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"A Theory of Conglomerate Mergers"

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Abstract

We present a theory of conglomerate mergers and explore the effect of portfolio differentiation due to the heterogeneity of consumption synergy derived from product bundling. The differentiation of product portfolios reduces competition and leads to higher prices for standalone products in highly concentrated markets. As a result, conglomerate mergers benefit consumers who purchase bundled products from the merged entity but can harm those who prefer to mix-and-match standalone products. We demonstrate that a conglomerate merger increases total consumer surplus if the merged firm continues to sell standalone products, but it can be detrimental to consumers if the firm commits to pure bundling. Our analysis provides important policy implications for assessing conglomerate merger cases.

Keywords: Conglomerate mergers, portfolio differentiation, bundling

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1 Introduction

Recent years have witnessed a new wave of mergers between "adjacent" markets, wherein the merging firms cater to the same customer base by offering either complementary or independent products. This is particularly the case in digital sectors, where notable examples include Facebook's $22 billion acquisition of WhatsApp in 2014, Google's $12.5 billion merger with Motorola Mobility in the same year, Dell's $67 billion purchase of the data storage company EMC in 2015, Microsoft's $26.2 billion acquisition of LinkedIn in 2016, and the US$6.9 billion merger between Nvidia (the leading supplier of Graphics Processing Units (GPUs)) and Mellanox (the leading supplier of network interconnect solutions for data centers) in 2019. These mergers, conducted between firms that do not share a horizontal relationship (as competitors in the same relevant market) or a vertical relationship (as suppliers or customers), are referred to as conglomerate mergers according to the European Non-Horizontal Merger Guidelines published in 2008.[1] They exhibit two common features. Firstly, they occur in highly concentrated markets, where at least one merging firm holds a dominant or leading position. Secondly, these mergers have the potential to generate significant benefits for customers, e.g., through enhanced product integration or one-stop-shopping benefits.

As these mergers involve at least one highly concentrated market, competition authorities may express concerns regarding potential exclusionary effects. By consolidating the supply of two products in adjacent markets, the merged entity could have the ability and incentive to leverage its dominant position in one market into the adjacent market through practices such as bundling and/or tying. However, there exists a significant divergence between the U.S. and the E.U. regarding the assessment of such exclusionary effects, which became particularly apparent in the well-known General Electric/Honeywell merger case.[2]

In the U.S., where the influential critique of the Chicago School on the rationale of market foreclosure has been prominent,[3] conglomerate mergers have been perceived as efficiency driven

[1] See "Guidelines on the assessment of non-horizontal mergers under the Council Regulation on the control of concentrations between undertakings", Official Journal of the European Union (2008), para. 5.

[2] In 2001, the General Electric Company (GE) proposed a $45 billion merger with Honeywell International, Inc. The U.S. Department of Justice Antitrust Division (DoJ) approved the merger with minor structural remedies, but a few months later the European Commission prohibited the merger. On appeal, the European Court of First Instance upheld the prohibition decision on the basis of horizontal effects, but expressed criticisms of the Commission's analysis of vertical and conglomerate effects.

[3] The Chicago School's argument, often referred to as the "single monopoly profit" theory, is that a monopolist has no incentives to leverage its market power from into a competitive complementary (vertical or adjacent)

and generally believed to have no adverse effects on competition.[4] Consequently, no conglomerate merger has been challenged since the 1970s. Commenting on the approval of the General Electric/Honeywell merger by the U.S. Department of Justice, then Deputy Assistant Attorney General William Kolasky noted that the theories of competitive harm developed in the 1960s had "faded away. [...] After fifteen years of painful experience with these now long-abandoned theories, the U.S. antitrust agencies concluded that antitrust should rarely, if ever, interfere with any conglomerate merger. The U.S. agencies simply could not identify any conditions under which a conglomerate merger, unlike a horizontal or vertical merger, would likely give the merged firm the ability and incentive to raise price and restrict output."[5]

By contrast, the European Commission has expressed concerns that conglomerate mergers might create or strengthen a dominant position thought "portfolio effects." It was particularly worried about the potential for the merged entity to leverage an expanded product range or portfolio through practices such as tying or bundling. This led the Commission to prohibit the merger between Aerospatiale-Alenia and de Havilland in 1991 (the Commission's very first prohibition decision, following the adoption of the merger regulation in 1989), as well as two other significant mergers. However, this came to a stop in 2002, when the European Court of First Instance overturned the Commission's decision in Tetra Laval-Sidel.[6]

The aforementioned antitrust dilemma raises several significant questions. Firstly, despite the inability of competition authorities in the U.S. and the E.U. to identify exclusionary effects in conglomerate mergers, are there any non-exclusionary effects that can have detrimental impacts on competition and consumers?[7] Secondly, what is the relevant theory of harm in conglomerate

market, as it can already capture all the profit in the monopolized market.

[4]See the influential statement of Bork (1978) at page 246.

[5]See Kolasky (2002).

[6]The Court of First Instance notably argued that "Since the effects of a conglomerate-type merger are generally considered to be neutral, or even beneficial, for competition on the markets concerned [...] the proof of anticompetitive conglomerate effects of such a merger calls for a precise examination, supported by convincing evidence, of the circumstances which allegedly produce those effects" (see *Tetra Laval*, 2002, E.C.R II-4381, page 155).

[7]For instance, the European Commission (EC) carried out an in-depth Phase-2 investigation into the proposed Nvidia/Mellanox merger. Although the EC was not convinced of a foreclosure effect after the merger, it still expressed concerns regarding the potential harm to a specific group of customers who combine Mellanox's InfiniBand fabric with GPUs from other brands. The concern was that these customers might face either higher prices or a degradation of interoperability between the GPU and NIC (network interface card). For more details, refer to the Commission Decision of 19 December 2019 in Case M.9424 – NVIDIA/Mellanox, paragraph 221.

mergers, beyond foreclosure, and how does it affect consumer welfare?

In this paper, we present a theory of conglomerate mergers and explore the scope for portfolio effects. Our primary focus is on the demand-side benefits often arising in conglomerate mergers, in contrast to the conventional emphasis on supply-side synergies in horizontal and vertical mergers. We refer to these benefits as "consumption synergies". For instance, in the case of the AT&T-DIRECTV merger, Katz (2014) argued that bundles combining broadband and TV programs "can offer consumers the convenience of a single installation, single bill, and single point of contact for customer care." In other scenarios where product integration is absent, one-stop shopping can enable customers to save on the transaction and opportunity costs associated with searching and matching products/services.[8] Unlike cost synergies, consumption synergies reflect customers' valuations of transaction costs and opportunity costs, and can thus vary among customers.

We establish a stylized baseline model featuring two independent product markets, each supplied by multiple identical single-product Bertrand competitors.[9] A conglomerate merger between two single-product firms operating in distinct markets enables the merged entity to offer a bundle of both products. This bundle generates consumption synergies compared with mixing and matching stand-alone offerings. These synergies however vary across consumers.

The merged firm can exploit these consumption synergies by offering the bundle at a price exceeding the sum of the stand-alone prices. Consumers with consumption synergies exceeding the price difference will choose the bundle, while others will combine stand-alone offerings. Heterogeneity among the consumption synergies gives rise to "portfolio differentiation" between the bundle and the stand-alone offerings, which has the potential for reducing competition between the merged entity and the stand-alone firms. However, the impact on prices hinges on the degree of competition among the remaining stand-alone firms. We examine the pricing effects under two distinct scenarios.

In the first scenario, both products continue to be supplied at competitive prices on a stand-

[8] For example, according to the Euroopean Commission, the Aerospatiale-Alenia / de Havilland merger, which would have created the first regional aircraft manufacturer covering all segments of this market, would have enabled the airlines to benefit from fleet commonality and save on maintenance cost and spare parts, as well as on pilot certification and training.

[9] To isolate the effects stemming from either demand-side or supply-side factors related to product complementarity, we focus on "pure" conglomerate mergers where firms face independent demands from the same customers. However, the analysis applies as well to the case of complementary products.

alone basis. This occurs when the merged firm continues to offer the stand-alone products alongside the bundle (mixed bundling), and/or when there remains at least two stand-alone firms in each market. In this case, the merger brings benefits to consumers who purchase the bundle without causing harm to others, while creating profit for the merged entity – a clear win-win outcome, which enhances welfare.

In the second scearnio, there remains a single firm offering the product on a stand-alone basis in at least one market. This arises when (i) a market exhibits high concentration (namely, only two firms are initially present in that market) and (ii) the merged firm engages in pure bundling (i.e., it stops offering the products on a stand-alone basis). Portfolio differentiation then confers market power to the remaining stand-alone firm, which enables it to raise its price. In such a scenario, the conglomerate merger can potentially reduce consumer welfare. Furthermore, if both markets are highly concentrated, the merger creates a Cournotian double marginalization problem between the remaining stand-alone firms, as the initially independent products become complements when consumers compare them to the bundle. This double-marginalization problem results in inefficiently high stand-alone prices and further benefits the merged entity at the expense of consumers. This paper thus highlights potential non-exclusionary effects of conglomerate mergers that have the potential to harm competition and consumers: portfolio differentiation softens competition between the merged entity and the remaining stand-alone firms, and double marginalization may further raise stand-alone prices.

We show that these effects may be amplified when there is product differentiation in the two markets. We do this in a simple setting where, in each market, two firms are horizontally differentiated à la Hotelling. Alongside the bundle that provides additional consumption synergies, the merged firm has the option to continue offering stand-alone products in each market. However, the merged firm faces a trade-off: selling its own stand-alone products shifts demand away from non-merged firms but also cannibalizes the sales of its own bundle. This cannibalization effect restrains the merged firm from engaging in aggressive competition and results in higher stand-alone prices. For low degrees of product differentiation, the gain from demand shifting outweighs the loss from cannibalization, leading the merged firm to continue competing on a stand-alone basis. In contrast, for high degrees of product differentiation, the merged firm opts for a *de facto* pure bundle strategy, even if it does not commit to doing so. In both cases, portfolio differentiation raises stand-alone prices, adversely impacting consumers with low consumption synergies. We find that the conglomerate merger increases total consumer surplus under mixed bundling but can reduce it under pure bundling. The merger has also the potential to harm competitors. While portfolio differentiation tends to mitigate the intensity of competition, shifting demand towards the bundle diminishes stand-alone firms' profits. We find that, except in scenarios with very strong product differentiation, the demand-shifting effect dominates, resulting in reduced profits for the stand-alone firms.

To examine the dynamics of conglomerate merger activity, we also extend the baseline model to account for a third product market. Following a first conglomerate merger, a second one may take place to create another product portfolio, which would intensify competition among different portfolios and benefit consumers. We explore several scenarios with varying levels of market concentration – for exposition purposes, we focus on identical degrees of concentration in all markets.

In the case of highly concentrated markets (i.e., only two stand-alone firms initially present in each market), a three-product conglomerate merger confers market power to the remaining stand-alone firm in every market. Consequently, these firms have no incentive to pursue a second merger, as this would intensify competition with the existing conglomerate.

In the case of less concentrated markets (i.e., more than two firms initially present in each market), competition among the stand-alone firms drives their profit down to zero even after a first conglomerate merger. A second merger (with a different product portfolio) may therefore be attractive. However, the first conglomerate can preempt a consecutive merger by expanding its own range of portfolios, namely, by offering several bundles of different sizes (i.e., three-product and two-product bundles). As a result, in equilibrium a three-product merger takes place and no subsequent merger takes place afterwards. Furthremore, the preemptive strategy adopted by the merged entity reduces consumer welfare.

Our analysis offers policy implications for the assessment of conglomerate mergers. When the merger involves highly concentrated markets, a key issue concerns the remaining competition among stand-alone offerings. If these offerings are expected to remain competitive – because there are multiple stand-alone firms, or because the conglomerate merger keeps competing on a stand-alone basis besides offering its bundle), the merger is unlikely to have adverse effects on competition and competitors. Caution is instead warranted if the merger is expected to significantly reduce competition among stand-alone product offerings. Forbidding pure bundling can constitute an effective remedy if it induces the conglomerate to keep competing effectively on a stand-alone basis.[10] If that is not the case (e.g., because of high product differentiation

[10] This is in line with policy interventions in recent cases, such as the Eurotunnel-SeaFrance merger, where similar restrictions have been imposed.

between the conglomerate and the remaining stand-alone firms), then the merger is likely to harm consumers and reduce welfare.

Related literature. Our analysis sheds light on a rationale for tying and bundling that differs from the focus of the existing literature. Instead of being an exclusionary practice aimed at foreclosing competitors,[11] tying and bundling serve here to soften competition. This finding is consistent with the work of Chen (1997), who examines the anti-competitive effects of bundling in a setting where two firms competing in one market can also offer a product already supplied by a competitive market. However, our paper differs from Chen (1997) in several aspects. First, Chen's focus is on bundling incentives arising from heterogeneous valuations of some products, while our paper centers on merger incentives and considers the efficiency gains from consumption synergies that generate the portfolio differentiation effect from bundling or one-stop-shopping benefits. Second, our paper demonstrates that the portfolio differentiation effect can occur even without bundling,[12] although bundling can enhance the merged firm's ability to exploit this effect further.

More recently, Rhodes and Zhou (2019) employ a search model to explain the coexistence of multi-product and single-product firms. According to their model, consumers first search among multi-product firms and then turn to single-product firms if they cannot find a suitable match. A conglomerate merger between single-product firms provides a competitive advantage to the merged entity by enabling consumers to save on search costs, thus potentially softening competition among single-product firms. This analysis is particularly relevant in retailing markets, where consumers may face substantial search costs in finding the right product match. In contrast, our paper examines the trade-off between consumption synergies (including but not limited to transaction cost savings) and the resulting portfolio differentiation effect, without relying on consumers having incomplete information about the firms' offerings.

The remainder of the paper is organized as follows. We present the baseline model in Section 2, and analyze the impact of portfolio differentiation in Section 3. We study the role of product differentiation and cannibalization in Section 4, and explore merger dynamics and preemption in Section 5. We consider several extensions in Section 6 and conclude the paper in Section 7.

[11] See Whinston (1990)'s seminal paper on entry deterrence, or more recently Carlton and Waldman (2002) or Choi and Stefanadis (2001). See Rey and Tirole (2007) for a survey of this literature.

[12] This is the case whenever dealing with a single supplier allows customers to save transaction costs; see the analysis in Online Appendix C.

2 Baseline Model

Consider two distinct markets, labeled as A and B, each offering a single product. A conglomerate merger results in the creation of a multi-product firm that offers both products.

Supply side. Initially, each market (i.e., A and B) is served by $n_i \geq 2$ identical stand-alone firms with constant marginal cost $c_i \geq 0$. Without loss of generality, we assume that market A is relatively more concentrated, with $n_B \geq n_A \geq 2$.

Demand side. There exists a continuum of consumers, and each consumer has a unit demand for each product. The total consumer population is normalized to 1. Consumers derive homogeneous utility u_i from consuming each product i (where $i = A, B$), with $u_i > c_i$. For simplicity, we focus on the scenario with independent demands for products A and B, meaning that the aggregate utility obtained from consuming both products is $u = u_A + u_B$. This focus on independent products allows us to isolate the effects resulting from product complementarity on the demand side. However, it is important to note that the analysis also applies to scenarios involving partial substitution (i.e., $u < u_A + u_B$) or complementarity (i.e., $u > u_A + u_B$). For ease of presentation, we use the social value generated by each product, denoted as $w_i \equiv u_i - c_i$ for $i = A, B$, and likewise, the total social value generated by both products is denoted as $w = w_A + w_B$.

Benchmark: Bertrand competition among stand-alone firms. Firms set their prices simultaneously in each market. Upon observing the prices, consumers make their purchase decisions. In the absence of any merger, Bertrand competition drives prices down to costs, resulting in zero profits for the firms. Meanwhile, consumers obtain a surplus equal to w.

For the sake of simplicity, we utilize margins (the difference between prices and costs) as variables, rather than explicit prices. Specifically, we denote α_i and β_i as the margins charged by firm A_i and B_i, respectively, in their stand-alone operations. It is worth noting that $\alpha_i = \beta_i = 0$ prior to the merger.

Consider a conglomerate merger between a firm in market A, referred to as A_1, and a firm in market B, referred to as B_1. The resulting merged entity is denoted as firm M. Through the merger, firm M has the capability to integrate products A and B and offer them as a bundled product, denoted as $A_1 - B_1$. Consuming the bundle, rather than combining two stand-alone products, generates consumption synergies, denoted as s. Therefore, consumers derive a total utility of $u + s$ from the bundle, whereas they obtain an aggregate utility of u from combining the individual products A_i and B_i on a stand-alone basis.

Consumption synergies are considered idiosyncratic as they are associated with consumer subjective valuations. In our analysis, we assume that these synergies are distributed within the range $[0, \bar{s}]$, following a cumulative distribution function $F(s)$ with a continuous density function $f(s)$. Additionally, we impose the following regularity conditions on the distribution: the function $h(s) \equiv (1 - F(s))/f(s)$ is strictly decreasing, while $k(s) \equiv F(s)/f(s)$ is strictly increasing. These assumptions ensure the quasi-concavity of profit functions and are typically satisfied by most commonly used distributions.[13]

Remark 1: Consumption Synergies

Consumption synergies arising from conglomerate mergers have become a prominent feature in various recent merger cases, including the notable AT&T/DIRECTV merger in 2015. In this case, AT&T provided broadband internet services while DIRECTV offered multichannel video programs (MVP) through its direct broadcast satellite network. Following the merger, AT&T introduced a bundle that allowed subscribers to access TV and video programs via broadband services, eliminating the need for a satellite dish.[14]

In the economic assessment of this merger, Katz (2014) argued that since the main products of the two firms were not substitutes, the merger could benefit consumers who highly value the convenience of one-stop shopping. Berry and Haile (2014) further conducted an empirical analysis and simulations using the nested logit model. They considered the consumption synergies generated by bundling broadband with MVP. They argue that "In the case of true and synthetic bundles, these combinations of services are advertised and promoted as distinct products with distinct prices, features, and contract terms. It is likely that different consumers understand and value these features and terms in a heterogeneous way." (Berry and Haile (2014), page 20). Thus, on top of the traditional idiosyncratic shocks on consumer tastes for the broadband and MVP respectively, they also consider the idiosyncratic shocks of consumer valuations on the bundle of two products/services. Their analysis demonstrated that, due to consumption synergies, the merger would result in net benefits for consumers, or at the very least, an absence of harm, even without considering the cost efficiencies arising from the merger.

In our study, we also consider consumption synergies resulting from product integration or bundling, which reflects the characteristics of recent conglomerate merger cases. However, it is important to note that consumption synergies can also arise in other contexts, such as one-stop

[13] See, e.g., Bagnoli and Bergstrom (2005).

[14] See "AT&T-DIRECTV description on transaction, public interest showing, and related demonstrations executive summary", available at https://www.sec.gov/Archives/edgar/data/732717/000073271714000061/e425.htm.

shopping, where consumers can save transaction costs and/or opportunity costs by purchasing both products from a single supplier,[15] even without explicit product bundling or integration. In Section 6, we demonstrate that most of our results and insights extend to these alternative contexts as well.

3 Portfolio Differentiation Effect

The merged entity offers the bundle $A_1 - B_1$ following the merger. Consumers derive a net utility $w + s - \mu$ from $A_1 - B_1$, where μ denotes the total margin for the bunlde (i.e. the total price minus the total cost $c_A + c_B$). In contrast, consumers derive a utility of $w - \alpha_i - \beta_i$ from the combination of stand-alone products A_i and B_i. The conglomerate merger creates a new differentiated product portfolio, $A_1 - B_1$, distinct from the existing portfolio by mixing stand-alone products (denoted as $\{A_i, B_i\}$), as consumption synergies exhibit heterogeneity among consumers. The differentiation between two portfolios is characterized by a cut-off threshold for consumption synergies denoted as $\sigma \equiv \mu - \alpha_i - \beta_i$. Consumers with $s > \sigma$ will choose $A_1 - B_1$, while others will continue to purchase $\{A_i, B_i\}$. The conglomerate earns a profit of $\mu (1 - F(\sigma))$ from selling the bundle.

On top of the bundle $A_1 - B_1$, the merged entity has the option to continue supplying products A and B as stand-alone offerings, if doing so can increase its profit. An important question arises regarding whether or not the merged entity M has incentives to maintain the provision of stand-alone products after the merger. To address this question, we first examine the scenario where M continues to offer the stand-alone products, and then analyze the case where M commits to pure bundling, exclusively offering the bundle. By comparing the equilibrium outcomes between these two scenarios, we find that M can benefit from pure bundling when at least one market is highly concentrated, e.g., $n_i = 2$ for market i.

3.1 Mixed Bundling

The equilibrium analysis without pure bundling is relatively straightforward. As the merged entity M continues to offer the products on a stand-alone basis, Bertrand competition for stand-alone products drives prices down to the cost, resulting in a zero margin for stand-alone products.

[15] Transaction costs may also influence consumers' preferences for shopping. In the case of industrial customers, transaction costs can encompass various factors such as the costs associated with adopting a supplier's technology, maintaining inventories of spare parts, and other relevant considerations.

In this case, the cut-off threshold becomes $\sigma = \mu$. M's profit solely comes from the sale of the bundle, denoted as $\Pi_M(\mu) \equiv \mu[1 - F(\mu)]$. The optimal margin under mixed bundling, denoted as $\mu^m = \sigma^m \in (0, \bar{s})$, is the unique solution to the equation[16]

$$\sigma^m = h(\sigma^m). \tag{1}$$

When M continues offering the stand-alone products after the merger, it has no impact on consumers who choose to purchase $\{A_i, B_i\}$. However, consumers who opt for the bundle must experience a higher level of utility. Through the revelation of preferences, it is evident that consumers selecting the bundle are better off. Additionally, M earns a positive profit: $\Pi_M^m(\sigma^m) = \sigma^m[1 - F(\sigma^m)] = h(\sigma^m)[1 - F(\sigma^m)] > 0$. Therefore, the conglomerate merger increases both total consumer surplus and social welfare.

The above analysis is summarized as follows:

Proposition 1 *Suppose the conglomerate continues offering the stand-alone products after the merger. There exists a unique threshold $\sigma^m \in (0, \bar{s})$ determined by the equation in (1), such that consumers with consumption synergies exceeding σ^m choose the bundle, while others opt for a combination of stand-alone products. The merged entity charges the margin $\mu^m = \sigma^m$ for the bundle and earns a profit $\Pi_M^m(\sigma^m)$. The merger results in an increase in total consumer surplus and social welfare.*

Proof. See Appendix A. ■

3.2 Pure Bundling

Suppose the merged entity decides to offer the bundle exclusively and discontinues the sale of stand-alone products A_1 and B_1. After the merger, if there are still competitive fringe firms supplying the stand-alone products in both markets, the merger will not alter the competitiveness of these markets. The stand-alone products will continue to be offered at a competitive price equal to the marginal cost, while the merged entity charges a margin $\mu^m = \sigma^m$ for the bundle.

However, pure bundling reduces competition if there remains only a single stand-alone firm in a market after the merger. This situation can occur $n_A = 2$ and/or $n_B = 2$. Consider the scenario with $n_A = n_B = 2$. Following the merger between A_1 and B_1, there is only one stand-alone firm remaining in each market, A_2 in market A and B_2 in market B. The remaining

[16] We use the superscript m to denote the equilibrium of mixed bundling and p to denote the equilibrium of pure bundling.

stand-alone firms, A_2 and B_2, set positive margins $\alpha > 0$ and $\beta > 0$, respectively. In this case, the cut-off threshold for consumption synergies becomes $\sigma = \mu - \alpha - \beta$.

Stand-alone firms A_2 and B_2 face a demand function $F(\sigma)$ and earn positive profits $\Pi_A = \alpha F(\sigma)$ and $\Pi_B = \beta F(\sigma)$, respectively, while the merged entity M earns a profit $\Pi_M = \mu(1 - F(\sigma))$. All of these profit functions are strictly quasi-concave. The best responses for the stand-alone firms are given by $\alpha = \beta = k(\sigma)$, while the best response for M is $\mu = h(\sigma)$. Substituting these into the equation $\sigma = \mu - \alpha - \beta$, we find that the equilibrium cut-off threshold, $\tilde{\sigma}^p$, satisfies:

$$\tilde{\sigma}^p = h(\tilde{\sigma}^p) - 2k(\tilde{\sigma}^p). \tag{2}$$

Since the left-hand side of the equation is strictly increasing and the right-hand side is strictly decreasing, it follows that the equation has a unique solution. The equilibrium margins for the bundle and stand-alone products are given by $\tilde{\mu}^p = h(\tilde{\sigma}^p)$ and $\tilde{\alpha} = \tilde{\beta} = k(\tilde{\sigma}^p)$, respectively. After the merger, firms' profits are $\Pi_M^p(\tilde{\sigma}^p) = h(\tilde{\sigma}^p)[1 - F(\tilde{\sigma}^p)]$ and $\Pi_A^p(\tilde{\sigma}^p) = \Pi_B^p(\tilde{\sigma}^p) = k(\tilde{\sigma}^p) F(\tilde{\sigma}^p)$.

The above analysis reveals two anti-competitive effects that have not been extensively discussed in the literature. Firstly, the portfolio differentiation effect resulting from the merger can soften competition among the stand-alone firms when the merged entity commits to pure bundling. In scenarios where there is only one stand-alone firm remaining in each market after the merger, this effect leads to higher prices for the stand-alone products, which in turn increases the price for the bundle due to strategic complementarity.

Secondly, the conglomerate merger transforms the initially independent stand-alone products into complements, as consumers now compare the combined stand-alone products with the bundle. This creates a double-marginalization problem among the stand-alone firms, where each firm charges a margin $k(\sigma)$ as a result of the Cournot effect for complementary goods. The presence of double-marginalization drives up prices for the stand-alone products, further benefiting the merged firm M due to the strategic complementarity in price competition.

These findings diverge from the conventional understanding of conglomerate mergers. It is commonly believed that conglomerate mergers can alleviate double-marginalization problems for the merging parties, which is considered an important efficiency gain associated with such mergers. For example, Katz (2014) argued that the AT&T-DIRECTV merger would enable the merged entity to internalize the pricing externality for the bundle. However, our analysis demonstrates that conglomerate mergers have the potential to create or worsen the double-marginalization problem among competitors by transforming independent products into complements.

Suppose there is a competitive fringe in one market, specifically market B, where the number of firms is greater than in market A ($n_B > n_A = 2$). After the merger, market B remains competitive with $\beta = 0$, while market A is served by a single stand-alone firm. By applying the same analysis as before, but with the substitution of $\beta = 0$, the equilibrium margins are determined by $\hat{\mu}^p = h(\hat{\sigma}^p)$ and $\hat{\alpha} = k(\hat{\sigma}^p)$, where $\hat{\sigma}^p$ is the solution to:

$$\hat{\sigma}^p = h(\hat{\sigma}^p) - k(\hat{\sigma}^p). \tag{3}$$

The portfolio differentiation effect leads to an increase in the price of the stand-alone product in market A when the conglomerate adopts pure bundling. However, the double-marginalization effect does not occur in this case since market B remains competitive.

Compared to the equilibrium with two highly concentrated markets ($n_B = n_A = 2$), the merged entity attracts more consumers, sets a lower price for the bundle, and earns lower profits. On the other hand, the stand-alone firm in market A charges a higher price, but consumers who choose to combine the two stand-alone products face a lower total price.

The next proposition summarizes the above analysis as well as the comparison of equilibrium outcomes under three different scenarios:

Proposition 2 *Suppose the merged entity commits itself to pure bundling. There exists an equilibrium threshold $\sigma^p \in (0, \bar{s})$ such that consumers with consumption synergies lower than σ^p buy the products on a stand-alone basis whereas others buy the bundle. Moreover:*

- *if $n_A, n_B \geq 3$, then the equilibrium outcomes are the same as with mixed bundling: $\sigma^p = \sigma^m$;*
- *if $n_B = n_A = 2$, then $\sigma^p = \tilde{\sigma}^p$ is given by (2). The equilibrium prices are $\tilde{\mu}^p = h(\tilde{\sigma}^p)$ and $\tilde{\alpha} = \tilde{\beta} = k(\tilde{\sigma}^p)$, while the equilibrium profits are $\Pi_M^p(\tilde{\sigma}^p)$ and $\Pi_A^p(\tilde{\sigma}^p) = \Pi_B^p(\tilde{\sigma}^p)$.*
- *if $n_B > n_A = 2$, then $\sigma^p = \hat{\sigma}^p$ is determined by (3). The equilibrium prices are $\hat{\mu}^p = h(\hat{\sigma}^p)$ and $\hat{\alpha} = k(\hat{\sigma}^p)$ while the equilibrium profits are $\Pi_M^p(\hat{\sigma}^p)$ and $\Pi_A^p(\hat{\sigma}^p)$;*
- *$\sigma^m > \hat{\sigma}^p > \tilde{\sigma}^p$, $\mu^m < \hat{\mu}^p < \tilde{\mu}^p$, and $\Pi_M^m(\sigma^m) < \Pi_M^p(\hat{\sigma}^p) < \Pi_M^p(\tilde{\sigma}^p)$. In addition, $\hat{\alpha} > \tilde{\alpha}$ while $\tilde{\alpha} + \tilde{\beta} > \hat{\alpha}$.*

Proof. See Appendix B. ■

3.3 Welfare Analysis

Before the merger, consumers faced competitive prices in both markets. The total consumer surplus, denoted as $S^0 = w$, served as a benchmark. The merger generates consumption synergies, which are partially retained by the merged firm. If the merged entity engages in mixed bundling, the merger benefits consumers who purchase the bundle without negatively impacting other consumers who choose to combine the stand-alone products. Thus, the merger is welfare-improving.

Suppose the conglomerate engages in pure bundling. Pure bundling does not affect the competitive price for stand-alone products when both markets are not highly concentrated, specifically when $n_A, n_B \geq 3$. However, in highly concentrated markets (i.e., any market i where $n_i = 2$), pure bundling eliminates competition among stand-alone firms. This results in increased prices for stand-alone products, subsequently raising the price for the bundle. To assess the overall impact of the merger in the case of pure bundling, we will now calculate the total consumer surplus after the merger.

Consider the first case where only one market is concentrated, specifically when $n_B > n_A = 2$. In this scenario, the conglomerate charges $\hat{\mu}^p = h(\hat{\sigma}^p)$, while stand-alone firms charge $\hat{\alpha} = k(\hat{\sigma}^p)$ and $\beta = 0$. The total consumer surplus in this case can be expressed as:

$$\hat{S}^p = \int_0^{\hat{\sigma}^p} (w - \hat{\alpha})\, dF(s) + \int_{\hat{\sigma}^p}^{\bar{s}} (w + s - \hat{\mu}^p)\, dF(s) = \int_0^{\bar{s}} (w - \hat{\alpha})\, dF(s) + \int_{\hat{\sigma}^p}^{\bar{s}} (s - \hat{\sigma}^p)\, dF(s),$$

where we used $\hat{\sigma}^p = \hat{\mu}^p - \hat{\alpha}$ to derive the second equality. The first term in the second equality represents the surplus from purchasing stand-alone products, while the second term represents the additional benefit from buying the bundle (noting that consumers opt for the bundle only if $s > \hat{\sigma}^p$). Therefore, the change in consumer surplus due to the conglomerate merger can be expressed:

$$\Delta S = \hat{S}^p - S^0 = \int_{\hat{\sigma}^p}^{\bar{s}} (s - \hat{\sigma}^p)\, dF(s) - \hat{\alpha}.$$

The merger results in an increased price for the stand-alone product A, which negatively impacts consumers who combine stand-alone products. However, consumers with significant consumption synergies experience a benefit of $s - \hat{\sigma}^p$ when purchasing the bundle. A conglomerate merger reduces total consumer surplus whenever the harm from higher stand-alone prices exceeds the benefit from consumption synergies:

$$\hat{\alpha} = k(\hat{\sigma}^p) > \int_{\hat{\sigma}^p}^{\bar{s}} (s - \hat{\sigma}^p)\, dF(s). \tag{4}$$

Whether this condition holds depends on the distribution of the consumption synergies.

The same analysis applies to the case with two highly concentrated markets (i.e., $n_A = n_B = 2$), where the conglomerate merger reduces total consumer surplus if:

$$\tilde{\alpha} + \tilde{\beta} = 2k\left(\tilde{\sigma}^p\right) > \int_{\tilde{\sigma}^p}^{\bar{s}} \left(s - \tilde{\sigma}^p\right) dF\left(s\right).$$

We provide an illustrative example with a uniform distribution of consumption synergies: $F(s) = s/\bar{s}$. Suppose M engages in pure bundling. For $n_B > n_A = 2$, the equilibrium outcomes are:

$$\hat{\sigma}^p = \frac{\bar{s}}{3},\ \hat{\mu}^p = \frac{\bar{s}}{2},\ \hat{\alpha} = \frac{\bar{s}}{3}.$$

In this case, the merger reduces total consumer surplus since $\Delta S = -11\bar{s}/54 < 0$. For the case with $n_B = n_A = 2$, the equilibrium outcomes are:

$$\tilde{\sigma}^p = \frac{\bar{s}}{4},\ \tilde{\mu}^p = \frac{3\bar{s}}{4},\ \tilde{\alpha} = \tilde{\beta} = \frac{\bar{s}}{4}.$$

Once again, the merger reduces total consumer surplus since $\Delta S = -7\bar{s}/32 < 0$.

The following proposition summarizes the welfare analysis:[17]

Proposition 3 *Suppose the merged entity commits itself to pure bundling. This practice does not have a harmful impact on consumers when both markets are not highly concentrated ($n_i \geq 3$ for $i = A, B$). However, if at least one market is highly concentrated (i.e., $n_i = 2$ for some market $i \in \{A, B\}$), pure bundling after the conglomerate merger increases the price for the stand-alone product in market i and harms consumers who opt for these products. This reduction in consumer surplus occurs under certain distributions of consumption synergies.*

4 Production Differentiation and Cannibalization Effect

The baseline analysis suggests that a conglomerate merger has no anti-competitive effect without pure bundling, even if the markets are highly concentrated. However, this result relies on the assumption that firms' products are perfect substitutes. In such cases, the prices for stand-alone products remain at cost under mixed bundling.

[17] As all consumers are always served here, a conglomerate merger always increases total social welfare. Buying stand-alone products generates the same social value as pre-merger, w, while purchasing the bundle generates higher social value, $w+s$. Pure bundling makes the merger even more welfare-enhancing when at least one market is highly concentrated, as it induces more consumers to buy the bundle.

When the merged entity offers stand-alone products alongside the bundle, it can tempt certain consumers to purchase the stand-alone products instead of opting for the bundle, particularly if the combined price of stand-alone products is lower than that of the bundle. This leads to a cannibalization effect, which can decrease the sales of the bundle.

In cases where stand-alone products are perfect substitutes, the cannibalization effect does not affect the merged entity. If the prices for the stand-alone products remain at cost after the merger, the merged entity lacks incentives to offer the stand-alone products as it does not generate any profit from them. However, if there is only one stand-alone firm remaining in a particular market after the merger, which charges a positive margin, the merged entity M can capture the entire demand for stand-alone products by slightly undercutting the rival's price. This strategy has a negligible impact on M's bundle sales.

Conversely, when the products are differentiated, the merged entity faces a new pricing trade-off for its stand-alone products. To increase sales of these products, it needs to significantly reduce their prices, which, in turn, entices some consumers to switch from the bundle to stand-alone products. The concern about cannibalization effect reduces competition and leads to higher prices for the stand-alone products.

We analyze the cannibalization effect in a setting that involves horizontal product differentiation in both markets. Specifically, we examine the case of highly concentrated markets (i.e., $n_A = n_B = 2$) and consider standard horizontal differentiation in the style of Hotelling. For the sake of simplicity in our analysis, we assume perfect correlation between the two markets. Formally, consumers are uniformly distributed along the Hotelling line. Two firms, denoted as A_1 and B_1, are located at one end, while the other two firms, A_2 and B_2, are situated at the opposite end. In what follows, A_j and B_j, where $j = 1, 2$, will interchangeably refer to the firms or their respective product varieties. To simplify notation, we use α_j and β_j to represent the margins for A_j and B_j, respectively.

In market A, a consumer located at $x \in [0, 1]$ derives a net utility of $w_A - \alpha_1 - tx$ from purchasing A_1, and a net utility of $w_A - \alpha_2 - t(1 - x)$ from purchasing A_2, where $t > 0$ denotes the level of product differentiation. Similarly, in market B, the same consumer obtains a net utility of $w_B - \beta_1 - tx$ from buying B_1 and $w_B - \beta_2 - t(1 - x)$ from B_2. We assume $w_A, w_B > 3t$ to ensure full market coverage.

Furthermore, we assume that consumption synergies are uniformly distributed over $[0, 1]$, with $F(s) = s$, to facilitate the tractability of our analysis. Since markets A and B are symmetric in this context, we concentrate on the symmetric equilibrium in which $\alpha_1 = \beta_1 \equiv \rho_1$ and

$\alpha_2 = \beta_2 \equiv \rho_2$.

Before the merger, the two markets operate independently. Consumers located at $x < \hat{x} \equiv \frac{1}{2} - \frac{\rho_1 - \rho_2}{2t}$ choose to purchase the combination $\{A_1, B_1\}$, while others opt for the mix $\{A_2, B_2\}$. Firms A_1 and B_1 earn a profit of $\rho_1 \hat{x}$, while A_2 and B_2 earn $\rho_2 (1 - \hat{x})$. The firms' best responses are determined by $\rho_1 = 2t\hat{x}$ and $\rho_2 = 2t(1 - \hat{x})$. Solving for these best responses yields the Hotelling price margins $\rho_1^* = \rho_2^* = t$, and each firm earns a profit of $t/2$.

4.1 Equilibrium Analysis

Consider the merger between A_1 and B_1. Suppose the merged entity does not commit itself to pure bundling. In this scenario, the merged entity offers A_1 and B_1 as stand-alone products and also provides the bundle $A_1 - B_1$ at a margin μ. Since consumers' preferences are perfectly correlated across markets, three options become relevant: the bundle $A_1 - B_1$ and two combinations of stand-alone products, $\{A_1, B_1\}$ and $\{A_2, B_2\}$. For a consumer located at x, the net utility obtained from the bundle is $w + s - \mu - 2tx$, while the net utility from the combination $\{A_1, B_1\}$ is $w - \alpha_1 - \beta_1 - 2tx$, and the net utility from the combination $\{A_2, B_2\}$ is $w - \alpha_2 - \beta_2 - 2t(1 - x)$.

In the symmetric equilibrium where $\alpha_1 = \beta_1 = \rho_1$ and $\alpha_2 = \beta_2 = \rho_2$, consumers located at $x < \hat{x} \equiv \frac{1}{2} - \frac{\rho_1 - \rho_2}{2t}$ and with$s \geq \sigma_1 \equiv \mu - 2\rho_1$ choose to buy the bundle, while those with $x < \hat{x}$ and $s < \sigma_1$ opt for the $\{A_1, B_1\}$ combination. On the other hand, consumers located at $x > \hat{x}$ and $s \geq \sigma_2(x) \equiv \mu - 2\rho_2 + 4t(x - \frac{1}{2})$ purchase the bundle, while those with $x > \hat{x}$ and $s < \sigma_2(x)$ go for the combination $\{A_2, B_2\}$. The demand for each option is illustrated in Figure 1.

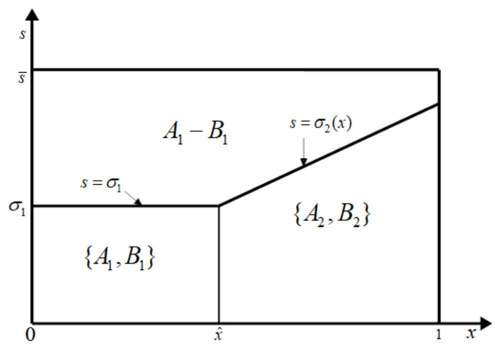

Figure 1: Weak differentiation

The provision of stand-alone products $\{A_1, B_1\}$ alongside the bundle generates two opposing effects on M's profit. On one hand, it creates direct competition with the portfolio $\{A_2, B_2\}$ as it did before the merger. Now, consumers with $x \leq \hat{x}$ prefer $\{A_1, B_1\}$ over $\{A_2, B_2\}$. This direct competition reduces the demand for $\{A_2, B_2\}$ to $\int_{\hat{x}}^{1} \sigma_2(x)\, dx$. The merged entity now attracts consumers in the region where $x \in [0, \hat{x}]$ and $s \leq \sigma_2(x)$ to purchase its stand-alone products $\{A_1, B_1\}$, resulting in a profit from direct competition of $2\rho_1 \int_0^{\hat{x}} \sigma_2(x)\, dx$.

On the other hand, offering stand-alone products $\{A_1, B_1\}$ leads to a cannibalization effect on the bundle $A_1 - B_1$. The merged firm must set a lower total price for the combination $\{A_1, B_1\}$ compared to the price of the bundle $A_1 - B_1$; otherwise, no one will purchase $\{A_1, B_1\}$. By offering a price discount for $\{A_1, B_1\}$, consumers who experience relatively low consumption synergies such that $s \leq \sigma_1$ will now choose $\{A_1, B_1\}$ over the bundle, resulting in a loss from cannibalization, $\sigma_1 \int_0^{\hat{x}} (\sigma_1 - \sigma_2(x))\, dx$.

If M continues to offer stand-alone products, its total profit can be expressed as follows:

$$\Pi_M = \mu[1 - \int_{\hat{x}}^{1} \sigma_2(x)\, dx] - \sigma_1^2 \hat{x}. \tag{5}$$

In this expression, the first term represents the potential profit M would obtain if all its customers were to purchase the bundle. The second term represents the loss resulting from the cannibalization effect. This loss arises from the foregone benefits of selling stand-alone products instead of the bundle to consumers with $x < \hat{x}$ and $s < \sigma_1$, at a discount of $\mu - 2\rho_1 = \sigma_1$, amounting to $\sigma_1^2 \hat{x}$. In contrast, the profits of the stand-alone firms are given by:

$$\Pi_A = \alpha_2 \int_{\hat{x}}^{1} \sigma_2(x)\, dx \text{ and } \Pi_B = \beta_2 \int_{\hat{x}}^{1} \sigma_2(x)\, dx.$$

The conglomerate merger does not affect the best response of the stand-alone firms. Let's consider the impact of a slight increase in A_2's equilibrium price, $\alpha_2 = \rho_2$, by ε. By using the definition of $\hat{x}$ and $\sigma_1 = \mu - 2\rho_1$, we can rewrite the cut-off threshold as $\sigma_2(x) = \mu - 2\rho_1 + 4t(x - \hat{x}) = \sigma_1 + 4t(x - \hat{x})$. The stand-alone firm A_2 earns additional profit from consumers with $x \geq \hat{x}$ and $s \leq \sigma_2(x)$:

$$\varepsilon \int_{\hat{x}}^{1} \sigma_2(x)\, dx = (1 - \hat{x})[\sigma_1 + 2t(1 - \hat{x})]\, \varepsilon.$$

However, increasing the price of A_2 leads to a reduction in demand and results in a loss from two sources. First, marginal consumers with $x \geq \hat{x}$ and $s = \sigma_2(x)$ will now choose to purchase the bundle rather than $\{A_2, B_2\}$, resulting in a loss of $\frac{d\sigma_2(x)}{d\rho_2} \varepsilon \times \rho_2 (1 - \hat{x}) = \rho_2 (1 - \hat{x})\, \varepsilon$. Second, marginal consumers with $x = \hat{x}$ and $s \leq \sigma_2(\hat{x}) = \sigma_1$ will opt for A_1 instead of A_2, leading to a loss of $\frac{d\hat{x}}{d\rho_2} \varepsilon \times \rho_2 \sigma_1 = \frac{\rho_2 \sigma_1}{2t} \varepsilon$. The total loss incurred is $\frac{\rho_2}{2t} [\sigma_1 + 2t(1 - \hat{x})]\, \varepsilon$. Since the demand and its derivative are multiplied by the same factor, the best responses of the stand-alone firms remain unchanged after the merger,[18] as given by $\rho_2 = 2t(1-\hat{x})$.

In contrast, the cannibalization effect alters M's best responses in stand-alone prices. A slight increase in $\alpha_1 = \rho_1$ by ε generates an additional profit of $\sigma_1 \hat{x} \varepsilon$ from selling A_1 to consumers with $x \leq \hat{x}$ and $s \leq \sigma_1$. Moreover, increasing ρ_1 also causes marginal consumers with $s = \tau_1$ and $x \leq \hat{x}$ to choose the bundle instead of $\{A_1, B_1\}$, resulting in a gain of $\sigma_1 \hat{x} \varepsilon$ by mitigating the cannibalization effect. In this case, the benefit gained from limiting the cannibalization effect equals the extra profit from selling A_1. However, such modification leads to a loss of demand for A_1, as marginal consumers with $s \leq \tau_1$ and $x = \hat{x}$ will now opt for $\{A_2, B_2\}$, resulting in a loss of $\frac{\rho_1}{2t}\sigma_1 \varepsilon$.

By equating the marginal benefit to the marginal cost for this alteration, we obtain the best response: $\rho_1 = 4t\hat{x}$. Hence, M's best response in stand-alone prices is twice as large as its pre-merger best response, $\rho_1 = 2t\hat{x}$. Substituting this into the definition of $\hat{x}$ and solving for the equilibrium cut-off threshold yields $\hat{x}^m = \frac{3}{8}$ (the superscript m stands for "mixed bundling").

Before the merger, the firms competed for stand-alone products, with each firm attracting half of the consumers. The cut-off threshold for x was at 1/2. However, after the merger, the merged entity becomes less aggressive in competing for stand-alone products due to the cannibalization effect. This change results in the stand-alone firms capturing more than half of the market share, with $1 - \hat{x}^m = 5/8$. As a result, all firms now charge higher margins for the stand-alone products compared to the pre-merger period:

$$\rho_1^m = \frac{3}{2}t, \; \rho_2^m \equiv \frac{5}{4}t. \tag{6}$$

As a result, consumers who purchase the stand-alone products are worse-off after the merger. The conglomerate sets higher prices for its stand-alone products compared to its rival: $\hat{\rho}_1 > \hat{\rho}_2$. While increasing the prices for its stand-alone products leads to some loss in demand to the rival, it also encourages more consumers to choose the bundle rather than the combination $\{A_1, B_1\}$, resulting in higher profits for the conglomerate.

In response to these stand-alone prices, M's equilibrium margin for the bundle is given by:

$$\mu^m \equiv \frac{1}{2} + \frac{107}{64}t. \tag{7}$$

This margin represents the expected consumption synergies (under the uniform distribution), which is 1/2, along with the price premium arising from the limitation of the cannibalization

[18] This feature relies on the specific Hotelling demand model used in this analysis, but it allows for a clear identification of the key driving forces. In more complex settings, the firms' responses may also depend on the price of the bundle.

effect, $(107/64)t$. The equilibrium with mixed bundling occurs only when $\mu^m > 2\rho_1^m$, which holds true when $t < t_m \equiv 32/85$.

Equilibria with de facto pure bundling

As the level of product differentiation increases, it becomes more costly for the conglomerate to attract consumers who would have purchased the stand-alone products $\{A_2, B_2\}$ from the rivals, to instead choose M's stand-alone offerings $\{A_1, B_1\}$. Consequently, competition among stand-alone products becomes less intense as t increases. In this scenario, the conglomerate has an incentive to raise the prices for stand-alone products in order to mitigate the loss from the cannibalization effect. By increasing its stand-alone margins, ρ_1, the conglomerate encourages some consumers to switch to the bundle, resulting in higher profits. As a result, as t increases, M benefits more from the sales of its bundle while gaining less from selling stand-alone products. Consequently, the threshold $\sigma_1 = \mu - 2\rho_1$ decreases as t increases.

When products are strongly differentiated (i.e., $t > t_M$, implying $\mu^m \leq 2\rho_1^m$), the merged entity refrains from selling its stand-alone products, even if it does not commit itself to pure bundling. In this scenario, the fear of the cannibalization effect leads to *de facto* pure bundling. In the scenario of *de facto* pure bundling, consumers choose between $A_1 - B_1$ and $\{A_2, B_2\}$, and they prefer the bundle when $s \geq \sigma_2(x) = \mu - \alpha_2 - \beta_2 + 4t\left(x - \frac{1}{2}\right)$. Alongside the horizontal differentiation between the two product lines, the consumption synergy creates vertical differentiation between $A_1 - B_1$ and $\{A_2, B_2\}$. Both effects contribute to the differentiation of the portfolio, but the underlying mechanisms for softening competition are distinct.

To illustrate this, we can rewrite the cut-off threshold $s = \sigma_2(x)$ as $\mu - \alpha_2 - \beta_2 = s + 4t\left(\frac{1}{2} - x\right)$. Marginal consumers with $s = \sigma_2(x)$ pay an additional premium of $\mu - \alpha_2 - \beta_2$ for the bundle, which comprises the combination of two effects: the positive vertical differentiation effect, s, and the horizontal differentiation effect, $4t\left(\frac{1}{2} - x\right)$. The vertical effect, s, is always positive, while the horizontal effect is positive for more loyal consumers (i.e., $x \leq 1/2$) and becomes negative for less loyal consumers (i.e., $x > 1/2$). Consumers who are located closer to zero are willing to pay an extra premium of $2t$ for the bundle, even if they receive zero consumption synergy. This premium becomes significant when t is large. As a result, the conglomerate can exploit loyal consumers who fall within the range of consumption synergies between 0 and $\tilde{x}$ (where $\tilde{x} > 0$ denotes the threshold value of x such that $\sigma_2(\tilde{x}) = 0$).

We summarize the above analysis in the following proposition and leave the complete characterization of equilibria and existence to Online Appendix A:

Proposition 4 *Consider the scenarios where products are horizontally differentiated à la Hotelling* *with perfect correlation across markets. Suppose the merged entity does not commit to pure bundling. In the scenario of weak product differentiation (i.e., $t < t_m$), there exists a unique symmetric equilibrium where the merged entity engages in mixed bundling. The conglomerate merger leads to a cannibalization effect, resulting in higher stand-alone prices for all firms, with a greater impact on the merged entity. In the case of strong product differentiation (i.e., $t > t_m$), there exists a unique symmetric equilibrium where the merged entity engages in de facto pure bundling.*

4.2 Welfare Analysis

Although the conglomerate merger generates consumption synergies and can benefit consumers who purchase the bundle, it also leads to higher prices for stand-alone products, negatively impacting consumers who buy these products. This effect becomes less significant when the products are less differentiated. As a result, we can expect total consumer surplus to increase when t is small, which is confirmed by the welfare analysis. However, when the products are sufficiently differentiated such that $t > t_s \simeq 0.49$ (greater than t_m), the total consumer surplus decreases.[19]

The merger has a mixed impact on rival firms. The stand-alone firms benefit from the increase in stand-alone prices, but they also experience a loss in market share due to competition from the bundle. However, as the products become more differentiated, the gains from price increases can outweigh the losses from diminished market share. We demonstrate that the merger increases the stand-alone firms' profits when $t > t_r \equiv \frac{3+2\sqrt{2}}{4}$ (greater than t_s).

The above welfare analysis is summarized below:

Proposition 5 *When products are horizontally differentiated, the conglomerate merger results in higher prices for stand-alone products, negatively impacting consumers who purchase these products. Furthermore, there exist thresholds $t_s > t_m$ and $t_r > t_s$ such that:*

- *the merger increases total consumer surplus if $t < t_s$, but decreases it otherwise;*
- *the merger harms rivals if $t < t_r$, but benefits them otherwise.*

[19] It is important to note that the merger increases total consumer surplus as long as the merged entity continues to sell its products on a stand-alone basis.

5 Merger Dynamics and Preemption

In the baseline analysis, we employed a static model comprising two markets, wherein firms within each market supply identical products. After the initial merger between firms A_1 and B_1, the incentives for conducting additional conglomerate mergers diminish for the remaining firms. This is primarily attributed to the fact that a potential merger between firms A_2 and B_2, for instance, would create another conglomerate firm offering an identical product portfolio. Consequently, Bertrand competition between two identical portfolios would drive their profit margins to zero. As a result, the market structure exhibits stability subsequent to the first merger.

In certain cases, conglomerate mergers may encompass more than two markets, leading stand-alone firms to consider a second merger in order to create a distinct product portfolio subsequent to the initial merger. Such consecutive mergers would intensify competition among diverse portfolios, ultimately benefiting consumers. However, the already merged entity has the ability to preempt the consecutive merger by expanding its own range of portfolios. In this section, we extend the baseline model to examine the dynamics of merger activities. We provide a brief overview of the modeling features and key findings, while the comprehensive analysis and proofs can be found in Online Appendix B.

Consider scenarios with three product markets labeled as $i = A, B, C$, each initially served by $n_i \geq 2$ identical firms with a constant marginal cost c_i. For simplicity, we assume symmetry in the number of firms in each market, that is, $n_A = n_B = n_C = n \in \{2, 3, m\}$, where $m \geq 4$. On the demand side, there exists a population of consumers with a unit mass, who derive homogeneous utility $u_i > c_i$ from consuming product i, where $i = A, B, C$. The social value generated by product i is denoted as $w_i = u_i - c_i$, and the total social value is represented by $w \equiv w_A + w_B + w_C$.

In this context, there are two types of conglomerate mergers. Firstly, there are mergers between two firms, as previously discussed, which can occur between any two product markets: $A_j - B_j$, $A_j - C_j$, or $B_j - C_j$, where $j = 1, 2, ..., n_i$. Since the firms are symmetric, we only need to consider mergers between pairs of firms from different markets. The resulting merged entity is referred to as the conglomerate M, and its bundle of two products is denoted as $\mathcal{B}_M$. Similar to the baseline model, we assume that consumers experience consumption synergies s when they consume a bundle of two products.

Secondly, there are mergers involving three firms, such as $A_j - B_j - C_j$, where the merged entity can offer a bundle of three products. Consuming a bundle of three products generates consumption synergies $2s$. We refer to this merged entity as the conglomerate L, and its bundle of three products is denoted as $\mathcal{B}_L$. For simplicity, we assume that the consumption synergies are uniformly distributed within the unit interval $[0, 1]$.

As a result of the conglomerate mergers, there will be three possible product portfolios available to consumers. These portfolios are:

- Portfolio $\mathcal{P}_L$: This portfolio includes the bundle $\mathcal{B}_L$ offered by the conglomerate L, which comprises all three products $A_j - B_j - C_j$. Consumers derive a gross value of $w + 2s$ from consuming this portfolio.

- Portfolio $\mathcal{P}_M$: This portfolio consists of a bundle $\mathcal{B}_M$ (e.g., $A_j - B_j$) offered by the conglomerate M, along with a stand-alone product C_j. Consumers derive a gross value of $w + s$ from consuming this portfolio.

- Portfolio $\mathcal{P}_S$: This portfolio comprises three stand-alone products, namely A_j, B_j, and C_j. Consumers derive a gross value of w from consuming this portfolio.

We consider a dynamic game comprising two stages of mergers and a third stage of price competition. In each merger stage, there is a once-in-a-lifetime opportunity for three firms to form either the conglomerate L or M. To maintain symmetry, we assume that three firms are selected randomly from the available firms. Furthermore, we assume that the merger bargaining process is efficient, meaning that a merger occurs only if the joint profit of the merging firms surpasses the sum of their individual profits as stand-alone firms. Once the merger decision is made, the merged entity determines its bundling strategy. It is worth noting that all decisions related to mergers, bundling, and prices are publicly observable.

Formally, the game unfolds according to the following timing:

- Stage 1: Three firms, namely A_j, B_j, and C_j, are randomly selected to consider a merger. They have the option to form either the conglomerate L, the conglomerate M, or remain as stand-alone firms. If the firms agree to a merger, the merged entity announces its bundling decision.

- Stage 2: Three firms, different from A_j, B_j, and C_j, are randomly chosen to consider a merger. They have the choice to form either L, M, or remain stand-alone. If the firms agree to merge, the merged entity determines its product bundles.

- Stage 3: All firms simultaneously set their prices. Following this, consumers make their purchase decisions based on the available portfolios and their preferences.

In the absence of conglomerate mergers, Bertrand competition drives prices down to the costs and all firms earn zero profits. Consequently, in the absence of mergers, firms always have an incentive to initiate the first merger, as portfolio differentiation allows for profit generation. Conversely, if a conglomerate already exists, attempting to form a second conglomerate with an identical portfolio would trigger unprofitable Bertrand-type competition between the two conglomerates.

This holds true for conglomerate L, which consists of three products, such as $A_1 - B_1 - C_1$ or $A_2 - B_2 - C_2$. It is also applicable to conglomerate M, which includes two products from different markets, for example, $A_1 - B_1$ or $B_2 - C_2$. Since combining the bundle $A_1 - B_1$ with a stand-alone product C_j produces the same total consumer value as mixing the bundle $B_2 - C_2$ with a stand-alone product A_j, both equal to $w + s$, these two merged entities offer identical portfolios. Consequently, engaging in such a merger would not be profitable due to the neck-to-neck competition between the conglomerates.

The above analysis narrows down the possible equilibria, as summarized in the following Lemma:

Lemma 1 *Consider the dynamic merger game involving three product markets. In any equilibrium:*

- *there is at least one conglomerate merger;*
- *there is at most one conglomerate L and at most one conglomerate M.*

In our analysis, we investigate the equilibria in three distinct scenarios: highly concentrated markets with $n = 2$, mildly concentrated markets with $n = 3$, and dispersed markets with $n \geq 4$. For each scenario, we initially examine the equilibrium outcomes resulting from various market configurations following the mergers, namely, the configuration with two conglomerates L and M, the configuration with only one conglomerate L, and the configuration with only one conglomerate M. We characterize the equilibrium under different bundling options and calculate the equilibrium profits of the merged firms. By comparing the profits obtained under different configurations, we can determine the subgame perfect Nash equilibrium for the dynamic merger game.

After a conglomerate merger involving three firms (A_1, B_1, and C_1), the merged firm L has multiple options for bundling decisions. It is intuitively clear that offering the stand-alone products would not benefit the merged firm. Instead, L can choose to offer a pure bundle $\mathcal{B}_L$, which includes all three products, and/or a pure bundle $\mathcal{B}_M$, such as A_1-B_1. If L is restricted to offering only one bundle, it will naturally choose to offer $\mathcal{B}_L$ since it generates more consumption synergies.

Suppose L commits itself to offering both bundles, $\mathcal{B}_L$ and $\mathcal{B}_M$. According to Lemma 1, there will be no consecutive mergers. This is because any consecutive merger to form the conglomerate L or M would result in Bertrand-type competition between two identical portfolios, rendering the second merger unprofitable. Therefore, after the first merger, the conglomerate L can strategically preempt any successive mergers by offering a full range of product bundles. We examine the possibility of preemption in the equilibrium under three different scenarios.

Highly Concentrated Markets

In the first scenario with highly concentrated markets, where $n_A = n_B = n_C = 2$, after the first conglomerate merger of three firms (A_1, B_1, and C_1), there is one stand-alone firm remaining in each market. The merged firm L engages in pure bundling. Then, the stand-alone firms in each market become the exclusive suppliers of the stand-alone product and can charge a positive margin for consumers who choose to mix the stand-alone products.

Suppose the merged firm L offers the large bundle $\mathcal{B}_L$ only. Although a second merger would allow the merged firm M to exploit consumption synergies, it would also intensify competition with the existing conglomerate L. In our analysis, we demonstrate that the benefits derived from remaining as stand-alone firms outweigh the profits that would be obtained from conducting the second merger. Consequently, there are no consecutive mergers after the first one. Given that the conglomerate L is the sole merged entity, it is preferable for L to offer the bundle $\mathcal{B}_L$ only. Introducing an additional bundle $\mathcal{B}_M$ would lead to a cannibalization effect, diminishing the profits of the merged firm. Thus, in the case of highly concentrated markets where all three markets have only two firms each, there is no need for preemption, and the remaining firms will not conduct a second merger after the first conglomerate merger forming L.

Less Concentrated Markets

In the case of mildly concentrated markets, where $n_A = n_B = n_C = 3$, the dynamics following the first merger among three firms (A_1, B_1, and C_1) are different. After the merger, there are two remaining stand-alone firms in each market, and the presence of Bertrand-type competition drives their prices down to cost.

In the context of the merged entity L, a new trade-off arises in its bundling decision. If L commits to offering both bundles $\mathcal{B}_L$ and $\mathcal{B}_M$, it deters any consecutive merger from occurring. Consequently, the stand-alone products continue to have zero margins, exerting competitive pressure on the pricing of bundle $\mathcal{B}_L$. This competitive pressure limits the profit potential for the merged entity L.

On the other hand, if L is restricted to offering the pure bundle $\mathcal{B}_L$ only, a successive merger will take place between two stand-alone firms from different markets, such as A_2 and B_2. Following the second merger, only one stand-alone firm remains in markets A and B, allowing it to charge a positive margin. The successive merger has two opposing effects on L's profits. Firstly, the merger reduces the number of stand-alone firms in the relevant markets and leads to higher prices for these products. Consequently, L can increase the prices for its bundle $\mathcal{B}_L$. However, secondly, the merger introduces a new portfolio $\mathcal{P}_M$, which competes with the existing portfolios $\mathcal{P}_L$ and $\mathcal{P}_S$. As a result, firm L loses some customers due to intensified competition among different portfolios.

Through our analysis, we establish that the negative impact of the second merger on L's profits outweighs the positive effect. As a result, the conglomerate L has strong incentives to preempt the successive merger. In the equilibrium of the dynamic merger game, after the first merger in Stage 1, the conglomerate L commits to offering both bundles $\mathcal{B}_L$ and $\mathcal{B}_M$. This commitment effectively prevents any further mergers from taking place in Stage 2.

Furthermore, in Stage 3, it is not profitable for the conglomerate L to sell both bundles $\mathcal{B}_L$ and $\mathcal{B}_M$. The introduction of bundle $\mathcal{B}_M$ on top of bundle $\mathcal{B}_L$ does not impact the equilibrium prices for the stand-alone products since there are still two remaining stand-alone firms in each market. However, selling both bundles intensifies the competition with the existing portfolios, leading to price reductions for both bundles. In light of this, the conglomerate L strategically chooses to set a sufficiently high price for bundle $\mathcal{B}_M$ to ensure that no consumers will purchase it in equilibrium. By doing so, the conglomerate L maximizes its profits and avoids cannibalization between the two bundles.

The analysis of the equilibrium for dispersed markets with $n \geq 4$ aligns with the previous analysis. After the first merger, it remains profitable for the conglomerate L to preempt any consecutive mergers. Allowing a second merger does not alter the competitiveness of the stand-alone products. However, the introduction of a new portfolio $\mathcal{P}_M$ through the second merger intensifies competition among existing product portfolios, reducing L's profits. Consequently, the equilibrium outcome for dispersed markets with $n \geq 4$ is identical to that of mildly concentrated markets with $n = 3$.

In both cases, the conglomerate L strategically preempts the second merger by committing to offer both bundles, but ultimately only sells the large bundle $\mathcal{B}_L$ in equilibrium. This preemption strategy mitigates competition among different portfolios, resulting in a reduction in total consumer welfare.

Summarizing the above analysis leads to the following proposition:

Proposition 6 *Consider conglomerate mergers involving three product markets in which each market is served by more than two symmetric firms. There exists a unique subgame perfect Nash equilibrium in which three firms conduct the first merger forming a large conglomerate, followed by no subsequent mergers.*

- *In highly concentrated markets with $n = 2$, the remaining stand-alone firms have no incentives to conduct any consecutive merger.*
- *In less concentrated markets with $n \geq 3$, the conglomerate L strategically preempts the second merger by committing to offer both bundles, $\mathcal{B}_L$ and $\mathcal{B}_M$. However, in the equilibrium, L only sells the large bundle $\mathcal{B}_L$ only. Such preemption strategy reduces total consumer surplus.*

6 Extensions

6.1 Monopoly in Market A

Recent conglomerate mergers often involve a (quasi) monopoly in one market (e.g., market A) that acquires a firm in a competitive market (e.g., market B). Prominent examples include the Google/Fitbit merger in 2022 and the Nvidia/Mellanox merger in 2019. The merged entity typically offers bundled products or services, enabling consumers to access additional value through consumption synergies. However, there is a lack of evidence indicating that these merged entities can foreclose competitors or significantly diminish competition in market B. Notably, even after the Google/Fitbit merger, the market for smartwatches and other wearable devices remains competitive, with Fitbit holding a market share of less than 8%. Consequently, competition authorities did not express concerns regarding the potential negative effects of these mergers.

Although these mergers are unlikely to impede competition in market B, they can result in price increases for product A due to the cannibalization effect. Consequently, consumers who purchase product A may be adversely affected. To investigate this scenario further, we consider a variation of the baseline model in which market A is operated by a monopoly firm.

The monopoly produces the stand-alone product with a constant marginal cost $c_A > 0$, while consumers derive a utility $\omega > c_A$ from consuming product A. Consumers have heterogeneous preferences over product A. We assume that the social value generated by product A, denoted by $\omega \equiv \omega - c_A$, varies among individuals and follows a cumulative distribution function $G(\cdot)$ with a continuous density $g(\cdot)$. Additionally, we assume that the function $\lambda(\cdot) \equiv (1 - G(\cdot))/g(\cdot)$ is decreasing.

Before the merger, the monopoly sets a margin α for product A, and consumers derive a net utility of $\omega - \alpha$. Consumers will choose to purchase product A only if their utility ω is greater than the margin α. The monopoly's profit from selling product A can be expressed as $\Pi_A = \alpha(1 - G(\alpha))$. Maximizing the profit Π_A leads to the the monopoly margin α_m, which is determined by $\alpha_m = \lambda(\alpha_m)$.

Market B is served by $n_B \geq 3$ identical stand-alone firms. Bertrand-type competition results in a zero margin for each firm, both before and after the merger. Consequently, consumers obtain a net utility of $w_B = w_B - c_B$ from purchasing product B.

Suppose the monopoly A acquires firm B_1 and offers a bundle $A - B_1$ at a margin μ. Consumers derive a net utility of $\omega + w_B + s - \mu$ from the bundle, where s is distributed according to the cumulative distribution function $F(\cdot)$ as described in the baseline model. We assume that the distributions for s and ω are independent. Our focus is on the scenario where the merged entity continues to offer product A as a stand-alone product with a margin α. Whether or not it continues to offer the stand-alone product B_1 does not affect the market price for product B, which remains at cost after the merger.

Consumers face three options:

- buying the bundle $A - B_1$ yields a net value $\omega + w_B + s - \mu$;
- mixing product A with a stand-alone product B_j gives a net utility $\omega + w_B - \alpha$;
- purchasing the stand-alone product B only provides a net surplus w_B.

We analyze the candidate equilibrium where all options attract consumers. Consumers prefer the bundle $A - B_1$ to the combination $\{A, B_i\}$ if $s \geq \mu - \alpha$, they choose $\{A, B_i\}$ over the stand-alone B_i if $\omega > \alpha$, and they prefer to buy $A - B_1$ instead of B_i only if $s > \mu - \omega$.

Consequently, consumers whose consumption synergy s and valuation ω satisfy $s < \mu - \omega$ and $\omega < \alpha$ will choose the stand-alone product B_i only, resulting in a total population of

$$\Psi(\alpha, \mu) \equiv \int_0^{\alpha} F(\mu - \omega)\, dG(\omega).$$

On the other hand, consumers with s and ω satisfying $s < \mu - \alpha$ and $\omega > \alpha$ will opt for a combination of product A with B_j, generating a demand of $(1 - G(\alpha)) F(\mu - \alpha)$. Finally, the remaining consumers will purchase the bundle, resulting in a total demand of $1 - \Psi(\alpha, \mu - \alpha) - (1 - G(\alpha)) F(\mu - \alpha)$.

The conglomerate chooses μ and α to maximize its profit:

$$\Pi_M = \mu \left[1 - \Psi(\alpha, \mu) - (1 - G(\alpha)) F(\mu - \alpha)\right] + \alpha (1 - G(\alpha)) F(\mu - \alpha),$$

where first term represents its profit from selling the bundle, while the second term represents the additional profit from selling product A as a stand-alone product.

Selling the stand-alone product A alongside the bundle $A - B_1$ leads to the cannibalization effect, resulting in a decrease in demand for the bundle by $(1 - G(\alpha)) F(\mu - \alpha)$. Increasing the margin α helps mitigate this cannibalization effect, and the optimal margin α is determined by the following first-order condition:

$$\alpha g(\alpha) F(\mu - \alpha) = (1 - G(\alpha)) \left[(\mu - \alpha) f(\mu - \alpha) + F(\mu - \alpha)\right]. \tag{8}$$

The equilibrium margin α^* is the solution to:

$$\alpha = \lambda(\alpha) \times \frac{(\mu - \alpha) f(\mu - \alpha) + F(\mu - \alpha)}{F(\mu - \alpha)}.$$

Comparing it to the monopoly price α_m, which is the solution of $\alpha = \lambda(\alpha)$, and noting that $\frac{(\mu-\alpha) f(\mu-\alpha) + F(\mu-\alpha)}{F(\mu-\alpha)} > 1$, we can conclude that $\alpha^* > \alpha_m$.

For further illustration, we consider an example with uniform distributions. Assume $F(s) = s$ and $G(\omega) = \omega/\bar{u}$. Before the merger, the monopoly margin for product A is $\alpha_m = \bar{u}/2$. After the merger, the equilibrium margins for product A and the bundle are $\alpha^* = \frac{2}{3}\bar{u}$ and $\mu^* = \frac{1}{2} + \frac{1}{3}\bar{u}$, respectively. This equilibrium exists only if $\mu^* > \alpha^*$, which holds when $\bar{u} < \frac{3}{2}$. For $\bar{u} > \frac{3}{2}$, we have $\mu^* < \alpha^*$, and no consumers will choose to mix A and B_j. In this case, the conglomerate engages in *de facto* pure bundling.

The merger leads to an increase in the price of product A, which has a negative impact on consumers who choose to mix A and B_j both before and after the merger. Specifically, this negative impact affects consumers with $\omega \geq \alpha_m$ and low consumer synergies such that

$s < \{\mu^* - \alpha^*, \mu^* - \omega\}$. In addition, the merger also negatively affects consumers with $\omega \geq \alpha_m$ and moderate consumption synergies such that $\mu^* - \alpha^* < s < \mu^* - \alpha_m$. These consumers would choose to combine A and B_j before the merger but instead switch to the bundle $A - B_1$ after the merger. On the other hand, the merger does not harm consumers with $\omega < \alpha_m$ who do not purchase A before the merger. Furthermore, it benefits consumers with sufficiently high consumption synergies. Nevertheless, in Online Appendix C, we demonstrate that under uniform distributions, the net impact on total consumer surplus is positive.

The impact of the conglomerate merger on consumers is summarized as follows:

Proposition 7 *Consider a conglomerate merger between a monopoly in market A and a competitive firm in market B. The merger leads to consumption synergies for consumers who purchase the bundled products. However, it also results in an increase in the price of product A, negatively impacting consumers who mix-and-match product A with a stand-alone product B. With uniform distributions for s and ω, the merger increases total consumer surplus.*

6.2 One-stop Shopping Benefits

Our analysis has primarily focused on conglomerate mergers that generate consumption synergies through service or product integration. In these cases, consumers can only benefit from the consumption synergies if they purchase the bundle, rather than the individual stand-alone products. However, in other situations, the merger may enable customers to save on transaction costs through one-stop shopping, even without product integration. In such cases, consumers may still benefit from these synergies even without purchasing a bundle. Our analysis can be easily extended to apply to such situations.

Consider for example a setting where combining products A_1 and B_1 enables consumers to obtain the same consumption synergies as from the bundle $A_1 - B_1$ – consumers must however buy the product from the same supplier to obtain these synergies, and thus cannot derive by mixing a conglomerate's product with rival firms' products. In this setting, consumers treat the portfolio $\{A_1, B_1\}$ as a physical bundle, and prefer it to other combinations $\{A_j, B_j\}$ whenever $s > \sigma = \alpha_1 + \beta_1 - \alpha_j - \beta_j$, where $j \geq 2$.

If the markets for stand-alone products remain competitive after the merger, i.e., $n_A, n_B \geq 3$, the merger generates a net consumer surplus without necessitating an increase in prices by the stand-alone firms. Such mergers are welfare-enhancing. After the merger, the stand-alone firms' products continue to be supplied at cost. However, the merged firm charges a total margin for its portfolio, $\mu^m = \alpha_1 + \beta_1 = h(\sigma^m)$, where σ^m is the same as discussed in the previous section. The only difference from the analysis in the baseline model is that there are multiple equilibria for the prices α_1 and β_1: any combination of α_1 and β_1 that satisfies $\alpha_1 \geq 0$, $\beta_1 \geq 0$, and $\alpha_1 + \beta_1 = h(\sigma^m)$ constitutes a Nash equilibrium. Therefore, the equilibrium margins for the merged firm are not uniquely determined.

It is important to note that in this situation, the merged firm cannot benefit from bundling, whether pure or mixed. The merged firm cannot benefit from mixed bundling because consumers can gain consumption synergies without purchasing the bundle. Additionally, it cannot benefit from pure bundling because the markets for the stand-alone products remain competitive.

Now let's consider the case where $n_A = 2$ and $n_B \geq 3$. After the merger, only market B remains competitive in supplying the stand-alone products, implying $\beta_j = 0$ for $j \geq 2$. Interestingly, there exists a unique Nash equilibrium where the merged firm charges a zero margin in the less competitive market (market A) and a positive margin in the more competitive market (market B), i.e., $\alpha_1^* = 0$ in market A and $\beta_1^* = h(\sigma^m)$ in market B.

Suppose the merged firm sets a positive margin, $\alpha_1 > 0$, for product A_1. In response, the remaining stand-alone firm will also set a positive margin, $\alpha_2 > 0$, which cannot be a Nash equilibrium under Bertrand competition. On the other hand, charging a positive margin for product B_1 does not induce other stand-alone firms to set positive margins, as the market in B remains competitive with $n_B \geq 3$. This results in a unique Nash equilibrium with $\alpha_1^* + \beta_1^* = h(\sigma^m)$.

If one market is served by a strategic firm after the merger, for example, $n_A = 2$, offering pure bundling can increase the profit of the merged firm. Suppose firm M commits to pure bundling and charges a total margin μ for the bundle $A_1 - B_1$. This commitment does not affect pricing in the competitive market B, but it does impact the price in the less competitive market A. It enables the stand-alone firm A_2 to charge a positive margin $\hat{\alpha}_2 = k(\hat{\sigma}^p)$, where $\hat{\sigma}^p$ is characterized by (3) as mentioned earlier. As a result, the price for the bundle increases to $\hat{\mu}^p = h(\hat{\sigma}^p) > h(\sigma^m)$.

Finally, let's consider the case where $n_A = n_B = 2$. After the merger, there remains only one stand-alone firm in each market. If the merged firm commits to pure bundling, it can soften competition through portfolio differentiation. The equilibrium in this case is exactly the same as in the baseline model, where the two stand-alone firms set $\tilde{\alpha}_2 = \tilde{\beta}_2 = k(\tilde{\sigma}^p)$, and the merged firm charges the highest total margin: $\tilde{\mu}^p = h(\tilde{\sigma}^p) > h(\hat{\sigma}^p)$.

However, when the merged firm cannot commit to pure bundling, the characterization of the equilibrium becomes more complex in this case. There is no pure-strategy Nash equilibrium. Bertrand-type competition among mix-and-matchers tends to drive prices down to zero in both markets, but this cannot form an equilibrium as the merged firm can still make a profit by exploiting the demand for one-stop shopping.[20] We can demonstrate that a mixed-strategy equilibrium exists, where both firms randomize their margins according to certain distribution functions.[21]

The above analysis leads to:

Proposition 8 *Suppose consumers can derive the same consumption synergies from combining the conglomerate's stand-alone products as they would from the bundle. When the conglomerate commits to pure bundling, the equilibrium outcomes and welfare analysis remain the same as in the baseline model. However, if the conglomerate cannot commit to pure bundling, then:*

- *if* $n_A, n_B \geq 3$, *there are multiple equilibria where prices satisfy* $\alpha_1^* + \beta_1^* = h(\sigma^m)$ *and* $\alpha_j = \beta_j = 0$ *for* $j \geq 2$*;*
- *if* $n_A = 2$ *and* $n_B \geq 3$, *there exists a unique Nash equilibrium where the merged firm charges* $\alpha_1^* = 0$ *and* $\beta_1^* = h(\sigma^m)$*;*
- *if* $n_A = n_B = 2$, *there is no pure-strategy Nash equilibrium.*

7 Conclusion

We present a theory of conglomerate mergers and explore the effect of portfolio differentiation stemming from heterogeneity in the consumption synergies that customers derive from product bundling after the merger. As long as there remains competition among stand-alone offerings, a merger creates value which is shared between consumers and the conglomerate. Product portfolio differentiation can however reduce competition and lead to higher standalone prices in

[20] It is worth noting that this tension between competition for multi-stop shoppers and the exploitation of one-stop shoppers resembles a similar tension observed in the sales model by Varian (1980), where firms can each exploit a captive customer base while competing for unattached consumers.

[21] It is straightforward to verify that the profit functions are bounded above and below, and they are continuous except at the point of zero. Thus, the payoff functions are upper hemi-continuous. Assuming that mix-and-matchers prefer the products offered by the stand-alone firms when both the stand-alone firms and the merged firm charge the same margin, we can view this as a game with endogenous sharing rules, as defined by Simon and Zame (1990). By applying the main theorem of their paper, we can conclude that a solution exists for the game, which coincides with the mixed-strategy Nash equilibrium.

highly concentrated markets, particularly if the conglomerate commits itself to pure bundling, or *de facto* engages in pure bundling (because of strong cannibalization effects due to high differentiation between the conglomerate's and its rivals' stand-alone offerings). In such a case, conglomerate mergers are still likely to benefit consumers with high consumption synergies but can harm those with lower synergies, who are more prone to mix-and-match stand-alone offerings. We find that a conglomerate merger still increases total consumer surplus as long as the merged firm continues to compete on a stand-alone basis, and can decrease it otherwise.

Our analysis has several policy implications. First, such conglomerate mergers are unlikely to be anti-competitive when there remains competition among stand-alone firms. When that is not the case, then forbidding pure bundling constitutes an effective remedy as long as the conglomerate has an incentive to keep competing on a stand-alone basis, which is likely to be the case if the conglomerate's stand-alone products are not too differentiated compared with its rival's.[22] By contrast, if there is little competition among the remaining stand-alone firms and their products are highly differentiated, then preventing pure bundling may no longer be an effective remedy, as the conglomerate would then have an incentive to charge prohibitively high stand-alone prices ("constructive refusal").

[22] For instance, when *Eurotunnel* (the provider of rail transportation services between France and the UK through the Channel tunnel) proposed to acquire *Sea France*, a provider of ferry transportation services across the Channel, the French *Autorité de la Concurrence* cleared the merger subject to an unbundling requirement, preventing Eurotunnel from offering packages combining rail and ferry services. The British authorities (the *Office of Fair Trading* and the *Competition Appeals Tribunal*, later on followed by the newly established *Competition and Markets Authority*), while disagreeing on the clearance decision, concurred in the need to prevent bundling practices.

Appendix

A Proof of Proposition 1

When the merged entity continues to supply stand-alone products after the merger, Bertrand competition drives the prices of stand-alone products down to the cost. In any candidate equilibrium where a firm could earn a positive profit on a stand-alone product, any other firm (including the merged entity, while keeping other prices constant) would have an incentive to attract consumers by charging a slightly lower margin.[23]

On the other hand, no stand-alone firm can profitably sell below cost, and the merged entity has no incentive to offer any product below cost on a stand-alone basis. If M were the only one to do so, it could increase its profit by raising both the stand-alone price and the price of the bundle. If, however, a stand-alone firm also offers the product at a below-cost price, the merged entity could increase its profit simply by raising its stand-alone price to the cost level.

It follows that the merged firm can only generate a profit from selling the bundle $A_1 - B_1$. Consumers who purchase the bundle obtain a net utility of $w + s - \mu$. On the other hand, purchasing the products on a stand-alone basis at competitive prices yields a net utility of w. Consequently, consumers choose the bundle if the value of the consumption synergies, s, exceeds the margin charged for the bundle: $s \geq \mu$. The demand for the bundle is represented by $1 - F(\mu)$, and the merged firm obtains a profit $\Pi_M = \mu [1 - F(\mu)]$, which is positive in the range $\mu \in [0, \bar{s}]$.

Within this range, the derivative is given by:

$$\frac{d\Pi_M}{d\mu} = 1 - F(\mu) - \mu f(\mu) = f(\mu) [h(\mu) - \mu],$$

where $f(\mu)$ is positive and $h(\mu) - \mu$ is strictly decreasing in μ. As a result, the profit function Π_M is strictly quasi-concave in μ, and the optimal margin, $\mu^m = \sigma^m$, is uniquely determined by the first-order-condition, $\mu = h(\mu)$, which satisfies $0 < \mu^m < \bar{s}$. Finally, the merged firm's equilibrium profit is given by $\Pi_M^m = h(\sigma^m) [1 - F(\sigma^m)] > 0$.

[23] It is worth noting that if there are at least three firms in a market, the merged entity may not offer product i as a stand-alone product in equilibrium. This is because competition among the stand-alone firms ensures that the product is offered at cost anyway. However, if there is only one stand-alone firm remaining in a market, the merged entity will necessarily sell that product at cost on a stand-alone basis in equilibrium.

B Proof of Proposition 2

Scenario (i): $n_A, n_B \geq 3$**.**

As stated in the main text, the equilibrium mirrors that observed with mixed bundling. Competition among firms selling stand-alone products drives their prices down to cost, while firm M sets a price of μ^m for the bundle.

Scenario (ii): $n_A = n_B = 2$**.**

In this scenario, it is evident that no firm will levy negative margins at equilibrium. It is also readily apparent that the merged firm charge a positive margin for its bundle $\mu > 0$. Let's assume that $\mu = 0$, which implies $\sigma \leq 0$. In this case, the merged firm would attract all consumers but generate no profits. Thus, the merged firm could realize a positive profit by marginally increasing the value of μ.

Given $\mu > 0$, consider the best responses of the stand-alone firms. It is never optimal for any such firm to charge a margin equal to or above μ, as this would result in no consumers purchasing its stand-alone product (i.e., $\sigma \leq 0$). Suppose firm A_2 sets a positive margin such that $\alpha < \mu$. In this case, the optimal response for Firm B_2 is to set a positive margin β satisfying $\beta < \mu - \alpha$, to maximize its profit $\beta F(\mu - \alpha - \beta)$. Similarly, given any $\beta < \mu$, firm A_2's optimal response is to charge a positive margin α, which maximizes its profit $\alpha F(\mu - \alpha - \beta)$. The assumptions made on the distribution $F(\cdot)$ ensure the existence and uniqueness of these optimal responses.

The merged firm's profit is represented by

$$\Pi_M = \mu(1 - F(\sigma)) = \mu(1 - F(\mu - \alpha - \beta)).$$

This profit equates to zero for $\mu = 0$ and for $\sigma \geq \bar{s}$ (where $F(\sigma) = 1$), and is positive for any μ situated between these bounds. Consequently, it is never optimal for the large firm to impose a negative margin $\mu \leq 0$ or an excessively high margin such that $\mu \geq \bar{s}$. Similarly, the stand-alone firms will refrain from charging any margin below 0 or above $\bar{s}$.

The derivative of Π_M with respect to μ is given by:

$$\frac{d\Pi_M}{d\mu} = 1 - F(\sigma) - \mu f(\sigma) = f(\sigma)(h(\sigma) - \mu) = f(\sigma)(h(\mu - \alpha - \beta) - \mu).$$

The monotonicity of the function $h(\cdot)$ ensures that the profit function Π_M exhibits strict quasi-concavity in μ. Furthermore, the best response, represented by $\mu(\alpha, \beta)$, is uniquely defined by the first-order condition, $\mu = h(\mu - \alpha - \beta)$.

Similarly, the profit functions of the stand-alone firms, $\Pi_A = \alpha F(\mu - \alpha - \beta)$ and $\Pi_B = \beta F(\mu - \alpha - \beta)$, are quasi-concave. The optimal responses of these stand-alone firms are determined by the first-order conditions:

$$\alpha = \beta = k(\sigma).$$

By substituting into the condition for σ, we get:

$$\sigma = \mu - \alpha - \beta = h(\sigma) - 2k(\sigma).$$

Denote by $\phi(\sigma) \equiv h(\sigma) - 2k(\sigma) - \sigma$. The equilibrium threshold, $\tilde{\sigma}^p$ is determined by $\phi(\tilde{\sigma}^p) = 0$, where $\phi(\sigma)$ is strictly decreasing. The equilibrium margins are then given by $\tilde{\mu}^p = h(\tilde{\sigma}^p)$ and $\tilde{\alpha} = \tilde{\beta} = k(\tilde{\sigma}^p)$.

Scenario (iii): $n_A = 2$ and $n_B \geq 3$.

A similar analysis applies in this case, with the caveat that $\beta = 0$. The best responses are determined by $\mu = h(\mu - \alpha)$ and $\alpha = k(\sigma)$, and the equilibrium threshold is defined as:

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

Denoting $\varphi(\sigma) \equiv h(\sigma) - k(\sigma) - \sigma$, the equilibrium threshold $\hat{\sigma}^p$ is given by $\varphi(\hat{\sigma}^p) = 0$, where $\varphi(\sigma)$ is strictly decreasing.

Comparative Statics.

Denoting $\psi(\sigma) = h(\sigma) - \sigma$, the equilibrium threshold σ^m is determined by $\psi(\sigma^m) = 0$. Since $\phi(\sigma)$, $\varphi(\sigma)$, and $\psi(\sigma)$ are all decreasing functions of σ and satisfy $\phi(\sigma) < \varphi(\sigma) < \psi(\sigma)$, we have $\sigma^m > \hat{\sigma}^p > \tilde{\sigma}^p$. This implies $\mu^m < \hat{\mu}^p < \tilde{\mu}^p$, then:

$$\Pi_M^m(\sigma^m) = h(\sigma^m)[1 - F(\sigma^m)] < \Pi_M^p(\hat{\sigma}^p) = h(\hat{\sigma}^p)[1 - F(\hat{\sigma}^p)] < \Pi_M^p(\tilde{\sigma}^p) = h(\tilde{\sigma}^p)[1 - F(\tilde{\sigma}^p)].$$

Moreover, $\hat{\alpha} = k(\hat{\sigma}^p) > k(\tilde{\sigma}^p) = \tilde{\alpha}$. Note that $\tilde{\alpha} + \tilde{\beta} = \tilde{\mu}^p - \tilde{\sigma}^p$, while $\hat{\alpha} = \hat{\mu}^p - \hat{\sigma}^p$, then $\tilde{\mu}^p > \hat{\mu}^p$ and $\tilde{\sigma}^p < \hat{\sigma}^p$ imply $\tilde{\alpha} + \tilde{\beta} > \hat{\alpha}$.

References

Bagnoli, Mark, and Ted Bergstrom (2005), "Log-concave probability and its applicationsn," *Economic Theory* 26:445–469.

Berry, Steven, and Philip Haile (2014), "Quantitative Analysis of an AT&T-DirecTV Merger: Additional Discussion of Modeling Choices, Data, and Results", available at https://ecfsapi.fcc.gov/file/7522909437.pdf.

Biglaiser, Gary (2014), "The Harms of AT&T-DirecTV Merger", available at: https://consumermediallc.files.wordpress.com/2015/06/140916-aca_att-directv_comments.pdf

Bork, Robert H. (1978), *The Antitrust Paradox*, New York: Free Press.

Carlton, Dennis W., and Michael Waldman (2002), "The Strategic Use of Tying to Preserve and Create Market Power in Evolving Industries", *Rand Journal of Economics* 33:194-220.

Chen, Yongmin (1997), "Equilibrium Product Bundling," *Journal of Business*, 70: 85-103.

Choi, Jay Pil, and Christodoulos Stefanadis (2001), "Tying, Investment, and the Dynamic Leverage Theory," *Rand Journal of Economics* 32(1):52-71.

Church, Jeffrey (2008), "Conglomerate Mergers," *Issues in Competition Law and Policy*, Chapter 62.

Cournot, Antoine-Augustin (1838), *Recherches sur les principes mathématiques de la théorie des richesses*, Paris: Hachette.

Katz, Michael (2014), "An Economic Assessment of AT&T's proposed Acquisition of DIRECTV," available at https://ecfsapi.fcc.gov/file/7521303307.pdf.

Kolasky, William (2002), "Conglomerate Mergers and Range Effects: It's a Long Way from Chicago to Brussels," *George Mason Law Review*, 10: 533

Pitofsky, Robert (2005), "Past, Present, and Future of Antitrust Enforcement at the Federal Trade Commission," *University of Chicago Law Review*, 72: 209-218.

Rey, Patrick, and Jean Tirole (2007), "A Primer on Foreclosure," *Handbook of Industrial Organization*, vol. III, Mark Armstrong and Rob Porter eds, North Holland, 2145-2220.

Shaked, Avner, and John Sutton (1982), "Relaxing Price Competition Through Product Differentiation," *The Review of Economic Studies*, 49(1):3-13.

Simon, Leo, and William Zame (1990), "Discontinuous Games and Endogenous Sharing Rules", *Econometrica*, vol. 58 (4): 861-872.

Rhodes, Andrew, and Jidong Zhou (2019), "Consumer Search and Retail Market Structure", *Management Science*, vol 65(6): 2607-2623.

Varian, Hal (1980), "A Model of Sales," *American Economic Review*, 70:651-659.

Whinston, Michael D. (2001), "Exclusivity and Tying in U.S. v. Microsoft: What We Know, and Don't Know," *Journal of Economic Perspectives* 15:63-80.