pure-strategy equilibrium, the standard Bertrand unravelling argument (noting that slightly undercutting the stand-alone rival has a negligible impact on the demand from one-stop shoppers) implies that all prices would be driven down to cost. However, this cannot constitute an equilibrium, as M would strictly benefit from increasing either of its margin by $\varepsilon > 0$. For sufficiently small ε, M would continue to attract some one-stop shoppers and could extract part of their benefits. Consequently, there is no pure-strategy Nash equilibrium.

Nevertheless, it is straightforward to verify that profit functions are bounded above and below, and continuous except at points where total margins coincide. Therefore, they are upper hemi-continuous. Assuming that multi-stop shoppers favor the stand-alone firms whenever both M and its rival charge the same total margin, the competition creates a game with endogenous sharing rules, as defined by Simon and Zame (1990). It follows from their main theorem that there exists an equilibrium in mixed strategies. Furthermore, in equilibrium, no firm charges a negative margin – this is obvious for stand-alone firms, and also holds for M, since replacing a negative margin with a zero margin would avoid a loss on multi-stop shoppers without affecting the demand from one-stop shoppers.[46] It follows that expected margins are positive.

F Proof of Proposition 6

Suppose M can commit to tying or pure bundling. We begin with a few preliminary observations.

If market $i \in \{A, B\}$ is dispersed (i.e., $n_i \geq 3$), Bertrand competition among stand-alone firms drives margins down to zero, regardless of whether M continues to offer product i on a stand-alone basis. As a result, M is indifferent about offering i on a stand-alone basis, since its decision does not affect the stand-alone price for i.

[46] If $\rho_{i_1} < 0$, all consumers purchase product i from M, as stand-alone firms would never charge a negative margin. Thus, the choice between one-stop shopping and multi-stop shopping depends only on the comparison between M and its rival's margins in the other market.

By contrast, if i is monopolistic (i.e., $n_i = 1$), M has a strict incentive to continue offering product i at the monopoly price. This allows M to captures full value from multi-stop shoppers without increasing competitive pressure on the demand from one-stop shoppers.

We now proceed to analyze in detail the various cases outlined in the Proposition.

• *Case* (i): *no market is duopolistic.* If both markets are dispersed (i.e., $n_A, n_B \geq 3$), the equilibrium remains the same as in the scenario without tying or bundling, as indicated by the first observation above. Both products continue to be offered at the pre-merger prices (i.e., $\rho_i^{**} = \rho_i^* = 0$), while M charges $\hat{\delta}_0 = h(\hat{\sigma}_0) = \hat{\sigma}_0$ for its basket, attracting consumers with $b > \hat{\sigma}_0$. The individual margins for M's products, ρ_{A_1} and ρ_{B_1}, are not uniquely determined: any (ρ_{A_1}, ρ_{B_1}) satisfying $\rho_{A_1} \geq 0$, $\rho_{B_1} \geq 0$, and $\rho_{A_1} + \rho_{B_1} = \hat{\delta}_0$ can be sustained in equilibrium. Alternatively, M may choose to cease selling either product (or both) on a stand-alone basis and charge $\hat{\delta}_0$ for the bundle. In either case, M obtains a profit of $\hat{\Pi}_M(\hat{\sigma}_0) > 0$, while stand-alone firms earn zero profit.

If instead market i is monopolistic and market j is dispersed (i.e., $n_i = 1$ and $n_j \geq 3$, for some $i \neq j \in \{A, B\}$), the equilibrium also remains the same as the scenario without tying or bundling. Both products continue to be offered at pre-merger prices (namely, $\rho_i^{**} = \rho_i^* = w_i$ and $\rho_j^{**} = \rho_j^* = 0$), and M charges an additional margin $\hat{\delta}_0 = h(\hat{\sigma}_0) = \hat{\sigma}_0$ on product j, attracting consumers with $b > \hat{\sigma}_0$. M thus obtains a profit of $\Pi_M^* + \hat{\Pi}_M(\hat{\sigma}_0) > \Pi_M^*$, while its rivals keep obtaining zero profit.

• *Case* (ii): $n_i = 1 < n_j = 2$, *for some* $i \neq j \in \{A, B\}$. That is, M holds a monopoly in market i and faces a single rival, say R, in market j. Based on the previous observations, M continues offering i on a stand-alone basis at the pre-merger margin: $\rho_i^{**} = \rho_i^* = w_i$. As a result, all consumers purchase A from M, allowing one-stop shoppers to arbitrage perfectly between the stand-alone basket $\{A_1, B_1\}$ and the bundle $A_1 - B_1$ if both options are available. Thus, M has no incentive to engage in tying or bundling.

In the absence of tying or bundling, Proposition 5 shows that M offers j to one-stop shoppers at an additional margin $\hat{\delta}_1$, while R charges $\hat{\rho}_1$ to multi-stop shoppers. If M stops offering j on a stand-alone basis, it still has a strong incentive to offer the bundle (along with the stand-alone product i) to supply one-stop shoppers, and charge an additional margin $\delta > 0$ to capture part of their one-stop shopping benefits. This strategy essentially mirrors what M achieves by offering j on a stand-alone basis at the same margin δ. Therefore, in equilibrium, M again charges $\delta = \hat{\delta}_1$ to one-stop shoppers, and R charges $\hat{\rho}_1$ to multi-stop shoppers. In other words, M is indifferent between tying j to i or not.

In either way, it sells i at the pre-merger margin $\rho_i^* = w_i$ and offers j (either at the stand-alone basis or as part of the bundle) at an additional margin $\hat{\delta}_1$.

• *Case (iii)*: $n_i = 2 < n_j$*, for some* $i \neq j \in \{A, B\}$. That is, M faces a single rival, say R, in market i, and several rivals in market j. From the previous observations, M has no incentive to stop supplying j on a stand-alone basis, so j remains available at cost: $\rho_j^{**} = \rho_j^* = 0$. Furthermore, in the absence of any tying or bundling, as established in Proposition 5, M offers j with an additional margin $\hat{\delta}_0$ and obtains a profit equal to $\hat{\Pi}_M(\hat{\sigma}_0)$.

Now suppose M stops offering i on a stand-alone basis. Let ρ_i denote R's margin and δ represent M's margin on the bundle $A_1 - B_1$. Multi-stop shoppers thus obtain $w - \rho_i$, while a one-stop shopper with benefit b obtains $w + b - \delta$. Consumers with $b > \sigma = \delta - \rho_i$ opt for one-stop shopping, whereas the others choose multi-stop shopping. M's and R's profits are therefore $\pi_M = [1 - F(\sigma)]\,\delta$ and $\pi_R = F(\sigma)\,\rho_i$, respectively. In equilibrium (similar to the case with consumption synergies), we have $\delta^{**} = \hat{\delta}_1 \equiv h(\hat{\sigma}_1)\,(> \hat{\delta}_0)$ and $\rho_i^{**} = \hat{\rho}_1 \equiv k(\hat{\sigma}_1)\,(> \rho_i^* = 0)$. As a result, M earns $\hat{\Pi}_M(\hat{\sigma}_1)\,(> \hat{\Pi}_M(\hat{\sigma}_1))$, providing it a strong incentive to stop selling i on a stand-alone basis. Specifically, M is indifferent between tying j to i (in which case it offers j at any price weakly above cost) and engaging in pure bundling; in both cases, M charges $\hat{\delta}_1$ for the bundle, while R charges $\hat{\rho}_1$.

• *Case (iv)*: $n_A = n_B = 2$. If M continues offering both products on a stand-alone basis, any equilibrium occurs in mixed strategies, resulting in a positive expected profit for both M and its rivals. Now, suppose M ties i to j (i.e., it stops offering i, but keeps offering j on a stand-alone basis). In market j, competition between M and its rival drives stand-alone prices down to cost: $\rho_j^{**} = \rho_j^* = 0$. In contrast, by withdrawing from market i, M confers market power to its rival, allow it to charge a positive margin ρ_i. Multi-stop shoppers consequently receive $w - \rho_i$, while one-stop shoppers obtain $w - \delta$, where δ denotes M's margin on the bundle. The same analysis as previous applies, showing that in equilibrium, M earns $\hat{\Pi}_M(\hat{\sigma}_1)\,(> 0)$.

If instead M engages in pure bundling (i.e., it stops offering any product on a stand-alone basis), it confers market power to both of its rivals. As a result, multi-stop shoppers receive $w - \rho_A - \rho_B$, where ρ_i denotes the margin of M's rival in market $i = A, B$, while one-stop shoppers obtain $w - \delta$. Similar to the case of consumption synergies, in equilibrium, M charges $\hat{\delta}_2 \equiv h(\hat{\sigma}_2)\,(> \hat{\delta}_1)$ and earns $\hat{\Pi}_M(\hat{\sigma}_2) > \hat{\Pi}_M(\hat{\sigma}_1)$, while its rivals charge $\rho_A^{**} = \rho_B^{**} = k(\hat{\sigma}_2) > 0$ and obtain $\Pi_A^{**} = \Pi_B^{**} = \hat{\Pi}_M(\hat{\sigma}_2)$. Therefore, in equilibrium, M either offer both products or none on a stand-alone basis.

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