Competing Multiproduct Intermediaries*

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Abstract

We develop a new framework of competition between asymmetric multiproduct intermediaries, each hosting its own set of product categories and serving one-stop shoppers. The central modeling ingredient is each intermediary's "channel conduct index": an aggregate measure of supplier market power across all product categories the intermediary hosts. The equilibrium prices reveal a novel interaction between horizontal marginalization (among suppliers through a common intermediary) and vertical marginalization (between intermediaries and suppliers). Contrary to conventional double-marginalization logic, a sufficiently disadvantaged intermediary expands its market share and profit by raising its channel conduct index, that is, softening its supplier competition. Product assortment, supplier screening, and vertical integration give the intermediary direct control over this index. This expansion result holds under the marketplace model (intermediaries set fees before suppliers' pricing) but disappears under the reseller model (suppliers set wholesale prices before intermediaries' pricing). The distinction arises from the different ways in which channel conduct indices drive horizontal and vertical marginalization under the two business models. For the same reason, an industry-wide shift from reselling to marketplaces can raise or lower final prices in both channels, depending on the asymmetry between the intermediaries. When business models are chosen, the marketplace model is a dominant strategy whenever a channel's conduct index is at least one, which holds if the channel hosts at least one monopolized category.

Keywords: multiproduct intermediary; one-stop shopping; marketplace and reseller business models; platform governance; supplier competition; Cournot miscoordination

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1 Introduction

Multiproduct intermediaries increasingly compete for the consumer's entire shopping relationship rather than for individual purchases. Subscribers to Amazon Prime, Walmart+, or JD Plus default to a single platform for purchases spanning household staples, electronics, and groceries; members of Costco or Sam's Club route bulk purchases through the club whose paid membership they hold. In these membership and default-channel settings, an intermediary that wins a consumer wins her demand across many product categories at once, so intermediaries compete for the consumer's basket as a whole. By assembling otherwise unrelated products, they turn independent categories into effective complements. At the same time, they engage with a diverse array of suppliers, with trading terms and pricing mechanisms that vary substantially across product categories.

These features raise questions that existing models of intermediation, built around a single intermediary or symmetric single-product competitors, are not designed to answer. Does each competing intermediary benefit from more intense competition among the suppliers in its product categories? What instruments does it have to shape that competition, and when should it use them? How does the industry's mix of business models, i.e., operating a marketplace versus reselling, affect retail prices, profits, and consumer welfare? Which business model should we expect intermediaries to adopt when they choose freely?

This paper develops a tractable framework of price competition between two asymmetric multiproduct intermediaries to address these questions. Each intermediary operates a retail channel carrying a set of independent product categories, and consumers engage in one-stop shopping, comparing the total value of each channel's basket and purchasing everything from the channel they select.[1] Within each category, suppliers' competitive conduct ranges from perfect competition to monopoly, which we capture with a conduct parameter following Weyl and Fabinger (2013). Summing these parameters across a channel's categories yields a *channel-level conduct index*. The two channels may differ both in overall efficiency, meaning the total value their baskets deliver net of costs, and in their conduct indices. In our baseline setting, both intermediaries operate under the marketplace model, whereby each intermediary commits to per-unit fees for its categories, and its suppliers then set retail prices.

Our first contribution is methodological: this seemingly complex environment admits a parsimonious equilibrium characterization. Prices are set in many categories, in two channels, and at two vertical layers, and each price affects all others through channel demand. Yet because consumers evaluate channels at the basket level, demand depends on prices only through a single statistic — the difference in consumer value between the two channels — and every equilibrium price and profit is a function of this equilibrium statistic. The characterization also makes the

[1] One-stop shopping in our analysis need not require all products to be purchased literally at the same time. It captures the idea that consumers treat a channel or platform as a default destination across multiple categories, so that the attractiveness of the intermediary is evaluated at the basket or shopping-relationship level. Membership and loyalty programs are natural sources of such behavior: warehouse clubs condition access on paid membership, while Prime, Walmart+, and JD Plus bundle shipping and convenience benefits that encourage consumers to route purchases through the platform. Relatedly, survey and browsing-data evidence shows that many U.S. consumers start online shopping searches on Amazon, suggesting that large platforms often serve as default starting points for shopping journeys (e.g., Farronato et al., 2023; Lebow, 2023).

anatomy of channel pricing explicit. Each channel's aggregate markup combines: (i) horizontal marginalization among the suppliers themselves, whose products one-stop shopping turns into complements; and (ii) vertical marginalization between each intermediary and the suppliers. The latter embeds two dimensions of strategic interactions. First, a within-channel interaction, since prices at the two vertical stages are strategic substitutes; second, a cross-channel interaction, scaled by the rival channel's conduct index, since prices are strategic complements across channels. All of our results can be read off this decomposition.

Our first set of results concerns how supplier competition shapes channel competition under the marketplace model. Softening supplier competition in a channel raises retail prices in both channels by aggravating double marginalization. Conventional intuition suggests it should also hurt the hosting intermediary, whose channel becomes less price-competitive and loses share. We show that this intuition fails for an intermediary with a sufficiently large efficiency disadvantage. For such an underdog, softening competition among its own suppliers raises both its market share and its profit. The reason is that softer supplier competition commits the channel to less aggressive retail pricing, which induces the rival channel to price less aggressively in turn, and for an efficiency underdog this cross-channel effect dominates the loss of within-channel competitiveness. The commitment logic itself is classic because raising own-channel conduct is reminiscent of a fat-cat strategy in the taxonomy of Fudenberg and Tirole (1984). The mechanism identifies a motive for platforms to relax supplier competition that operates through cross-channel strategic interaction, in contrast to the fee-internalization motives emphasized in the platform-governance literature (e.g., Teh, 2022). The softening also spills across categories: suppliers in the channel's other categories gain whenever the channel's market share expands, so a regulator that evaluates each product category in isolation would miss these linkages.

Following up on our comparative statics, we demonstrate three levers through which an intermediary can control its conduct index directly, each with a microfoundation consistent with our framework. The first is through product assortment. Shuffling the composition of the category portfolio toward categories served by fewer suppliers raises the channel's conduct while leaving the basket's value unchanged. Meanwhile, stocking an additional marginal category trades off the utility it contributes against the conduct it adds. The second lever is supplier screening. A tighter quality standard, which can be enforced through certification or interface design, admits fewer but higher-quality suppliers, thereby raising the conduct index. The third is vertical integration. Acquiring suppliers or expanding private labels is outcome-equivalent to driving conduct to zero in the affected categories. Our comparative statics above have implications for the trade-offs that an intermediary faces when approaching these levers.

Our second set of results applies the same framework to the reseller model, in which suppliers set wholesale prices first and each intermediary then sets the retail prices in its channel. The reseller equilibrium has the same decomposition as the marketplace equilibrium. The key difference is that the cross-channel interaction is now scaled by the channel's own conduct index rather than the rival's. This is because under reselling it is the channel's own suppliers who anticipate the response of the rival intermediary, whereas under the marketplace model each intermediary anticipates the responses of the rival channel's suppliers (so cross-channel interactions scale with the rival's conduct index). This difference in scaling factor reverses the previous comparative statics of supplier competition. Under the reseller model, softening supplier competition in a channel always contracts that channel's market share and profit, so the strategic motive to soften competition identified above is specific to the marketplace model.

Our third set of results builds on this contrast to compare business models across the industry. When the two channels have equal conduct indices, equilibrium prices and market shares are invariant to the business model, extending the neutrality finding of Johnson (2017) from a monopoly single-product channel to competing multiproduct channels. However, neutrality fails once conduct indices differ, because the two business models attach the cross-channel markup to different conduct indices. An industry-wide shift from reselling to marketplaces then contracts the market share of the channel with a lower conduct index (i.e., the channel with more intense supplier competition). The price effects, in contrast, can run in either direction. If the channel facing more intense supplier competition also has a large enough equilibrium market share, the shift instead raises retail prices in both channels and lowers consumer surplus; if that channel's equilibrium market share is small, the shift lowers retail prices in both channels and benefits consumers. The same industry-wide change can therefore soften or intensify channel competition. Both possibilities are absent in models with a monopoly intermediary or symmetric intermediaries, in which the shift merely redistributes profit from suppliers to intermediaries. Under a uniform specification of channel demand, we also show that the profits of intermediaries and suppliers can either increase or decrease in general.

Finally, we endogenize the business model. Adopting the marketplace model is a dominant strategy for any intermediary whose conduct index is at least one. For instance, this holds if the intermediary hosts at least one category that is occupied by a monopoly supplier. Delegating retail pricing to suppliers with market power both expands the channel's equilibrium market share and, because prices at the two vertical stages are strategic substitutes, allows the intermediary to extract surplus as a first mover. The result is consistent with the migration of large retailers toward marketplace formats and supports our focus on the marketplace configuration in the baseline analysis.

Related literature

Our paper contributes to three strands of literature: multiproduct intermediaries, platform governance, and models of intermediation. We discuss each strand in turn.

☐ **Multiproduct intermediaries**. Our paper belongs to the growing literature on multiproduct intermediaries. A key feature of this literature is that such intermediaries turn otherwise unrelated products into effective complements in one-stop shopping or search environments.[2] Given such induced complementarity, Rhodes et al. (2021) develop a search model to study a monopolistic intermediary's assortment decision. The intermediary faces a trade-off between

[2]Models of multiproduct intermediaries are distinct from those analyzing multiproduct firms (or suppliers in our terminology) that sell substitutable products (e.g., Anderson and De Palma, 2006; Nocke and Schutz, 2018). In the latter class of models, (i) one-stop shopping or search facilitation is not relevant, and (ii) vertical contracting is absent. Recently, Nocke and Schutz (2025) extend this literature by considering general demand systems that allow for one-stop shopping, thereby giving rise to the possibility of product complementarity.

showcasing products that attract more consumers and selling products that generate greater profits. In their search framework, because consumers observe prices only after incurring a search cost, each product is priced at the monopoly level, consistent with the Diamond paradox. Therefore, unlike in our paper, double or multiple marginalization issues do not arise.

Gautier et al. (2025) and Ishihara et al. (2026) study how a monopolistic intermediary internalizes the Cournot externality associated with induced complementarity among the products it hosts. When suppliers set prices independently, they charge higher prices than a multiproduct monopolist would. As mechanisms to address this inefficiency, Gautier et al. (2025) allow the intermediary to sell all products as a bundle (bundled entry), while Ishihara et al. (2026) allow it to sell one of the products below cost (loss-leader pricing). These papers assume that the intermediary operates as a hybrid platform, serving both as a marketplace operator and as a seller, whereas we do not examine hybrid platforms in this paper.[3] Other issues addressed in this literature include how one-stop shopping alters the effects of mergers between suppliers (Ide, 2026) and the intermediary's incentive to charge consumers an access fee (Gao, 2025).[4] By contrast, our key innovation is to develop a tractable model that accommodates asymmetric competition between multiproduct intermediaries, providing novel insights into the interplay between vertical and horizontal marginalization.[5]

□ **Platform governance**. This paper also contributes to the recent literature on platform governance and platform design (e.g., Teh, 2022; Choi and Jeon, 2023), especially by introducing competition between platforms. This literature examines how a monopolistic platform designs its marketplace. For example, a platform may design a search interface that favors lower-priced offerings, or introduce algorithmic pricing tools that affect the scope for collusive pricing among sellers (Dinerstein et al., 2018; Johnson et al., 2023). Casner (2020) and Teh (2022) show that a platform may want to relax seller competition when it collects proportional fees from sellers: weaker competition leaves sellers with greater revenue, which expands the commission base from which the platform earns fees.

We also study how changes in the intensity of competition among suppliers (i.e., conduct indices) affect competition between multiproduct intermediaries, and we show that an intermediary may want to relax supplier competition. However, our mechanism differs substantially from those in the existing literature. We assume linear contracts between intermediaries and suppliers, rather than proportional fees. Our theory instead stems from competition between multiproduct intermediaries. Because of the interplay between vertical and horizontal marginalization within and across intermediaries, relaxing supplier competition serves as a strategic commitment device

[3]Regarding the recent work on hybrid platforms, see, for example, Etro (2021); Hagiu et al. (2022); Zennyo (2022); Anderson and Bedre-Defolie (2024); Hervas-Drane and Shelegia (2025).

[4]Related contributions on multiproduct retailing that incorporate one-stop shopping but abstract from vertical relations include, among others, Lal and Matutes (1994), Chen and Rey (2012), and Rhodes (2015).

[5]More broadly, multiproduct intermediaries can be viewed as two-sided platforms connecting buyers and suppliers (or sellers). Some existing studies on competing two-sided platforms also model buyers with multiproduct demand and sellers with pricing power, but focus primarily on cross-group network externalities (e.g., Hagiu, 2009; Belleflamme and Peitz, 2010, 2019; Jeon and Rey, 2024). Jullien et al. (2021) provide a comprehensive survey of this literature.

to relax cross-channel competition.[6]

☐ **Models of intermediation**. Finally, our paper is related to the literature comparing two modes of intermediation: marketplace and reseller (e.g., Abhishek et al., 2016; Hagiu and Wright, 2015). The marketplace and reseller models are also known in the literature as the agency and wholesale models, respectively. Nonetheless, we refrain from using the label "agency model" throughout because the label typically refers to a proportion-based revenue-sharing rule in pricing, which indicates a different pricing mechanism from that used in our marketplace model. Our focus is instead on the sequence of moves in vertical relations.

Key considerations in this literature include vertical double marginalization (Johnson, 2017; Foros et al., 2017), access fees charged to consumers (Gaudin and White, 2021) and to sellers (Allain et al., 2024), negative cross-brand pass-through (Hu et al., 2022), the distribution of bargaining power among channel members (De los Santos et al., 2026), dynamic pricing and consumer lock-in effects (Johnson, 2020), and information sharing between platforms and sellers (Tsunoda and Zennyo, 2021). Most of this literature, however, focuses on either a monopolistic intermediary or symmetric competition between intermediaries. We develop a tractable model of competition between asymmetric multiproduct intermediaries under each mode of intermediation. This allows us to show how asymmetry across intermediaries shapes the interplay between vertical and horizontal marginalization, and hence changes the implications of the marketplace and reseller models. These insights would be absent without explicitly allowing for asymmetric competition between multiproduct intermediaries.

The remainder of the paper proceeds as follows. Section 2 presents the model and discusses its key assumptions, Section 3 characterizes the marketplace equilibrium and the effects of supplier competition, Section 4 analyzes the reseller model and the endogenous choice of business models, and Section 5 concludes with managerial and policy implications.

2 The model

We consider a market with two competing channels $k \in \{A, B\}$, each consisting of an intermediary denoted as k and a finite set $\mathcal{N}^k$ of distinct independent product categories (where $|\mathcal{N}^k| = N^k \geq 1$), each occupied by one or more symmetric suppliers. The two channels may carry different categories, so that N^A and N^B need not coincide. There is also a unit mass of heterogeneous consumers who are interested in buying from every product category.

We initially consider the case in which both intermediaries operate under the *marketplace* business model whereby they let suppliers set retail prices. The timing structure is

- In Stage 1, intermediaries in each channel set non-negative per-unit fees $\{f_i^A\}_{i\in\mathcal{N}^A}$ and $\{f_i^B\}_{i\in\mathcal{N}^B}$ for their respective categories simultaneously.[7]

[6] The logic here has a high-level similarity with the strategic-delegation literature, which we discuss in Section 3.2 after developing the appropriate context.

[7] As will be shown in the equilibrium characterization below, it is also without loss of generality if we assume that the intermediaries are restricted to setting single fees f_0^A and f_0^B across all of their respective categories.

- In Stage 2, for each category $i \in \mathcal{N}^k$ of channel k, suppliers set retail price $p_i^k \geq 0$ independently and simultaneously. Then, consumers choose a retail channel to shop at.

We now describe the specifications on consumers, suppliers, and intermediaries in detail. To simplify notation, without loss of generality we normalize the production costs for all products and the retailing costs to zero.

□ **Shopping within each channel**. Each consumer chooses a single retail channel for all purchases, engaging in one-stop shopping.[8] If a consumer purchases a product from category i at retail price p_i^k, she derives value $u_i^k - p_i^k$, where u_i^k is the gross utility derived from consuming product i at channel k. We assume throughout that each u_i^k is sufficiently large that $u_i^k - p_i^k \geq 0$ holds category by category at the equilibrium prices characterized below, so that no category is priced out of the basket. A consumer choosing channel k then receives total consumer value

$$V^k \equiv \sum\nolimits_{i\in\mathcal{N}^k} u_i^k - \sum\nolimits_{i\in\mathcal{N}^k} p_i^k.$$

We define $z \equiv \sum_{i\in\mathcal{N}^A} u_i^A - \sum_{i\in\mathcal{N}^B} u_i^B$ as the efficiency difference. As the two channels can differ both in the number of categories they carry and in category-level gross utilities, z captures the overall gross-utility difference between channels. Here, $z > (<)0$ indicates that intermediary A enjoys an advantage (disadvantage) over B.

□ **Demand for retail channels.** Retail channels are horizontally differentiated, and the market is fully covered. Following the random-utility discrete choice specification, we assume consumers have channel-specific idiosyncratic preferences described by a random draw x such that a consumer prefers to shop at channel A if and only if $x \leq V^A - V^B$; otherwise, the consumer shops at channel B. Here, $x \in [\underline{x}, \bar{x}]$ is distributed according to cumulative distribution function (CDF) $G(\cdot)$, which is twice continuously differentiable and has a strictly positive density function $g(\cdot)$ with bounded support. Let $\Delta \equiv V^A - V^B$ denote the consumer value difference between channels. Then, the masses of consumers who choose channels A and B are given by $G(\Delta)$ and $1 - G(\Delta)$, respectively.

□ **Suppliers within each channel**. To model supplier behaviors in a compact manner, we apply the conduct-parameter approach widely used in recent literature (Weyl and Fabinger, 2013; Johnson, 2017; Miklós-Thal and Shaffer, 2021; Hu et al., 2022; Ritz, 2024). The following description follows that of Weyl and Fabinger (2013). Within channel k, each category i consists of one or more symmetric suppliers, each facing effective marginal cost f_i^k. The conduct-parameter approach stipulates that, in equilibrium, all category-i suppliers set a symmetric price p_i^k that follows the Lerner formula indexed by *conduct parameter* $\theta_i^k \in [0, 1]$. To fix ideas, consider channel A; then

$$\frac{p_i^A - f_i^A}{p_i^A} = \frac{\theta_i^A}{\epsilon^A} \tag{1}$$

where $\epsilon^A = \frac{p_i^A g(\Delta)}{G(\Delta)}$ is the effective elasticity of channel-A demand $G(\Delta)$ with respect to p_i^A.

[8] As discussed in the introduction, one-stop shopping captures membership and default-channel settings, in which paid memberships (Costco, Sam's Club) or bundled convenience benefits (Amazon Prime, Walmart+, JD Plus) tie the consumer's purchases across categories to a single channel.

Similarly, for channel B the same pricing equation (1) applies after replacing the elasticity term with $\epsilon^B = \frac{p_i^B g(\Delta)}{1-G(\Delta)}$.

Here, lower values of θ_i^k correspond to more intense competition: $\theta_i^k = 1$ corresponds to a monopoly supplier or collusion in the category, whereas $\theta_i^k = 0$ corresponds to perfect competition, and intermediate values correspond to imperfect competition between these extremes. Following Weyl and Fabinger (2013) and Ritz (2024), one way to microfound the imperfect competition is to consider Cournot competition between $n_i^k \geq 1$ homogeneous suppliers within each category. Online Appendices A and B explicitly develop this microfoundation with a fully specified game whereby $\theta_i^k = 1/n_i^k$, which is invariant to fees.[9]

For our subsequent analysis, it is useful to summarize the supply-side conduct facing intermediary k by the channel-level scalar

$$\theta^k \equiv \sum\nolimits_{i \in \mathcal{N}^k} \theta_i^k \in [0, N^k], \tag{2}$$

which we call the *channel-k conduct index*. A lower conduct index θ^k reflects a channel composed mainly of categories with many close substitutes (where competition among suppliers drives prices toward marginal cost), and a higher index one composed mainly of categories with a few hard-to-substitute brands (where suppliers can sustain prices above cost) (e.g., Inderst and Shaffer, 2007; Marx and Shaffer, 2010; ACCC, 2025). In the case of an online retail channel, conduct θ^k could also be influenced by deliberate platform governance or interface design that intensifies or relaxes competition between suppliers (e.g., Dinerstein et al., 2018; Casner, 2020; Teh, 2022; Johnson et al., 2023). Section 3.3 discusses several formal microfoundations where an intermediary can exercise these influences on the conduct index it faces within our framework.

□ **Timing and assumptions.** All prices and fees are public information. Therefore, for our two-stage pricing game described above, the solution concept is subgame-perfect Nash equilibrium.

We impose two conditions on channel demand. First, we assume G is symmetric around $\Delta = 0$, so that asymmetry across channels is captured through the efficiency term z. Second, defining the standard markup terms at channels A and B as

$$\lambda(\Delta) \equiv \frac{G(\Delta)}{g(\Delta)}, \; \mu(\Delta) \equiv \frac{1 - G(\Delta)}{g(\Delta)},$$

we impose the following regularity condition throughout the paper to ensure that the pricing problems of intermediaries are quasiconcave:

Assumption I *For all Δ in the support of CDF $G(\cdot)$, the markup terms $\lambda(\Delta)$ and $\mu(\Delta)$ and their first and second derivatives satisfy: (i) $\lambda'(\Delta) > 0$ and $\mu'(\Delta) < 0$; and (ii) for all $\Delta \in (\underline{x}, \bar{x})$,*

$$\frac{\lambda'(\Delta)}{\lambda(\Delta)} \geq -\frac{\lambda''(\Delta)}{\lambda'(\Delta)} \geq \frac{\mu'(\Delta)}{\mu(\Delta)} \quad \textit{and} \quad \frac{\lambda'(\Delta)}{\lambda(\Delta)} \geq -\frac{\mu''(\Delta)}{\mu'(\Delta)} \geq \frac{\mu'(\Delta)}{\mu(\Delta)}.$$

[9] In a slightly different single-channel setting, Hu et al. (2022) assume conduct invariance and verify that it holds under Bertrand price competition between differentiated suppliers for standard demand families characterized by their log-curvature.

The first part of Assumption I is equivalent to strict log-concavity of $G(\Delta)$ and $1 - G(\Delta)$ (Bagnoli and Bergstrom, 2005) typically imposed in price competition models. The second part of Assumption I requires that the markup terms λ and μ exhibit bounded curvature, ensuring that suppliers' pricing remains sufficiently "well-behaved" in response to changes in intermediaries' fees. A clear example satisfying Assumption I is when G corresponds to a uniform distribution over a bounded interval $[-\sigma/2, \sigma/2]$ (e.g., Hotelling model), where

$$G(\Delta) = \frac{1}{2} + \frac{\Delta}{\sigma},\ \lambda(\Delta) = \frac{\sigma}{2} + \Delta,\ \mu(\Delta) = \frac{\sigma}{2} - \Delta, \tag{3}$$

and so $\lambda''(\Delta) = \mu''(\Delta) = 0$.[10] We will occasionally refer to this uniform distribution specification (3) to sharpen certain results. When doing so, we assume

$$\frac{z}{\sigma} \in \left[-\frac{3 + 2\theta^A + 4\theta^B}{2}, \frac{3 + 4\theta^A + 2\theta^B}{2}\right] \tag{4}$$

which is necessary and sufficient for both channels to hold interior market shares (coexist) in the marketplace equilibrium.

2.1 Discussion of modeling choices

□ **Linear vertical contracts.** Following the literature on intermediation models (e.g., Johnson, 2017; Foros et al., 2017), we focus on simple vertical contracts with uniform pricing only. Our goal is to examine price competition between retail channels under linear pricing contracts, which are prevalent in many real-world settings, for example between TV networks and cable distributors (Crawford and Yurukoglu, 2012) and between e-book publishers and resellers (Gilbert, 2015). Dobson and Waterson (1997, 2007) point out that simple linear tariffs are preferable when there is a disparity between the frequency at which supermarket retailers order inputs (e.g., weekly, in order to adjust to demand) and that at which they meet with the suppliers (e.g., monthly). Linear contracts are also widely used in the theoretical literature on input price discrimination (e.g., Inderst and Shaffer, 2007; O'Brien, 2014).

□ **Business model.** We interpret our current model as a *marketplace* business model, capturing the move order in which the intermediary commits to its per-unit fee before suppliers set retail prices. This reflects a particular allocation of control rights (Hagiu and Wright, 2015): in the marketplace model, suppliers, rather than the intermediary, set retail prices. The alternative *reseller* model, in which the intermediary instead sets retail prices while taking wholesale prices set by suppliers as given, is introduced in Section 4. There, we compare business models and endogenize the choice between them.

□ **Cross-channel listing.** We assume that each supplier supplies exclusively to a single retail channel. This assumption reflects the common practice among intermediaries of differentiating their supply chains, achieved by signing exclusivity agreements, sourcing from distinct

[10] Besides the uniform distribution, the assumption is satisfied numerically by a centered normal distribution with standard deviation s, truncated to $[-\bar{x}, \bar{x}]$ if $\bar{x}/s \leq 1.119$, and by a centered logistic distribution with scale parameter s, truncated to the same interval, if $\bar{x}/s \leq 1.596$.

suppliers, or developing their own brands (e.g., private labels). This simplification allows us to abstract away from multi-channel pricing problems faced by suppliers and to focus on the competition between channels. In Online Appendix C we show that adding a category occupied by a monopoly supplier that lists on both channels leaves the equilibrium outcome unchanged, provided each channel hosts sufficiently many categories.[11]

□ **Channel asymmetry**. In our baseline model, the two channels differ only in terms of $z = \sum_{i\in\mathcal{N}^A} u_i^A - \sum_{i\in\mathcal{N}^B} u_i^B$ and the conduct indices θ^A and θ^B. If $z = 0$ and $\theta^A = \theta^B$, then the two channels are perfectly symmetric. Our framework can be easily extended to incorporate cost asymmetries between channels. For instance, suppose the retailing and production costs in each channel k are $\sum_{i\in\mathcal{N}^k} \gamma_i^k$ and $\sum_{i\in\mathcal{N}^k} c_i^k$, respectively. Then, our analysis remains applicable after redefining $z = \sum_{i\in\mathcal{N}^A}(u_i^A - c_i^A - \gamma_i^A) - \sum_{i\in\mathcal{N}^B}(u_i^B - c_i^B - \gamma_i^B)$. Accordingly, the parameter z can be interpreted more broadly as the value-cost difference.

3 Equilibrium analysis

We start by characterizing the equilibrium and highlighting the novel interactions among markups. We then show how these interactions lead to counterintuitive implications for intermediaries' incentives in manipulating supplier conduct.

3.1 Marketplace equilibrium

We consider the configuration in which both intermediaries adopt the marketplace model, which is denoted as mm. Recall that the consumer value difference between channels is given by

$$\Delta = V^A - V^B = z + \sum\nolimits_{i\in\mathcal{N}^B} p_i^B - \sum\nolimits_{i\in\mathcal{N}^A} p_i^A.$$

In what follows, we will use the value difference Δ as the key variable and express the equilibrium markups and profits as functions of Δ. Then, the equilibrium outcomes are determined after we solve for the equilibrium value difference, denoted as Δ^*.

By backward induction, we analyze the retail pricing decisions of suppliers in each category i, given the per-unit fees f_i^A and f_i^B for channels A and B, respectively. Following the conduct-parameter approach in (1) and using the identities $\lambda(\Delta) = \frac{G(\Delta)}{g(\Delta)}$ and $\mu(\Delta) = \frac{1-G(\Delta)}{g(\Delta)}$, we get

$$p_i^A = f_i^A + \theta_i^A \lambda(\Delta) \qquad \text{and} \qquad p_i^B = f_i^B + \theta_i^B \mu(\Delta).$$

Here, $\theta_i^A \lambda(\Delta)$ and $\theta_i^B \mu(\Delta)$ represent the markups for suppliers in channels A and B, respectively, after adjusting for the respective conduct parameters.

[11] The reason is that, with many categories, an individual multihoming supplier has weak influence on the channel demand. Consequently, in equilibrium, a multihoming supplier sets a high price in both channels to fully extract the surplus it adds to each channel, and so it drops out of the cross-channel comparison. In other single-product settings, a multihoming seller may set different prices across channels to influence relative channel demands. The issue has been investigated by Miklós-Thal and Shaffer (2021) under the reseller model, and by Wang and Wright (2025) under the marketplace model.

Summing across categories, the *aggregate retail prices* $P^k \equiv \sum_{i\in\mathcal{N}^k} p_i^k$ for the channels are

$$P^A = \sum\nolimits_{i\in\mathcal{N}^A} f_i^A + \theta^A\lambda(\Delta) \qquad \text{and} \qquad P^B = \sum\nolimits_{i\in\mathcal{N}^B} f_i^B + \theta^B\mu(\Delta)\ , \tag{5}$$

where we used the definition of conduct index in (2). The value difference Δ^* in the equilibrium of the subgame is then implicitly determined by

$$\Delta^* = z + \sum\nolimits_{i\in\mathcal{N}^B} f_i^B + \theta^B\mu\left(\Delta^*\right) - \sum\nolimits_{i\in\mathcal{N}^A} f_i^A - \theta^A\lambda\left(\Delta^*\right), \tag{6}$$

which just depends on the *aggregate fees* $f^k \equiv \sum_{i\in\mathcal{N}^k} f_i^k$ of each channel.

Turning to Stage 1, each intermediary k's choice is equivalent to choosing $f^k \equiv \sum_{i\in\mathcal{N}^k} f_i^k$ to maximize its profit:

$$\Pi^A = f^A G\left(\Delta^*\right) \qquad \text{and} \qquad \Pi^B = f^B\left(1 - G\left(\Delta^*\right)\right),$$

where Δ^* is given by (6). Assumption I implies that the profit functions are quasiconcave. The first-order conditions yield equilibrium aggregate fees:[12]

$$\begin{aligned} f^A &= \frac{\lambda(\Delta^*)}{-d\Delta^*/df^A} = \lambda(\Delta^*)(1+\theta^A\lambda'(\Delta^*) - \theta^B\mu'(\Delta^*)), \\ f^B &= \frac{\mu(\Delta^*)}{d\Delta^*/df^B} = \mu\left(\Delta^*\right)\left(1+\theta^A\lambda'(\Delta^*) - \theta^B\mu'(\Delta^*)\right). \end{aligned}$$

Substituting these back into (6), we establish the overall equilibrium as follows:[13]

Proposition 1 *(marketplace equilibrium). Denote channel-A and channel-B equilibrium markup functions as*

$$P_{mm}^A(\Delta) \equiv \theta^A\lambda(\Delta) + \lambda(\Delta)\left(1+\theta^A\lambda'(\Delta) - \theta^B\mu'(\Delta)\right) \tag{7}$$

$$P_{mm}^B(\Delta) \equiv \theta^B\mu\left(\Delta\right) + \mu\left(\Delta\right)\left(1+\theta^A\lambda'(\Delta) - \theta^B\mu'(\Delta)\right). \tag{8}$$

The equilibrium value difference Δ_{mm}^* is uniquely pinned down by

$$\Delta_{mm}^* = z + P_{mm}^B(\Delta_{mm}^*) - P_{mm}^A(\Delta_{mm}^*), \tag{9}$$

and the aggregate retail prices are $P_{mm}^{A*} = P_{mm}^A(\Delta_{mm}^*)$ and $P_{mm}^{B*} = P_{mm}^B(\Delta_{mm}^*)$.

Proposition 1 reduces a complex asymmetric pricing game with multiple categories and two vertical layers to a single summary statistic in (9). Every equilibrium markup and profit is a function of the value difference Δ_{mm}^* alone. This property is what makes competition between asymmetric multiproduct intermediaries tractable, and all subsequent results are read off the markup functions (7)–(8).[14] To interpret the equilibrium outlined in Proposition 1, we begin by

[12]Recall that $\mu' \leq 0$ by Assumption I, and so we can equivalently state the fees as $f^A = \lambda(\Delta^*)(1+\theta^A\lambda'(\Delta^*) + \theta^B|\mu'(\Delta^*)|)$ and $f^B = \mu(\Delta^*)(1+\theta^A\lambda'(\Delta^*) + \theta^B|\mu'(\Delta^*)|)$ where $|\cdot|$ is the absolute value operator.

[13]Any allocation of fees $\{f_i^k\}_{i\in\mathcal{N}^k}$ that sums to the same aggregate fee f^k will support the equilibrium outcome. Without loss of generality, we can assume that the intermediaries set a single fee $f_0^k \equiv f^k/N^k$ across all categories.

[14]This property of reducing an asymmetric multiproduct pricing game to a single summary statistic is, at a

examining the total markup in channel A (the same reasoning applies symmetrically to channel B). Figure 1 summarizes the markup structure in the equilibrium.

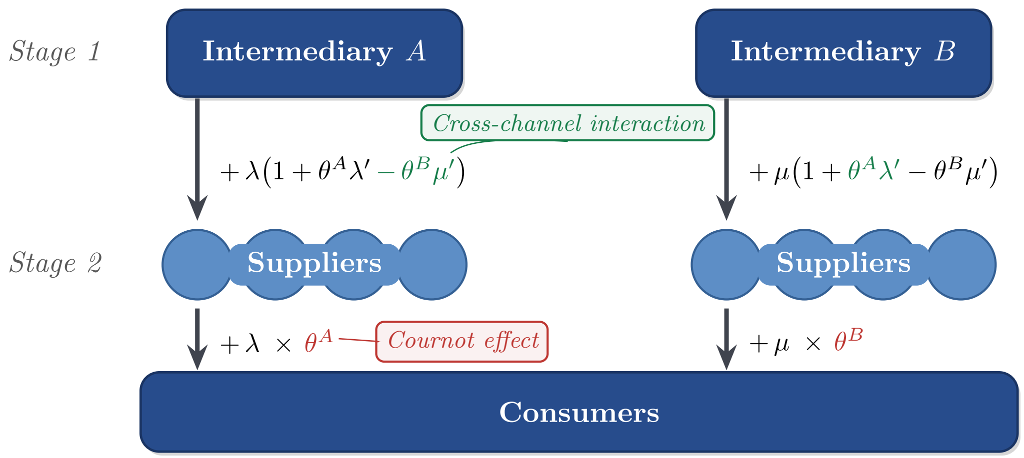

Figure 1: Equilibrium markups in the marketplace configuration.

Channel pricing exhibits a novel combination of *horizontal marginalization* (among channel A's suppliers) and *vertical marginalization* (between the intermediary and each supplier). The combination gives rise to the total markup (7), which can be understood as follows.

The first term in (7) represents the suppliers' aggregate Stage-2 markup, $\theta^A\lambda$. In each category i, the suppliers retain a markup $\theta_i^A\lambda$ over the per-unit fee, which aggregates across categories to $\theta^A\lambda$, where $\theta^A \equiv \sum_{i\in\mathcal{N}^A}\theta_i^A$. This markup reflects horizontal marginalization: the interaction among channel A suppliers is analogous to the classic Cournot miscoordination in the pricing of complementary goods. Selling through a common intermediary effectively transforms independent products into complements, causing each supplier to ignore the negative externality that its own price increase imposes on the profits of others by reducing total channel demand. In the marketplace model, this Cournot miscoordination arises at the Stage-2 level, where suppliers set retail prices.

The second term in (7) represents the intermediary's Stage-1 markup $\lambda(1+\theta^A\lambda' - \theta^B\mu')$, embedded in the per-unit fee it commits to before suppliers price. This markup carries an amplification factor $1+\theta^A\lambda' - \theta^B\mu'$ from vertical marginalization. The term $\theta^A\lambda' \geq 0$ captures *within-channel strategic interaction*, arising from the fact that prices in the two stages are strategic substitutes. Specifically, a higher Stage-1 fee leads the channel-A suppliers to lower their Stage-2 markups, enabling intermediary A to extract more surplus, and the strength of this effect is scaled by the own-channel conduct θ^A. In contrast, the term $-\theta^B\mu' \geq 0$ reflects *cross-channel strategic interaction*. Here, prices are strategic complements across retail channels: when intermediary A raises its Stage-1 fee, the suppliers in the rival channel B respond with higher Stage-2 markups. Anticipating this, intermediary A is incentivized to raise its fee, softening cross-channel competition. This effect is scaled by the rival-channel conduct θ^B. Both types of strategic interaction distort Stage-1 pricing upward.

high level, reminiscent of the aggregative game approach by Nocke and Schutz (2018), but we note our one-stop shopping setting is very different from their substitute goods setting.

3.2 Implications of supplier competition

We now examine how relaxing the intensity of supplier competition within each channel shapes the overall equilibrium outcome. To do so, we consider an increase in the supplier conduct parameter θ_i^k of some category $i \in \mathcal{N}^k$ (i.e., competition in the category becomes softer), holding all else constant.

□ **Market share, prices, and intermediary profits.** Here and in what follows, we slightly abuse notation by referring to the value difference Δ as channel A's market share, because the actual market share $G(\Delta)$ is strictly increasing in Δ.

From Proposition 1, conduct parameter θ_i^k affects the final price and intermediary profit through the aggregate index $\theta^k \equiv \sum_{i \in \mathcal{N}^k} \theta_i^k$. As such, we state our comparative statics in terms of conduct index θ^k for notational simplicity. We focus on channel A's conduct index θ^A, noting that results for θ^B follow symmetrically by appropriately adjusting the value of z.

Proposition 2 *In the marketplace configuration, an increase in conduct index θ^A (a softening of supplier competition in channel A) has the following effects:*

P^{A*} *and* P^{B*}	Δ^*	Π^{A*}	Π^{B*}
$\uparrow$	$\uparrow$ *if* $z < \bar{z}$	$\uparrow$ *if* $z < \bar{z}$	$\uparrow$
	$\downarrow$ *otherwise*	$\sim$ *otherwise*	

"$\uparrow$" = increases; "$\downarrow$" = decreases; "$\sim$" = generally non-monotone.

where $\bar{z} < 0$ is a threshold independent of θ^A.

The price implications from Proposition 2 are intuitive. A softening of supplier competition in channel A (a higher θ^A) raises equilibrium retail prices by aggravating the double-marginalization problem within that channel. This, in turn, induces less competitive pricing and dampens cross-channel competition, thereby reducing consumer surplus.

However, the implications for market shares and profits from Proposition 2 are more subtle. At first glance, the conventional wisdom suggests that softening supplier competition in one's own channel is counterproductive: higher supplier markups should make intermediary A less competitive, shrinking its market share and profit. This conventional intuition does not always hold in a competitive setting. To see this, we totally differentiate the expression for Δ_{mm}^* given in Proposition 1:

$$\frac{d\Delta_{mm}^*}{d\theta^A} < 0 \quad \Leftrightarrow \quad \frac{\partial P_{mm}^A}{\partial \theta^A} - \frac{\partial P_{mm}^B}{\partial \theta^A} = \left[\lambda\left(1 + \lambda'\right) - \mu\lambda'\right]_{\Delta = \Delta_{mm}^*} > 0,$$

which does not always hold. Intuitively, a higher θ^A raises the own-channel markup ($\partial P_{mm}^A / \partial \theta^A > 0$) and also raises the rival-channel markup through cross-channel interactions ($\partial P_{mm}^B / \partial \theta^A > 0$). As a result, softening own-channel supplier competition shrinks channel A's market share if and only if the own-channel effect outweighs the rival-channel effect.

Counterintuitively, Proposition 2 shows that when $z < \bar{z} < 0$—so that channel A is an underdog with an efficiency disadvantage—the effect on the rival channel B dominates that on the own channel. As a consequence of this cross-channel strategic interaction, an increase in θ^A *raises* intermediary A's market share Δ^*_{mm} and profit Π^{A*}_{mm}. From the proof, an equivalent condition to $z < \bar{z}$ is $G(\Delta^*_{mm}) < G(\bar{\Delta})$, where $\bar{\Delta}$ solves $\mu\lambda' = \lambda(1+\lambda')$. Under the uniform specification, $G(\bar{\Delta}) = 1/3$, that is, the expansion result applies whenever channel A's equilibrium market share is below 1/3. In other words, for an underdog intermediary, softening competition among its own suppliers can be *beneficial*, expanding both its market share and its profit.

The observation above has novel strategic implications. A marketplace intermediary (e.g., an e-commerce platform) facing a significant efficiency disadvantage may therefore have a strategic incentive to *soften* supplier competition in its own channel. In Section 3.3, we discuss various ways an intermediary can actively influence the channel-specific conduct through, e.g., stocking more big-brand products or manipulating aspects of platform governance design. Intuitively, manipulating supplier conduct allows intermediary k to "commit" its channel to not engage in aggressive retail pricing against the rival channel, thereby softening the pricing in the rival channel. This mechanism highlights a potential avenue for anti-competitive conduct that benefits intermediaries but ultimately leads to higher equilibrium retail prices and reduced consumer welfare.

When $z \geq \bar{z}$, Proposition 2 shows that an increase in θ^A contracts intermediary A's market share Δ^*_{mm}, but does *not* necessarily reduce its profit Π^{A*}_{mm}. To see this more formally, we impose the uniform-distribution specification introduced in (3). Under this assumption,

$$\frac{d\Pi^{A*}_{mm}}{d\theta^A} > 0 \quad \Leftrightarrow \quad z < \sigma\left(\frac{1}{2} + \theta^A\right)$$

whereas

$$\frac{d\Delta^*_{mm}}{d\theta^A} > 0 \quad \Leftrightarrow \quad z < \bar{z} = -\sigma\left(\frac{1}{2} + \theta^B\right).$$

Therefore, market share expansion is sufficient but not necessary for Π^{A*}_{mm} to rise with θ^A, reflecting its benefit in relaxing competition through cross-channel interactions.

Figure 2 below illustrates Proposition 2. We assume linear demand with parameters $\sigma = 2$, $N^A = N^B = 10$, $\theta^B = 3$. We consider varying levels $z \in \{-10, -7, 8\}$. The parameters imply $\bar{z} = -7$.

□ **Supplier profits.** In equilibrium, for each category $i \in \mathcal{N}^k$ of channels $k \in \{A, B\}$, the aggregate profits of the category's suppliers are, respectively,

$$\pi^{A*}_i = \theta^A_i \lambda(\Delta^*_{mm}) G(\Delta^*_{mm}) \quad \text{and} \quad \pi^{B*}_i = \theta^B_i \mu(\Delta^*_{mm})(1 - G(\Delta^*_{mm})), \tag{10}$$

where we recall that Δ^*_{mm} depends on indices $\theta^A \equiv \sum_{i\in\mathcal{N}^A} \theta^A_i$ and $\theta^B \equiv \sum_{i\in\mathcal{N}^B} \theta^B_i$. Therefore, changes in a category i's conduct parameter affect not only supplier profits in the same category but also those of the other categories $j \neq i$ across both channels.

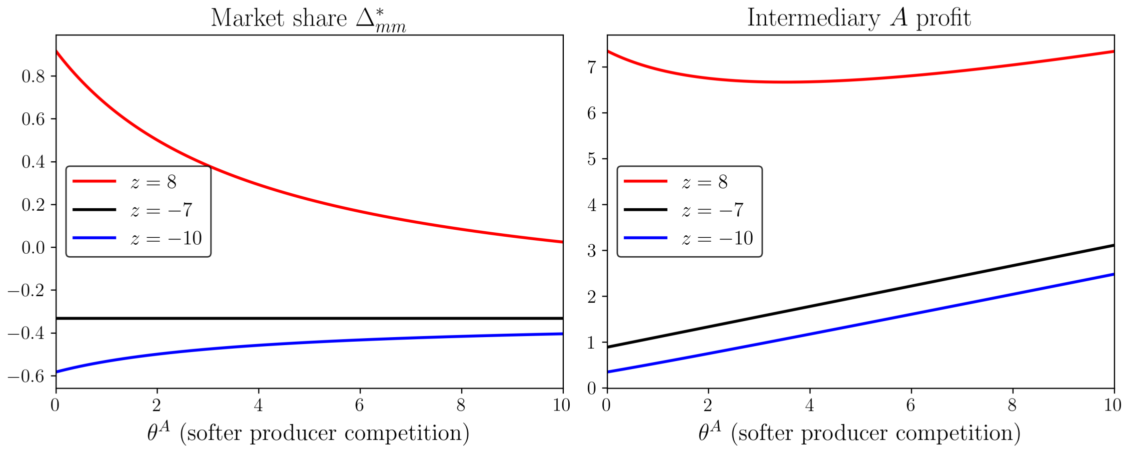

Figure 2: Effects of softening supplier competition in the marketplace model depend on z.

Corollary 1 *In the marketplace configuration, an increase in conduct parameter θ_i^A of any category $i \in \mathcal{N}^A$ (a softening of supplier competition in the category) has the following effects:*

π_i^{A*}	π_j^{A*}, $j \in \mathcal{N}^A \backslash \{i\}$	π_j^{B*} *for* $j \in \mathcal{N}^B$
$\uparrow$ *if* $z < \bar{z}$	$\uparrow$ *if* $z < \bar{z}$	$\downarrow$ *if* $z < \bar{z}$
$\uparrow$ *if* $z \geq \bar{z}$ *and* G *is linear*	$\downarrow$ *otherwise*	$\uparrow$ *otherwise*

where $\bar{z}$ is defined as in Proposition 2.

Corollary 1 has two main implications. First, the suppliers in category $i \in \mathcal{N}^A$, who now enjoy the softened competition, tend to benefit. From (10), an increase in θ_i^A directly raises supplier i's margin, and this direct effect tends to dominate any countervailing movement in channel A's market share. When $z < \bar{z}$, the two effects reinforce each other because the softening also expands channel A's share; when $z \geq \bar{z}$, the market share shrinks, but the direct margin effect still prevails when G is linear.

Second, softening supplier competition in some category i, which seemingly worsens the double-marginalization, need not harm suppliers in other categories $j \neq i$ in channel A. This means that a change in conduct in category i generates cross-category spillover effects on other categories. The reason follows from Proposition 2: the softening can relax the competition between the channels and expand the equilibrium market share of channel A, which occurs when $z < \bar{z}$. The opposite implications apply symmetrically to channel-B suppliers.

□ **Relation to strategic delegation.** The commitment logic behind Proposition 2 connects our analysis to the classic taxonomy of Fudenberg and Tirole (1984), in which raising θ^A is a "fat-cat" strategy. It commits channel A to higher retail prices (at the cost of higher supplier markups), and because prices are strategic complements across channels, the rival channel accommodates by pricing higher in turn. It also relates to the vertical-delegation results of Moorthy (1988) and Bonanno and Vickers (1988), in which delegating retail pricing can soften product-market competition by inducing a more accommodating rival response. Our mechanism follows the same economic principles but differs in three ways. First, in a marketplace model, the intermediary's strategic decision is not whether to delegate pricing to suppliers, since it already does so by definition. Instead, the decision concerns how competitive the delegated price setters are, which the intermediary can shape through assortment and platform governance choices. Second, the vertical-delegation results typically rely on a joint-profit criterion (as when intermediaries can fully extract supplier surplus through lump-sum fees), whereas in our setting the intermediary considers only its own profit.[15] Third, the marketplace setting turns out to be crucial for our mechanism. As Section 4 below shows, the reseller configuration attaches the cross-channel markup to a different conduct index, in which case the commitment logic disappears.

3.3 Levers that influence the conduct index

The comparative statics above treat the conduct indices θ^A and θ^B as primitives. In practice, an intermediary has considerable influence over the intensity of supplier competition inside its own channel. Here we discuss three ways it can move its conduct index, each with an explicit microfoundation consistent with our framework. We relegate the formal analysis to Online Appendix B.

□ **Composition and coverage of the category portfolio.** In the spirit of Rhodes et al. (2021), suppose that an intermediary can influence its conduct index by manipulating its set of available categories through product assortment decisions. We develop this interpretation based on the Cournot microfoundation of Online Appendix A. Suppose there is a wide range of candidate categories, each characterized by a pair (u_i, n_i), indicating a gross utility $u_i > 0$ that the category delivers, and a number of competing suppliers $n_i \geq 1$, hence a category conduct $\theta_i = 1/n_i \in (0, 1]$.[16] An arbitrarily chosen portfolio $\mathcal{N}^k$ then delivers gross utility $\sum_{i\in\mathcal{N}^k} u_i$ and conduct index $\theta^k = \sum_{i\in\mathcal{N}^k} 1/n_i$. Categories with few suppliers boost the conduct index, while commoditized categories add utility but almost no conduct.

The formulation above yields a product-assortment interpretation for the conduct index. If the intermediary reshuffles its portfolio toward categories with fewer suppliers while holding the total utility it offers fixed, z does not move and θ^k rises. This is the movement in θ^k at fixed z that the baseline comparative statics describe. If instead a stocking decision does change utility (e.g., expanding the number of categories covered), adding a marginal category involves comparing the utility it brings against the conduct it adds. The logic of Proposition 2 implies that a leading intermediary is harmed by a higher conduct index and so it stocks only categories with a sufficiently high utility-to-conduct ratio $\frac{u_i}{1/n_i}$.[17] In contrast, an underdog faces

[15]Nonetheless, in an earlier version, we showed that the market-share and profit-expansion results in Proposition 2 still hold if we assume the same contracting instruments as Bonanno and Vickers (1988), where each intermediary fully extracts its suppliers' surplus through a fixed fee settled once the per-unit fees are observed. Details are available upon request.

[16]Without loss of generality, we assume this set of available candidate categories is the same for both intermediaries. Whether the intermediaries select overlapping categories is irrelevant to our analysis because consumers one-stop shop.

[17]In the product-assortment model of Rhodes et al. (2021), a monopolistic intermediary trades off a product's attractiveness (the net utility it offers) against the profit the intermediary must pay the supplier to stock that product exclusively (since suppliers can sell directly to consumers). As discussed in the introduction, conduct

no trade-off, because a higher conduct index softens competition and expands its market share.

□ **Screening of suppliers.** The supplier count of a category need not be exogenous. Following the formulation of Casner (2020) and Teh (2022), suppose that within each category there is a large pool of potential suppliers that differ in *unobserved quality*. The intermediary operates a screening device (e.g., certification, interface design, or eligibility rules), which admits only suppliers whose unobserved quality clears a minimum quality standard s_i. Conditional on clearing the standard, the active suppliers are symmetric from the consumers' viewpoint and offer the same expected quality. Denote the resulting number of active suppliers as $n_i(s_i)$. Applying the Cournot microfoundation, the category's conduct is then $\theta_i = 1/n_i(s_i)$.

Screening delivers a platform governance interpretation for conduct. A tighter standard admits fewer suppliers but raises the average quality of those admitted, so $n_i(s_i)$ strictly decreases and $u_i(s_i)$ increases. A higher standard therefore moves gross utility and conduct together, and the intermediary faces a trade-off that is parallel to that of category-portfolio expansion discussed above. In the special case where $u_i(\cdot)$ is a constant, the tightening just reduces the number of active suppliers without raising the utility (e.g., an interface design that shrinks the consumer consideration set).

□ **Vertical integration into categories.** Another instrument for intermediaries to influence conduct is through ownership and control. Suppose intermediary k integrates the supply of a subset $\mathcal{F}^k \subseteq \mathcal{N}^k$ of its categories. That is, supplier pricing in each integrated category $i \in \mathcal{F}^k$ is now fully controlled by the intermediary to maximize the joint profit of the integrated entity. We show that this integration is outcome-equivalent to setting $\theta_i^k = 0$ for every $i \in \mathcal{F}^k$, so that the resulting equilibrium coincides with our baseline with conduct index:[18]

$$\theta^k = \sum\nolimits_{i \in \mathcal{N}^k \setminus \mathcal{F}^k} \theta_i^k + \sum\nolimits_{i \in \mathcal{F}^k} 0.$$

In practice, such integration can be achieved via supplier acquisitions and private-label penetration in various categories. These would lower category-specific conduct θ_i^k, which microfounds a fall in the conduct index θ^k. It also carries a warning. Reading the logic of Proposition 2 in reverse, a lower conduct index can reduce an efficiency-disadvantaged intermediary's market share and profit. Therefore, vertical integration, which conventional intuition treats as unambiguously strengthening a retailer, can create a strategic disadvantage for an underdog in a competitive marketplace environment.

4 Business model analysis

The analysis so far has held the marketplace model fixed. We now contrast it with the reseller model (each intermediary takes ownership of the goods and resells them). This section first shows that the reseller equilibrium is similarly tractable and combines horizontal and

plays no role in their model, because they consider a consumer-search setting in which Diamond-paradox reasoning pins down supplier pricing.

[18] The equivalence also holds for the reseller configuration timing that we consider in the next section.

vertical marginalization. It then compares the reseller equilibrium with the marketplace equilibrium. Finally, it analyzes endogenous choices of business models, showing the condition for the marketplace equilibrium to arise.

4.1 Reseller equilibrium

We consider the configuration in which both intermediaries adopt the reseller model, hereafter referred to as rr when applicable.

By backward induction, we consider the retail pricing decisions of intermediaries in the Stage-2 subgame, given the Stage-1 prices at both channels $\{w_i^A\}_{i\in\mathcal{N}^A}$ and $\{w_i^B\}_{i\in\mathcal{N}^B}$. Intermediary A chooses $\{p_i^A\}_{i\in\mathcal{N}^A}$ to maximize its profit

$$\Pi^A = \left(\sum\nolimits_{i\in\mathcal{N}^A} p_i^A - \sum\nolimits_{i\in\mathcal{N}^A} w_i^A\right) G(\Delta),$$

whereas intermediary B chooses $\{p_i^B\}_{i\in\mathcal{N}^B}$ to maximize the profit

$$\Pi^B = \left(\sum\nolimits_{i\in\mathcal{N}^B} p_i^B - \sum\nolimits_{i\in\mathcal{N}^B} w_i^B\right) (1 - G(\Delta)).$$

The pricing problem for each intermediary k is equivalent to choosing the aggregate channel-k retail price $P^k \equiv \sum_{i\in\mathcal{N}^k} p_i^k$. The first-order conditions yield

$$P^A = \sum\nolimits_{i\in\mathcal{N}^A} w_i^A + \lambda(\Delta) \qquad \text{and} \qquad P^B = \sum\nolimits_{i\in\mathcal{N}^B} w_i^B + \mu(\Delta)\ .$$

In the equilibrium of the subgame, market share is determined by the value difference

$$\Delta^* = z + \sum\nolimits_{i\in\mathcal{N}^B} w_i^B + \mu(\Delta^*) - \sum\nolimits_{i\in\mathcal{N}^A} w_i^A - \lambda(\Delta^*), \tag{11}$$

which is a function of Stage-1 prices $\{w_i^A\}_{i\in\mathcal{N}^A}$ and $\{w_i^B\}_{i\in\mathcal{N}^B}$.

Turning to Stage 1, within each category $i \in \mathcal{N}^A$ of channel A the symmetric suppliers face an effective marginal cost of zero. To apply the conduct-parameter approach in (1), we note that suppliers have to account for the downstream pricing responses in (11) when setting w_i^A. Therefore, the appropriate demand elasticity formula is now

$$\epsilon^A = -\frac{w_i^A g(\Delta^*)}{G(\Delta^*)} \cdot \frac{\partial \Delta^*}{\partial w_i^A},$$

where $\partial\Delta^*/\partial w_i^A$ is based on differentiating (11). Then, by the elasticity-adjusted Lerner rule with conduct parameter θ_i^A, each category i's wholesale price w_i^A satisfies

$$1 = \frac{\theta_i^A}{\epsilon^A} \qquad \Rightarrow \qquad w_i^A = \frac{\theta_i^A \lambda(\Delta^*)}{-\partial\Delta^*/\partial w_i^A} = \theta_i^A \lambda(\Delta^*)(1 + \lambda'(\Delta^*) - \mu'(\Delta^*)). \tag{12}$$

By the same reasoning, channel B has

$$w_i^B = \frac{\theta_i^B \mu(\Delta^*)}{\partial\Delta^*/\partial w_i^B} = \theta_i^B \mu\left(\Delta^*\right)\left(1 + \lambda'(\Delta^*) - \mu'(\Delta^*)\right).$$

Substituting these into (11) yields the overall equilibrium, summarized as follows:

Proposition 3 *(reseller equilibrium). Denote channel-A and channel-B equilibrium markup functions as*

$$\begin{aligned} P_{rr}^{A}(\Delta) &\equiv \lambda(\Delta)+\theta^{A}\lambda(\Delta)\left(1+\lambda'(\Delta)-\mu'(\Delta)\right), \\ P_{rr}^{B}(\Delta) &\equiv \mu(\Delta)+\theta^{B}\mu(\Delta)\left(1+\lambda'(\Delta)-\mu'(\Delta)\right). \end{aligned} \tag{13}$$

The equilibrium value difference Δ_{rr}^{*} is uniquely pinned down by

$$\Delta_{rr}^{*}=z+P_{rr}^{B}(\Delta_{rr}^{*})-P_{rr}^{A}(\Delta_{rr}^{*}), \tag{14}$$

and the aggregate retail prices are $P_{rr}^{A*}=P_{rr}^{A}(\Delta_{rr}^{*})$ and $P_{rr}^{B*}=P_{rr}^{B}(\Delta_{rr}^{*})$.

Similar to Proposition 1, the equilibrium markups can be expressed as functions of a single summary statistic Δ_{rr}^{*}. From the markup function (13), the term λ is the Stage-2 markup imposed by the intermediary, whereas $\theta^{A}\lambda(1+\lambda'-\mu')$ is the Stage-1 markup imposed by suppliers. The latter reflects: (i) the *within-channel strategic interaction* between the suppliers and the channel-A intermediary, captured by the term $\theta^{A}\lambda\lambda'$; and (ii) the *cross-channel strategic interaction* between the suppliers and the rival-channel intermediary, captured by the term $\theta^{A}\lambda(-\mu')$.

Figure 3 below summarizes the markup structure of Proposition 3. Despite the high-level similarities between Propositions 1 (marketplace equilibrium) and 3 (reseller equilibrium) in terms of the components of the equilibrium markup structures, they yield substantially different market outcomes, which we discuss in the next subsection.

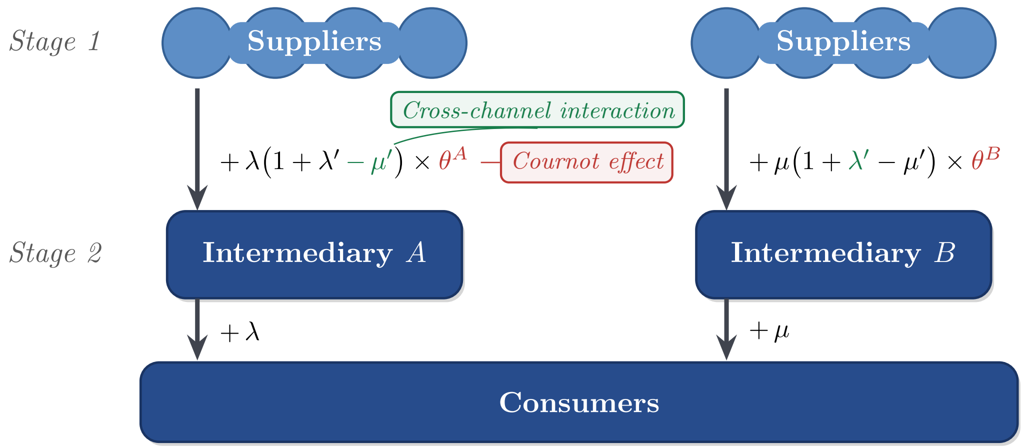

Figure 3: Equilibrium markups in the reseller configuration.

4.2 Comparison of business models

□ **(Non-)neutrality of the business model**. We rewrite the aggregate markup in channel A by grouping the terms with coefficient μ' (which indicate *cross-channel interactions*) and the terms without (which indicate *within-channel interactions*), as follows:

$$
\begin{array}{rl}
P^{A}_{mm}(\Delta) \equiv & \left(\theta^{A}+1\right)\lambda(\Delta)+\theta^{A}\lambda(\Delta)\lambda'(\Delta) \quad + \quad \theta^{B}\lambda(\Delta)(-\mu'(\Delta)) \\
P^{A}_{rr}(\Delta) \equiv & \underbrace{\left(\theta^{A}+1\right)\lambda(\Delta)+\theta^{A}\lambda(\Delta)\lambda'(\Delta)}_{\text{aggregate within-channel markup}} \quad + \quad \underbrace{\theta^{A}\lambda(\Delta)(-\mu'(\Delta))}_{\text{aggregate cross-channel markup}}
\end{array}
. \tag{15}
$$

Suppose, for the moment, that we ignore the cross-channel interaction ($\mu' = 0$). Across both marketplace and reseller configurations, the within-channel markups sum up to the same value: $(\theta^A + 1)\lambda$ represents the total markup imposed by the suppliers and the intermediary in channel A, while $\theta^A\lambda\lambda'$ captures the markups arising from the within-channel interactions in the two-stage pricing game. These imply a neutrality result $P^{A*}_{mm} = P^{A*}_{rr}$. That is, the final retail price remains unchanged regardless of whether the Cournot miscoordination effect appears at Stage 2 (as in the marketplace model) or Stage 1 (as in the reseller model). Johnson (2017) finds a similar neutrality result in a monopoly single-product channel, showing that the equilibrium retail price is invariant to the timing of moves between the supplier and retailer.

However, this neutrality result does not generally hold in scenarios involving retail competition ($-\mu' > 0$). The distinction between Propositions 1 and 3 lies in the differing coefficient for the cross-channel strategic interaction. In the marketplace configuration, the interaction depends on the conduct index θ^B of the *rival channel*. Intuitively, when the sole intermediary A (whose conduct equals 1 by definition) sets its fees, it anticipates subsequent best responses from the rival-channel suppliers (whose aggregate conduct is θ^B). In contrast, in the reseller configuration the interaction depends on the conduct index θ^A of the *own channel*. This is because when channel-A suppliers (whose aggregate conduct is θ^A) set their wholesale prices, they anticipate the best response of the sole rival-channel intermediary B (whose conduct equals 1). The difference in cross-channel interactions implies $P^{A*}_{mm} \neq P^{A*}_{rr}$ whenever $\theta^A \neq \theta^B$. Summarizing the discussions above:

Corollary 2 *If the intermediaries are local monopolies or have symmetric conduct indices ($\theta^A = \theta^B$), then the equilibrium market shares and final prices are invariant to the business-model configuration. Otherwise, $\Delta^*_{mm} \neq \Delta^*_{rr}$, $P^{A*}_{mm} \neq P^{A*}_{rr}$, and $P^{B*}_{mm} \neq P^{B*}_{rr}$ in general.*

□ **Implications of supplier competition intensity**. An important observation from (15) is that the function P^A_{rr} depends only on the own-channel conduct index θ^A, in contrast to P^A_{mm}, which depends on both θ^A and θ^B. This observation has implications for our comparative statics with respect to conduct parameters. To see this, we totally differentiate Δ^*_{rr} from Proposition 3 with respect to θ^A:

$$
\frac{d\Delta^*_{rr}}{d\theta^A} < 0 \Leftrightarrow \frac{\partial P^A_{rr}}{\partial \theta^A} = \left[\lambda\left(1 + \lambda' - \mu'\right)\right]_{\Delta = \Delta^*_{rr}} > 0,
$$

which always holds by Assumption I. Intuitively, softening supplier competition in channel A raises the own-channel markup ($\partial P^A_{rr}/\partial\theta^A > 0$) without affecting the rival-channel markup ($\partial P^B_{rr}/\partial\theta^A = 0$). Consequently, the reseller model delivers the conventional comparative statics: an increase in θ^A raises both equilibrium retail prices P^{A*} and P^{B*}, raises intermediary B's profit

Π_{rr}^{B*}, and reduces intermediary A's market share Δ_{rr}^{*} and profit Π_{rr}^{A*}.[19] The latter results are in contrast with Section 3.2: in the marketplace model, an increase in θ^A can benefit intermediary A by influencing the markups of the rival channel. That mechanism is absent in the reseller model because $P_{rr}^{k}(\Delta)$ just depends on own-channel conduct θ^k, as seen from (15).

□ **An industry-wide shift to the marketplace model**. While traditional big-box intermediaries have predominantly operated under the reseller model, there has been a significant shift toward the marketplace model, particularly among emerging online retail platforms. We now assess the impact of this industry-wide shift on competition and consumer welfare.[20]

Proposition 4 *Suppose $\theta^A < \theta^B$. Then, the industry-wide shift from the reseller model to the marketplace model has the following effects:*

- *A lower market share of intermediary A: $\Delta_{mm}^{*} < \Delta_{rr}^{*}$.*
- *Higher final prices $P_{mm}^{A*} > P_{rr}^{A*}$ and $P_{mm}^{B*} > P_{rr}^{B*}$ if z is sufficiently large.*
- *Lower final prices $P_{mm}^{A*} < P_{rr}^{A*}$ and $P_{mm}^{B*} < P_{rr}^{B*}$ if z is sufficiently small.*

Proposition 4 is driven by the differing cross-channel interactions in the two configurations. The intuition for the decrease in A's market share can be understood from (15). Under the reseller model, a lower conduct index θ^A (more intense supplier competition) benefits channel A by lowering both the within-channel and cross-channel interaction terms of the channel. In contrast, under the marketplace model, channel A's cross-channel interaction term is instead governed by that of the rival channel, θ^B, and so it becomes higher. As a result, channel A's advantage of $\theta^A < \theta^B$ no longer translates into a pricing advantage (in terms of total markups of the channel), leading to a reduction in its market share.

The reasoning for the weakened price competition is the following. Continuing from (15), we observe that the shift to the marketplace model increases channel A's cross-channel markup from $\theta^A\lambda(-\mu')$ to $\theta^B\lambda(-\mu')$. This imposes *upward pricing pressure* on channel A's final price, which—through strategic complementarities—translates into an upward pressure on channel B's final price. By the reverse reasoning, the cross-channel markup in channel B decreases, generating *downward pricing pressure* on both channels. In equilibrium, which direction dominates depends on the relative market share. If the efficiency difference z is sufficiently large, the larger market share of channel A means that the upward pressure originating from channel A dominates; if z is small, then the downward pressure originating from channel B dominates.[21]

Proposition 4 has implications for consumer surplus. It identifies conditions under which the shift to the marketplace model softens channel competition and lowers consumer surplus (when z is large), or intensifies channel competition and raises consumer surplus (when z is small). Notably, this competition-modifying effect is absent in the existing literature (e.g., Johnson,

[19] The same logic carries over to supplier profits. As supplier competition relaxes in some category $i \in \mathcal{N}^A$ (so θ^A rises), it benefits suppliers in category i. However, the resulting contraction of Δ_{rr}^{*} harms the profit π_j^{A*} of other categories $j \neq i$ of channel A but benefits suppliers in channel B.

[20] In Section 4.3, we further demonstrate that the marketplace model tends to emerge endogenously when intermediaries choose their business models prior to engaging in price competition.

[21] As an illustration, in our uniform specification (3), the necessary and sufficient conditions for the price comparisons are: $P_{rr}^{A*} < P_{mm}^{A*} \Leftrightarrow \theta^B - \theta^A > -\frac{1}{4} - \frac{z}{2\sigma}$, and $P_{rr}^{B*} < P_{mm}^{B*} \Leftrightarrow \theta^B - \theta^A > \frac{1}{4} - \frac{z}{2\sigma}$. Both inequalities do not violate the coexistence condition in (4).

2017), which focuses on monopoly or symmetric duopoly intermediaries. As pointed out in Corollary 2, if $\theta^A = \theta^B$, then the equilibrium prices are identical across the configurations for any efficiency difference z.

We now examine the implications for profits. To gain tractability, we adopt the uniform distribution specification (3).[22] We write $\pi^{k*} \equiv \sum_{i \in \mathcal{N}^k} \pi_i^{k*}$ for the aggregate supplier profit in channel k, adding a configuration subscript where needed.

Proposition 5 *Suppose $\theta^A < \theta^B$ and the uniform distribution specification (3) hold. There exist thresholds $\hat{z}^A$ and $\hat{z}^B$ such that the industry-wide shift from the reseller model to the marketplace model has the following effects:*

- *A lower profit of intermediary A, $\Pi_{mm}^{A*} < \Pi_{rr}^{A*}$, if and only if $z < \hat{z}^A$.*
- *A higher profit of intermediary B, $\Pi_{mm}^{B*} > \Pi_{rr}^{B*}$.*
- *A lower profit of suppliers in channel A, $\pi_{mm}^{A*} < \pi_{rr}^{A*}$.*
- *A lower profit of suppliers in channel B: $\pi_{mm}^{B*} < \pi_{rr}^{B*}$, if and only if $z < \hat{z}^B$.*

To understand Proposition 5, it is useful to start from a monopoly-channel benchmark (e.g., Johnson, 2017). In this case, the shift from the reseller to the marketplace configuration just confers first-mover pricing advantages to the intermediaries relative to the suppliers, resulting in a redistribution of profits from suppliers to intermediaries: $\Pi_{mm}^{k*} > \Pi_{rr}^{k*}$ and $\pi_{mm}^{k*} < \pi_{rr}^{k*}$ for both channels $k = A, B$.

In our competitive setting, the additional effect comes from the change in cross-channel competition, which reduces channel A's market share ($\Delta_{mm}^* < \Delta_{rr}^*$; Proposition 4). This effect benefits intermediary B and reinforces its gain from the aforementioned first-mover advantage, implying unambiguously that $\Pi_{mm}^{B*} > \Pi_{rr}^{B*}$. In contrast, the effect harms intermediary A. If A's existing market share is sufficiently small (equivalently, if the efficiency difference z is sufficiently negative), this adverse effect dominates A's gain from the first-mover advantage, implying $\Pi_{mm}^{A*} < \Pi_{rr}^{A*}$.[23]

In sum, by allowing for asymmetry in the intensity of supplier competition across channels, our model shows that changes in intermediation models affect not only profit distribution but also prices, competition intensity, and consumer surplus. This perspective complements existing analyses, which primarily highlight the profit redistribution logic that harms suppliers under marketplace models.

[22] The profit comparisons in Proposition 5, like the price comparisons in Proposition 4, require both channels to hold interior market shares in the marketplace and the reseller equilibria. Under the uniform specification, we accordingly assume

$$\frac{z}{\sigma} \in \left[-\frac{3 + 2\theta^A + 4\theta^B}{2}, \frac{3 + 6\theta^A}{2}\right], \tag{16}$$

which is necessary and sufficient for interiority to hold simultaneously for both the marketplace and reseller configurations. Given $\theta^A < \theta^B$, the lower bound is the marketplace interiority threshold and the upper bound the reseller one, each binding at its respective end.

[23] A similar reasoning applies to suppliers and is therefore omitted.

4.3 Endogenous business model

We have so far treated the business model of the channels as exogenous. In this section, we suppose intermediaries simultaneously choose their business models prior to the pricing game and analyze which configuration arises in equilibrium. To keep the exposition compact, we focus on presenting the main economic insight and relegate the formal derivation details to Online Appendix D (which includes the analysis of the pricing equilibrium when intermediaries have asymmetric business models).

Our first question is: how does an intermediary's equilibrium market share change when it unilaterally changes its business model?

Lemma 1 *For each channel $k = A, B$, if its conduct index satisfies $\theta^k \geq 1$, then channel-k market share in the overall equilibrium increases whenever channel k unilaterally switches from the reseller to the marketplace model.*[24] *If instead $\theta^k < 1$, then the opposite is true.*

Lemma 1 is driven by the way business models shape the cross-channel interactions, as discussed in (15). The key idea is that a channel k becomes more advantaged when its Stage-2 prices are set by the party that is more "strategically responsive", as doing so manipulates the cross-channel interactions faced by the rival channel. When $\theta^k \geq 1$ (high supplier conduct), this idea calls for Stage-2 pricing by suppliers, i.e., adopting the marketplace model. When $\theta^k < 1$ (lower supplier conduct), this idea calls for Stage-2 pricing by the intermediary, i.e., adopting the reseller model.

Building on Lemma 1, we are now ready to analyze the best-response business models and the overall equilibrium. An important caveat is that, in practice, factors outside the model may also influence this comparison. These include logistics, category management, marketing activities, and differences in operational costs across models.[25] The comparison below should therefore be understood as isolating the role of the strategic interactions within and across channels, treating other factors as exogenous.

Proposition 6 *For each intermediary $k = A, B$, if $\theta^k \geq 1$, then the dominant strategy is to adopt the marketplace model. Consequently, if $\min\{\theta^A, \theta^B\} \geq 1$, then both intermediaries adopt the marketplace model in the equilibrium.*

Proposition 6 shows that choosing the marketplace model is a dominant strategy for each intermediary k as long as supplier competition is not too intense in aggregate, i.e., $\theta^k \geq 1$. A mild sufficient condition is that at least one category $i \in \mathcal{N}^k$ is occupied by a monopoly supplier.

[24] More formally, with channel $k = A$, this means $\Delta^*_{mr} \geq \Delta^*_{rr}$ and $\Delta^*_{mm} \geq \Delta^*_{rm}$, where mr indicates the asymmetric equilibrium with A adopting the marketplace model and B adopting the reseller model, whereas rm indicates the reverse.

[25] For example, Hagiu and Wright (2015) frame the choice as an allocation of control rights over non-contractible variables such as marketing, showing that the choice between reseller or marketplace models depends on whether the intermediary or independent suppliers possess more relevant information for tailoring product-specific marketing strategies. Tian et al. (2018) highlight that the interplay between order-fulfillment costs and the intensity of upstream competition also influences the optimal business model.

This finding supports our focus on the marketplace model in the baseline Sections 2–3.[26]

Intuitively, the dominance of the marketplace model reflects two benefits. First, there is a market share expansion benefit. As noted in Lemma 1, when $\theta^k \geq 1$, a unilateral adoption of the marketplace model expands intermediary k's equilibrium market share, thereby creating a cross-channel competitive advantage. Second, there is a first-mover advantage benefit. In vertical relations with a monopoly channel, it is well established that the first mover earns higher profits when prices at different stages are strategic substitutes (Bulow et al., 1985). This effect applies in our competitive setting as well and consistently favors the marketplace model (whereby the intermediary is the first mover in setting fees).

The threshold $\theta^k \geq 1$ also isolates what the multiproduct structure adds relative to single-product delegation models such as Moorthy (1988). In a single-category channel the conduct parameter is bounded above by one, so the dominance condition $\theta^k \geq 1$ holds only in the knife-edge case of a monopolized category.

5 Implications and concluding remarks

Multiproduct intermediaries serve as gatekeepers between consumers and suppliers. This paper develops a tractable framework to study competition between asymmetric multiproduct intermediaries facing consumers with multiproduct demand. The pricing equilibrium combines horizontal marginalization, among the suppliers within a channel, and vertical marginalization, between intermediaries and suppliers.[27] The form this interaction takes depends on the prevailing business model, and that dependence drives the managerial and policy conclusions below.

A first managerial lesson departs from the usual view that a marketplace intermediary always benefits from cheaper, more competitive suppliers. A marketplace intermediary trailing on total utility offered can gain by softening competition among its third-party sellers. Softer supplier competition means that its channel will not price aggressively, which induces the rival to price higher in turn. The intermediary can act on this through the levers it controls, including assortment of product categories, platform governance, and integration. The motive is strategic manipulation of cross-channel competition, and it differs from the fee-structure explanations common in the platform literature (e.g., Casner, 2020; Teh, 2022; Choi and Jeon, 2023).

The second lesson is that the choice between reselling and running a marketplace can be an instrument for influencing competition between vertical channels. When some suppliers hold market power, handing retail pricing to suppliers is privately beneficial for an intermediary,

[26]For the sake of completeness, Online Appendix D shows that the reseller model can be a best response when $\theta^k < 1$ is sufficiently small. The reason is that in this case the adoption of the reseller model expands the equilibrium market share and dominates the first-mover advantage benefit of the marketplace model.

[27]We note that three features of our analysis have no counterpart in a single-category model of competing intermediaries. First, that competition between multiproduct channels can be summarized by one scalar conduct index θ^k per channel is not obvious ex ante. Second, the multiproduct structure widens the set of instruments through which an intermediary can influence that index. In particular, product assortment has no counterpart in a single-category analysis, yet it is among the most natural levers an intermediary holds. Third and most importantly, aggregation relaxes the upper bound on conduct. Category-level conduct satisfies $\theta_i^k \leq 1$ by construction, so a single-category model confines the index to $\theta^k \leq 1$ and would therefore exclude the parameter region that is relevant for our results.

as doing so induces softer equilibrium pricing by the rival channel. As such, the business model decision is not just a matter of relative fulfillment cost (Tian et al., 2018) or information advantages between intermediaries and suppliers (Hagiu and Wright, 2015).

From a policy perspective, our analysis shows how competition in one product category spills onto others. Every category in a channel shares one intermediary and draws on the same consumers. A shift in competition intensity within a single category therefore moves the whole channel's competitiveness. A supplier that faces softer competition in its own category gains directly. Whether suppliers in the other categories gain or lose, by contrast, turns on whether the channel's overall market share expands or contracts. As such, practitioners and regulators watching each specific category in isolation would miss these linkages.

A final lesson is that marketplace adoption may harm consumers in a way that differs from the harm to sellers on which scrutiny usually rests (e.g., Johnson, 2017). When intermediaries differ in their conduct indices, an industry-wide move to marketplaces can soften price competition across channels and thereby raise final prices. When their conduct indices coincide, the same move only shifts profit from suppliers to intermediaries. Thus, a benchmark built on symmetric or monopoly intermediaries may miss the price effect entirely.

Our framework can be extended in several directions. First, in line with the literature on intermediation models, we have focused on linear per-unit tariffs; extending our multiproduct intermediary model to a more general contracting framework while preserving tractability remains a challenge. Second, we assume that consumers are one-stop shoppers. This assumption corresponds to membership and default-channel environments, such as warehouse clubs and platform subscription programs, in which the consumer's purchases across categories are tied to a single channel. In some other cases, consumers may split their baskets across channels and the single-index characterization does not necessarily apply.[28] Extending the framework to a population that mixes one-stop and multi-stop shoppers would significantly expand its scope. Finally, embedding a generalized multiproduct demand system, such as the aggregative-game and potential-game methods of Nocke and Schutz (2018) and Nocke and Schutz (2025), into our vertical-relations framework is a promising direction for further work.

References

Abhishek, Vibhanshu, Kinshuk Jerath, and Z. John Zhang (2016) "Agency selling or reselling? Channel structures in electronic retailing," *Management Science*, 62 (8), 2259–2280.

ACCC (2025) "Supermarkets inquiry final report," final report, Australian Competition and Consumer Commission, https://www.accc.gov.au/system/files/supermarkets-inquiry_1.pdf.

Allain, Marie-Laure, Marc Bourreau, and José L. Moraga-González (2024) "The agency and wholesale models when a platform can charge entry fees," *CEPR Discussion Paper 21154*.

Anderson, Simon P. and Özlem Bedre-Defolie (2024) "Hybrid platform model: Monopolistic competition and a dominant firm," *The RAND Journal of Economics*, 55 (4), 684–718.

[28]For grocery retailing, for instance, Thomassen et al. (2017) find that 36% of UK shoppers consistently use a single store each week, 17% consistently visit multiple stores, and the rest alternate across weeks, so supermarket competition mixes one-stop and multi-stop behavior.

Anderson, Simon P. and André De Palma (2006) “Market performance with multiproduct firms,” *The Journal of Industrial Economics*, 54 (1), 95–124.

Bagnoli, Mark and Theodore Bergstrom (2005) “Log-concave probability and its applications,” *Economic Theory*, 26 (2), 445–469.

Belleflamme, Paul and Martin Peitz (2010) “Platform competition and seller investment incentives,” *European Economic Review*, 54 (8), 1059–1076.

——— (2019) “Managing competition on a two-sided platform,” *Journal of Economics & Management Strategy*, 28 (1), 5–22.

Bonanno, Giacomo and John Vickers (1988) “Vertical separation,” *The Journal of Industrial Economics*, 36 (3), 257–265.

Bulow, Jeremy I, John D Geanakoplos, and Paul D Klemperer (1985) “Multimarket oligopoly: Strategic substitutes and complements,” *Journal of Political Economy*, 93 (3), 488–511.

Casner, Ben (2020) “Seller curation in platforms,” *International Journal of Industrial Organization*, 72, 102659.

Chen, Zhijun and Patrick Rey (2012) “Loss leading as an exploitative practice,” *American Economic Review*, 102 (7), 3462–3482.

Choi, Jay Pil and Doh-Shin Jeon (2023) “Platform design biases in ad-funded two-sided markets,” *The RAND Journal of Economics*, 54 (2), 240–267.

Crawford, Gregory S. and Ali Yurukoglu (2012) “The welfare effects of bundling in multichannel television markets,” *American Economic Review*, 102 (2), 643–685.

Dinerstein, Michael, Liran Einav, Jonathan Levin, and Neel Sundaresan (2018) “Consumer price search and platform design in internet commerce,” *American Economic Review*, 108 (7), 1820–1859.

Dobson, Paul W and Michael Waterson (1997) “Countervailing power and consumer prices,” *The Economic Journal*, 107 (441), 418–430.

——— (2007) “The competition effects of industry-wide vertical price fixing in bilateral oligopoly,” *International Journal of Industrial Organization*, 25 (5), 935–962.

Etro, Federico (2021) “Product selection in online marketplaces,” *Journal of Economics & Management Strategy*, 30 (3), 614–637.

Farronato, Chiara, Andrey Fradkin, and Alexander MacKay (2023) “Self-preferencing at Amazon: Evidence from search rankings,” *AEA Papers and Proceedings*, 113, 239–243.

Foros, Øystein, Hans Jarle Kind, and Greg Shaffer (2017) “Apple’s agency model and the role of most-favored-nation clauses,” *The RAND Journal of Economics*, 48 (3), 673–703.

Fudenberg, Drew and Jean Tirole (1984) “The fat-cat effect, the puppy-dog ploy, and the lean and hungry look,” *American Economic Review*, 74 (2), 361–366.

Gao, Ming (2025) “Retailer access pricing and supplier relations in the agency model,” *Journal of Economics & Management Strategy*, 34 (1), 42–66.

Gaudin, Germain and Alexander White (2021) “Vertical agreements and user access,” *American Economic Journal: Microeconomics*, 13 (3), 328–371.

Gautier, Axel, Leonardo Madio, and Shiva Shekhar (2025) “Network externalities and platform strategy: Agency, bundled entry, and integration,” *CESifo Working Paper 11711.*

Gilbert, Richard J (2015) “E-books: A tale of digital disruption,” *Journal of Economic Perspectives*, 29 (3), 165–184.

Hagiu, Andrei (2009) "Two-sided platforms: Product variety and pricing structures," *Journal of Economics & Management Strategy*, 18 (4), 1011–1043.

Hagiu, Andrei, Tat-How Teh, and Julian Wright (2022) "Should platforms be allowed to sell on their own marketplaces?" *The RAND Journal of Economics*, 53 (2), 297–327.

Hagiu, Andrei and Julian Wright (2015) "Marketplace or reseller?" *Management Science*, 61 (1), 184–203.

——— (2024) "Marketplace leakage," *Management Science*, 70 (3), 1529–1553.

Hervas-Drane, Andres and Sandro Shelegia (2025) "Retailer-led marketplaces," *Management Science*, 71 (11), 9650–9669.

Hu, Honggang, Quan Zheng, and Xiajun Amy Pan (2022) "Agency or wholesale? The role of retail pass-through," *Management Science*, 68 (10), 7538–7554.

Ide, Enrique (2026) "Revisiting the Impact of Upstream Mergers with Downstream Complements and Substitutes," *The Economic Journal*, 136 (673), 232–258.

Inderst, Roman and Greg Shaffer (2007) "Retail mergers, buyer power and product variety," *The Economic Journal*, 117 (516), 45–67.

Ishihara, Yuto, Yushi Tsunoda, and Yusuke Zennyo (2026) "Loss-Leader Pricing on Hybrid Platforms: A Multiproduct Perspective," *SSRN Working Paper 6253640*.

Jeon, Doh-Shin and Patrick Rey (2024) "Platform Competition and Innovation," *CEPR Discussion Paper 19456*.

Johnson, Justin P (2017) "The agency model and MFN clauses," *The Review of Economic Studies*, 84 (3), 1151–1185.

——— (2020) "The agency and wholesale models in electronic content markets," *International Journal of Industrial Organization*, 69, 102581.

Johnson, Justin P., Andrew Rhodes, and Matthijs R. Wildenbeest (2023) "Platform design when sellers use pricing algorithms," *Econometrica*, 91 (5), 1841–1879.

Jullien, Bruno, Alessandro Pavan, and Marc Rysman (2021) "Two-sided markets, pricing, and network effects," in Kate Ho, Ali Hortaçsu, and Alessandro Lizzeri eds. *Handbook of Industrial Organization*, Vol. 4, 485–592: North-Holland.

Lal, Rajiv and Carmen Matutes (1994) "Retail pricing and advertising strategies," *Journal of Business*, 67 (3), 345–370.

Lebow, Sara (2023) "Good news for Prime Day: Most US online shoppers start product searches on Amazon," EMARKETER, https://www.emarketer.com/content/prime-day-us-online-shoppers-start-product-searches-amazon, Accessed: 2026-07-14.

Marx, Leslie M. and Greg Shaffer (2010) "Slotting allowances and scarce shelf space," *Journal of Economics & Management Strategy*, 19 (3), 575–603.

Miklós-Thal, Jeanine and Greg Shaffer (2021) "Input price discrimination by resale market," *The RAND Journal of Economics*, 52 (4), 727–757.

Moorthy, K. Sridhar (1988) "Strategic decentralization in channels," *Marketing Science*, 7 (4), 335–355.

Nocke, Volker and Nicolas Schutz (2018) "Multiproduct-firm oligopoly: An aggregative games approach," *Econometrica*, 86 (2), 523–557.

——— (2025) "Oligopoly, complementarities, and transformed potentials," *CEPR Discussion Paper 20527*.

O'Brien, Daniel P. (2014) "The welfare effects of third-degree price discrimination in intermediate good markets: the case of bargaining," *The RAND Journal of Economics*, 45 (1), 92–115.

Rhodes, Andrew (2015) "Multiproduct retailing," *The Review of Economic Studies*, 82 (1), 360–390.

Rhodes, Andrew, Makoto Watanabe, and Jidong Zhou (2021) "Multiproduct intermediaries," *Journal of Political Economy*, 129 (2), 421–464.

Ritz, Robert A (2024) "Does competition increase pass-through?" *The RAND Journal of Economics*, 55 (1), 140–165.

De los Santos, Babur, Daniel P. O'Brien, and Matthijs R. Wildenbeest (2026) "Agency pricing and bargaining: Evidence from the e-book market," *American Economic Journal: Microeconomics*, 18 (2), 146–191, 10.1257/mic.20220232.

Teh, Tat-How (2022) "Platform governance," *American Economic Journal: Microeconomics*, 14 (3), 213–254.

Thomassen, Øyvind, Howard Smith, Stephan Seiler, and Pasquale Schiraldi (2017) "Multi-category competition and market power: a model of supermarket pricing," *American Economic Review*, 107 (8), 2308–2351.

Tian, Lin, Asoo J Vakharia, Yinliang Tan, and Yifan Xu (2018) "Marketplace, reseller, or hybrid: Strategic analysis of an emerging e-commerce model," *Production and Operations Management*, 27 (8), 1595–1610.

Tsunoda, Yushi and Yusuke Zennyo (2021) "Platform information transparency and effects on third-party suppliers and offline retailers," *Production and Operations Management*, 30 (11), 4219–4235.

Wang, Chengsi and Julian Wright (2025) "Regulating platform fees," *Journal of the European Economic Association*, 23 (2), 746–783.

Weyl, E Glen and Michal Fabinger (2013) "Pass-through as an economic tool: Principles of incidence under imperfect competition," *Journal of Political Economy*, 121 (3), 528–583.

Zennyo, Yusuke (2022) "Platform encroachment and own-content bias," *The Journal of Industrial Economics*, 70 (3), 684–710.

Appendix: Proofs

Proof of Proposition 1

In the marketplace configuration, it remains to verify that $P^A_{mm}(\Delta)$ and $P^B_{mm}(\Delta)$ are, respectively, increasing and decreasing functions of Δ. Writing $P^A_{mm} = (1+\theta^A)\lambda + \theta^A\lambda\lambda' + \theta^B(-\lambda\mu')$ and $P^B_{mm} = (1+\theta^B)\mu + \theta^A\mu\lambda' + \theta^B(-\mu\mu')$, this follows from the log-concavity of G, which implies $\lambda'(\Delta) > 0$ and $\mu'(\Delta) < 0$. Assumption I further implies that $\lambda(\Delta)\lambda'(\Delta) > 0$ and $-\lambda(\Delta)\mu'(\Delta) > 0$ are increasing functions, while $\mu(\Delta)\lambda'(\Delta) > 0$ and $-\mu(\Delta)\mu'(\Delta) > 0$ are decreasing functions.

Proof of Proposition 2

For the purpose of this proof, it is occasionally useful to make explicit the dependence of the equilibrium $\Delta^*_{mm}(\theta^A, z)$ on the parameters θ^A and z. In what follows, we will suppress the arguments of $\lambda(\Delta)$ and $\mu(\Delta)$ when doing so does not cause confusion.

□ **Equilibrium market share**. We first note the following total derivative from (9):

$$\left(1 - \frac{\partial P^B_{mm}}{\partial \Delta} + \frac{\partial P^A_{mm}}{\partial \Delta}\right)\frac{d\Delta^*_{mm}}{d\theta^A} = \left[\mu\lambda' - \lambda\left(1+\lambda'\right)\right]_{\Delta=\Delta^*_{mm}}. \tag{17}$$

Define a critical threshold value $\bar{\Delta}$ implicitly by $[\mu\lambda' - \lambda(1+\lambda')]_{\Delta=\bar{\Delta}} = 0$, such that

$$[\mu\lambda' - \lambda(1+\lambda')]_{\Delta} > (<) 0 \text{ whenever } \Delta < (>) \bar{\Delta},$$

which is valid given $\mu\lambda' - \lambda(1+\lambda')$ is decreasing in Δ by Assumption I. Then, define threshold $\bar{z}$ as

$$\begin{aligned} \bar{z} &= \bar{\Delta} - P^B_{mm}(\bar{\Delta}) + P^A_{mm}(\bar{\Delta}) \\ &= \bar{\Delta} + \lambda(\bar{\Delta}) - \mu(\bar{\Delta}) - \theta^B \left[\mu(\bar{\Delta}) - \mu(\bar{\Delta})\mu'(\bar{\Delta}) + \lambda(\bar{\Delta})\mu'(\bar{\Delta})\right], \end{aligned} \tag{18}$$

where we used $\mu(\bar{\Delta})\lambda'(\bar{\Delta}) = \lambda(\bar{\Delta})\left(1+\lambda'(\bar{\Delta})\right)$ to derive the last line.

Observe that $\frac{d\bar{z}}{d\theta^A} = 0$. We claim that $\bar{z}$ is the required threshold. To see this, note that $\Delta^*_{mm}(\theta^A; \bar{z}) = \bar{\Delta}$ for any θ^A by plugging in the definition of $\bar{z}$ (18). Note that Δ^*_{mm} is the unique solution to

$$\Gamma_{mm}(\Delta) \equiv \Delta + P^A_{mm}(\Delta) - P^B_{mm}(\Delta) = z.$$

Since $\Gamma_{mm}(\Delta)$ is an increasing function,

$$\frac{d}{dz}\Delta^*_{mm}(\theta^A; z) = \frac{1}{\Gamma'_{mm}(\Delta)} > 0.$$

It follows that $z > (<) \bar{z}$ implies $\Delta^*_{mm}(\theta^A; z) > (<) \bar{\Delta}$, which then implies $\frac{d\Delta^*_{mm}}{d\theta^A} < (>) 0$ by the definition of $\bar{\Delta}$.

To show $\bar{z} < 0$, we first observe that $\bar{\Delta} < 0$ because $[\mu\lambda' - \lambda(1+\lambda')]_{\Delta=0} = -\lambda < 0$ by the symmetry of the distribution function. Then, $\bar{\Delta} < 0$ implies $\bar{\Delta} + \lambda(\bar{\Delta}) - \mu(\bar{\Delta}) < 0$ by distribution symmetry, while

$$[\mu - \mu\mu' + \lambda\mu']_{\Delta=\bar{\Delta}} > [\mu - \mu\mu' + \lambda\mu']_{\Delta=0} = \mu > 0,$$

where the inequality follows because μ, $-\mu\mu'$, and $\lambda\mu'$ are all decreasing in Δ (by Assumption I and the monotonicity properties of $-\mu\mu'$ and $-\lambda\mu'$ established in the proof of Proposition 1), so that $\mu - \mu\mu' + \lambda\mu'$ is decreasing over $[\bar{\Delta}, 0]$. Given the definition of $\bar{z}$ (18), these two observations imply $\bar{z} < 0$.

☐ **Retail prices.** If $z < \bar{z}$ so that $\frac{d\Delta^*_{mm}}{d\theta^A} > 0$, then we can express the overall price impacts $\frac{d}{d\theta^A}P^A_{mm}(\Delta^*_{mm}(\theta^A))$ and $\frac{d}{d\theta^A}P^B_{mm}(\Delta^*_{mm}(\theta^A))$ as

$$\frac{dP^{A*}_{mm}}{d\theta^A} = \underbrace{\lambda(1+\lambda')}_{>0} + \underbrace{\frac{\partial P^A_{mm}}{\partial \Delta}}_{>0} \times \frac{d\Delta^*_{mm}}{d\theta^A} > 0, \tag{19}$$

$$\frac{dP^{B*}_{mm}}{d\theta^A} = \underbrace{\lambda(1+\lambda')}_{>0} + \underbrace{\left(1 + \frac{\partial P^A_{mm}}{\partial \Delta}\right)}_{>0} \times \frac{d\Delta^*_{mm}}{d\theta^A} > 0. \tag{20}$$

If $z > \bar{z}$ so that $\frac{d\Delta^*_{mm}}{d\theta^A} < 0$, then we can use (17) to rewrite (19) and (20) as

$$\begin{aligned} \frac{dP^{A*}_{mm}}{d\theta^A} &= \underbrace{\mu\lambda'}_{>0} - \underbrace{\left(1 - \frac{\partial P^B_{mm}}{\partial \Delta}\right)}_{>0} \times \frac{d\Delta^*_{mm}}{d\theta^A} > 0, \\ \frac{dP^{B*}_{mm}}{d\theta^A} &= \underbrace{\mu\lambda'}_{>0} + \underbrace{\frac{\partial P^B_{mm}}{\partial \Delta}}_{<0} \times \frac{d\Delta^*_{mm}}{d\theta^A} > 0. \end{aligned}$$

□ **Intermediary A's profit.** We write the profit as $\Pi_{mm}^{A*} = \Pi_{mm}^{A}(\Delta_{mm}^*; \theta^A)$, where

$$\Pi_{mm}^{A}(\Delta; \theta^A) = \left[1 + \theta^A \lambda'(\Delta) - \theta^B \mu'(\Delta)\right] \lambda(\Delta) G(\Delta) = \left(P_{mm}^A(\Delta) - \theta^A \lambda\right) G(\Delta). \tag{21}$$

Differentiating with respect to θ^A yields

$$\frac{d\Pi_{mm}^{A}}{d\theta^A} = \underbrace{\lambda\lambda' G(\Delta_{mm}^*)}_{=\frac{\partial \Pi_{mm}^{A}}{\partial \theta^A} > 0} + \underbrace{\frac{\partial \Pi_{mm}^{A}}{\partial \Delta}}_{>0} \times \frac{d\Delta_{mm}^*}{d\theta^A}. \tag{22}$$

If $z < \bar{z}$ so that $\frac{d\Delta_{mm}^*}{d\theta^A} > 0$, then (22) implies $\frac{d\Pi_{mm}^{A}}{d\theta^A} > 0$.
If $z > \bar{z}$ so that $\frac{d\Delta_{mm}^*}{d\theta^A} < 0$, then we use the uniform distribution specification in (3) to obtain

$$\Delta_{mm}^* = \frac{2z - \sigma\left(\theta^A - \theta^B\right)}{6\left(\theta^A + \theta^B + 1\right)} \quad \text{and} \quad \Pi_{mm}^{A*} = \frac{(2z + (3 + 2\theta^A + 4\theta^B)\sigma)^2}{36(\theta^A + \theta^B + 1)\sigma}.$$

Then, the definitions of the critical value $\bar{\Delta}$ and the threshold $\bar{z}$ give $\bar{\Delta} = -\sigma/6$ and

$$\bar{z} = -\frac{\sigma}{2}\left(1 + 2\theta^B\right),$$

which are indeed independent of θ^A. Moreover,

$$\frac{d\Pi_{mm}^{A*}}{d\theta^A} = \frac{2\sigma}{36\left(\theta^A + \theta^B + 1\right)^2}\left(\frac{2z}{\sigma} + 3 + 2\theta^A + 4\theta^B\right)\left(\theta^A - \frac{z}{\sigma} + \frac{1}{2}\right) > 0$$

if and only if $\theta^A > z/\sigma - 1/2$, as stated in the text.

□ **Intermediary B's profit.** We write the profit as $\Pi_{mm}^{B*} = \Pi_{mm}^{B}(\Delta_{mm}^*; \theta^A)$, where

$$\begin{aligned} \Pi_{mm}^{B}(\Delta; \theta^A) &= \left[1 + \theta^A \lambda'(\Delta) - \theta^B \mu'(\Delta)\right] \mu(\Delta)\left(1 - G(\Delta)\right) \\ &= \left(P_{mm}^B(\Delta) - \theta^B \mu\right)(1 - G(\Delta)). \end{aligned}$$

Differentiating with respect to θ^A, we obtain

$$\frac{d\Pi_{mm}^{B*}}{d\theta^A} = \underbrace{\mu\lambda'\left(1 - G(\Delta_{mm}^*)\right)}_{=\frac{\partial \Pi_{mm}^{B}}{\partial \theta^A} > 0} + \underbrace{\frac{\partial \Pi_{mm}^{B}}{\partial \Delta}}_{<0} \times \frac{d\Delta_{mm}^*}{d\theta^A}. \tag{23}$$

If $z > \bar{z}$ so that $\frac{d\Delta_{mm}^*}{d\theta^A} < 0$, then (23) implies $\frac{d\Pi_{mm}^{B}}{d\theta^A} > 0$.
If $z < \bar{z}$ so that $\frac{d\Delta_{mm}^*}{d\theta^A} > 0$, we expand the partial derivative of $\Pi_{mm}^{B}(\Delta; \theta^A)$ as

$$\frac{\partial \Pi_{mm}^{B}}{\partial \Delta} = (1 - G(\Delta))\left(\frac{\partial P_{mm}^B(\Delta)}{\partial \Delta} - 1 - \theta^A \lambda'\right).$$

Evaluating at $\Delta = \Delta_{mm}^*$ and using (17), we obtain

$$\left(\frac{\partial \Pi_{mm}^{B}}{\partial \Delta} \times \frac{d\Delta_{mm}^*}{d\theta^A}\right)_{\Delta = \Delta_{mm}^*} = (1 - G(\Delta_{mm}^*))\left(\frac{\partial P_{mm}^A}{\partial \Delta}\frac{d\Delta_{mm}^*}{d\theta^A} - \mu\lambda' + \lambda\left(1 + \lambda'\right) - \theta^A \lambda' \frac{d\Delta_{mm}^*}{d\theta^A}\right).$$

Substituting into (23), we get

$$\frac{1}{1-G(\Delta_{mm}^*)}\frac{d\Pi_{mm}^{B*}}{d\theta^A}=\lambda\,(1+\lambda')+\underbrace{\left(\frac{\partial P_{mm}^A}{\partial\Delta}-\theta^A\lambda'\right)\frac{d\Delta_{mm}^*}{d\theta^A}}_{>0\text{ given }z<\bar{z}},$$

where $\frac{\partial P_{mm}^A}{\partial\Delta}-\theta^A\lambda'=\lambda'+\theta^A(\lambda\lambda''+\lambda'\lambda')-\theta^B(\lambda\mu''+\lambda'\mu')>0$ by Assumption I. Hence $\frac{d\Pi_{mm}^{B*}}{d\theta^A}>0$.

Proof of Corollary 1

The equilibrium index Δ_{mm}^* depends on channel A's category-i conduct θ_i^A only through the aggregate index $\theta^A=\sum_{l\in\mathcal{N}^A}\theta_l^A$, and $\partial\theta^A/\partial\theta_i^A=1$. Hence

$$\frac{d\Delta_{mm}^*}{d\theta_i^A}=\frac{d\Delta_{mm}^*}{d\theta^A}. \tag{24}$$

We treat the three groups of suppliers in turn.

☐ **Categories $j\in\mathcal{N}^A\setminus\{i\}$ in channel A.** For $j\neq i$, θ_i^A affects π_j^{A*} only through Δ_{mm}^*. Using (24),

$$\frac{d\pi_j^{A*}}{d\theta_i^A}=\theta_j^A\,(1+\lambda')G(\Delta_{mm}^*)\cdot\frac{d\Delta_{mm}^*}{d\theta^A},$$

where we used $d(\lambda G)/d\Delta=(1+\lambda')G$. The derivative has the same sign as $d\Delta_{mm}^*/d\theta^A$, and so the result follows from Proposition 2.

☐ **Categories $j\in\mathcal{N}^B$ in channel B.** Here θ_i^A affects π_j^{B*} only through Δ_{mm}^*, so

$$\frac{d\pi_j^{B*}}{d\theta_i^A}=\theta_j^B\,(\mu'-1)(1-G(\Delta_{mm}^*))\frac{d\Delta_{mm}^*}{d\theta^A},$$

where we used $d(\mu(1-G))/d\Delta=(\mu'-1)(1-G)$. The derivative has the opposite sign to $d\Delta_{mm}^*/d\theta^A$, and so the result follows from Proposition 2.

☐ **Own category i in channel A.** The conduct θ_i^A enters supplier i's profit both *directly* through the markup and *indirectly* through Δ_{mm}^*. Differentiating and using (24),

$$\frac{d\pi_i^{A*}}{d\theta_i^A}=\underbrace{\lambda(\Delta_{mm}^*)\,G(\Delta_{mm}^*)}_{\text{direct effect }>0}+\theta_i^A\,(1+\lambda')G(\Delta_{mm}^*)\,\frac{d\Delta_{mm}^*}{d\theta^A}. \tag{25}$$

If $z<\bar{z}$, then $d\Delta_{mm}^*/d\theta^A>0$ by Proposition 2, and so $d\pi_i^{A*}/d\theta_i^A>0$ by (25). If instead $z\geq\bar{z}$, we sign $d\pi_i^{A*}/d\theta_i^A$ as follows. Recall from (17) in the proof of Proposition 2 that

$$\frac{d\Delta_{mm}^*}{d\theta^A}=\frac{\mu\lambda'-\lambda(1+\lambda')}{D},\qquad D\equiv 1-\frac{\partial P_{mm}^B}{\partial\Delta}+\frac{\partial P_{mm}^A}{\partial\Delta}=K(1+\lambda'-\mu')+K'(\lambda-\mu)>0, \tag{26}$$

with $K\equiv 1+\theta^A\lambda'-\theta^B\mu'$ and $K'\equiv\theta^A\lambda''-\theta^B\mu''$. Substituting (26) into (25) and multiplying through by $D>0$,

$$D\,\frac{d\pi_i^{A*}}{d\theta_i^A}=G(\Delta_{mm}^*)[\lambda D-\theta_i^A\,(1+\lambda')(\lambda(1+\lambda')-\mu\lambda')]. \tag{27}$$

Since $D>0$, the sign of $d\pi_i^{A*}/d\theta_i^A$ is the same as that of $\lambda D-\theta_i^A(1+\lambda')(\lambda(1+\lambda')-\mu\lambda')$. When G is linear, $\lambda' = -\mu' = 1$ and so $K' = 0$, $D = 3(1 + \theta^A + \theta^B)$. Hence, for every $\theta_i^A \in [0, 1]$,

$$\begin{aligned}\lambda D - \theta_i^A(1+\lambda')\big(\lambda(1+\lambda') - \mu\lambda'\big) &= 3\lambda(1+\theta^A+\theta^B) - 2\theta_i^A(2\lambda-\mu) \\ &\geq 3\lambda(1+\theta_i^A+\theta^B) - 2\theta_i^A(2\lambda-\mu) \\ &= 3\lambda + 3\lambda\theta^B - \lambda\theta_i^A + 2\mu\theta_i^A \\ &\geq 2\lambda + 3\lambda\theta^B + 2\mu\theta_i^A > 0,\end{aligned}$$

where the two inequalities use $\theta^A \geq \theta_i^A$ and $\theta_i^A \leq 1$, respectively. Therefore $d\pi_i^{A*}/d\theta_i^A > 0$ when $z \geq \bar{z}$ as well.

Proof of Proposition 3

In the reseller configuration, it remains to verify that $P_{rr}^A(\Delta)$ and $P_{rr}^B(\Delta)$ are, respectively, increasing and decreasing functions of Δ. This follows from the log-concavity of G, which implies $\lambda'(\Delta) > 0$ and $\mu'(\Delta) < 0$. Assumption I further implies that $\lambda(\Delta)\lambda'(\Delta) > 0$ and $-\lambda(\Delta)\mu'(\Delta) > 0$ are increasing functions, while $\mu(\Delta)\lambda'(\Delta) > 0$ and $-\mu(\Delta)\mu'(\Delta) > 0$ are decreasing functions.

We now prove the comparative statics with respect to the conduct parameter claimed in Section 4.2. By the implicit function theorem, we have

$$\frac{d\Delta_{rr}^*}{d\theta^A} = \frac{-\partial P_{rr}^A/\partial\theta^A}{1 - \partial P_{rr}^B/\partial\Delta + \partial P_{rr}^A/\partial\Delta} < 0,$$

where $\partial P_{rr}^A/\partial\theta^A = \lambda(1 + \lambda' - \mu') > 0$. Profits in channel A are given by

$$\begin{aligned}\Pi_{rr}^{A*} &= \lambda(\Delta_{rr}^*)G(\Delta_{rr}^*), \\ \pi_{rr}^{A*} &= \theta^A\lambda(\Delta_{rr}^*)(1+\lambda'(\Delta_{rr}^*) - \mu'(\Delta_{rr}^*))G\left(\Delta_{rr}^*\right),\end{aligned}$$

which are increasing in Δ_{rr}^* by the log-concavity of G and Assumption I. Profits in channel B are

$$\begin{aligned}\Pi_{rr}^{B*} &= \mu(\Delta_{rr}^*)\left(1 - G(\Delta_{rr}^*)\right), \\ \pi_{rr}^{B*} &= \theta^B\mu\left(\Delta_{rr}^*\right)\left(1+\lambda'(\Delta_{rr}^*) - \mu'(\Delta_{rr}^*)\right)\left(1 - G\left(\Delta_{rr}^*\right)\right),\end{aligned}$$

which are decreasing in Δ_{rr}^* by the log-concavity of $1 - G$ and Assumption I. Finally, recalling that $\partial P_{rr}^B/\partial\Delta < 0$ and $\partial P_{rr}^A/\partial\Delta > 0$, we obtain

$$\begin{aligned}\frac{dP_{rr}^{B*}}{d\theta^A} &= \frac{\partial P_{rr}^B}{\partial\Delta}\frac{d\Delta_{rr}^*}{d\theta^A} > 0, \\ \frac{dP_{rr}^{A*}}{d\theta^A} &= \frac{\partial P_{rr}^A}{\partial\theta^A} + \frac{\partial P_{rr}^A}{\partial\Delta}\frac{d\Delta_{rr}^*}{d\theta^A} = \frac{\partial P_{rr}^A}{\partial\theta^A}\left(1 - \frac{\partial P_{rr}^A/\partial\Delta}{1 - \partial P_{rr}^B/\partial\Delta + \partial P_{rr}^A/\partial\Delta}\right) > 0.\end{aligned}$$

Proof of Proposition 4

☐ **Market share.** Let $\Gamma_{rr}(\Delta) \equiv \Delta + P_{rr}^A(\Delta) - P_{rr}^B(\Delta)$ and $\Gamma_{mm}(\Delta) \equiv \Delta + P_{mm}^A(\Delta) - P_{mm}^B(\Delta)$; both are increasing functions of Δ. We have

$$\Gamma_{rr}(\Delta) - \Gamma_{mm}(\Delta) = [\lambda(-\mu') + \mu\lambda']\,(\theta^A - \theta^B),$$

where the bracketed term is positive by Assumption I. Since $\theta^A < \theta^B$ by the maintained assumption, $\Gamma_{rr}(\Delta) < \Gamma_{mm}(\Delta)$ for all Δ. Because the equilibrium value differences solve $\Gamma_{rr}(\Delta_{rr}^*) = z = \Gamma_{mm}(\Delta_{mm}^*)$ from (9) and (14), and both Γ_{mm} and Γ_{rr} are increasing, this implies $\Delta_{mm}^* < \Delta_{rr}^*$.

□ **Prices.** Evaluated at a common Δ, the markup functions of Propositions 1 and 3 differ only in their cross-channel components:

$$P^A_{mm}(\Delta) - P^A_{rr}(\Delta) \quad = \quad (\theta^B - \theta^A)\lambda(\Delta)(-\mu'(\Delta)) > 0, \tag{28}$$
$$P^B_{mm}(\Delta) - P^B_{rr}(\Delta) \quad = \quad -(\theta^B - \theta^A)\mu(\Delta)\lambda'(\Delta) < 0, \tag{29}$$

where the signs use $\theta^B > \theta^A$ together with $\lambda' > 0$ and $\mu' < 0$. Subtracting the equilibrium conditions (9) and (14) yields the price link

$$P^{A*}_{mm} - P^{A*}_{rr} = \left(P^{B*}_{mm} - P^{B*}_{rr}\right) + \left(\Delta^*_{rr} - \Delta^*_{mm}\right). \tag{30}$$

Since $\Delta^*_{rr} - \Delta^*_{mm} > 0$, any weak increase in channel B's retail price entails a strict increase in channel A's, and any weak decrease in channel A's retail price entails a strict decrease in channel B's. It therefore suffices to sign the price change in the channel that binds at each end of the coexistence region.

Sufficiently large z. Coexistence requires both Δ^*_{mm} and Δ^*_{rr} to lie in the interior of the support $[\underline{x}, \bar{x}]$. Since $\Delta^*_{mm} < \Delta^*_{rr}$, the reseller value difference reaches the upper endpoint first, so the upper coexistence boundary is the value of z at which $\Delta^*_{rr} = \bar{x}$. As $g(\bar{x}) > 0$, at that endpoint $\mu(\bar{x}) = 0$, so

$$P^{B*}_{rr} = \mu(\Delta^*_{rr})\left[1 + \theta^B + \theta^B\lambda'(\Delta^*_{rr}) - \theta^B\mu'(\Delta^*_{rr})\right] \to 0.$$

The marketplace equilibrium stays strictly interior: $\Gamma_{mm}(\bar{x}) > \Gamma_{rr}(\bar{x}) = z$ and monotonicity of Γ_{mm} give $\Delta^*_{mm} < \bar{x}$, hence $\mu(\Delta^*_{mm}) > 0$ and

$$P^{B*}_{mm} = \mu(\Delta^*_{mm})\left[1 + \theta^B + \theta^A\lambda'(\Delta^*_{mm}) - \theta^B\mu'(\Delta^*_{mm})\right] > 0.$$

Thus $P^{B*}_{mm} - P^{B*}_{rr} > 0$ at the upper coexistence boundary, and by continuity $P^{B*}_{mm} > P^{B*}_{rr}$ for all z sufficiently large. The identity (30) then gives $P^{A*}_{mm} > P^{A*}_{rr}$.

Sufficiently small z. The argument is symmetric at the lower endpoint. As z falls, Δ^*_{mm} reaches the lower endpoint first, so the lower coexistence boundary is the value of z at which $\Delta^*_{mm} = \underline{x}$. As $g(\underline{x}) > 0$, at that endpoint $\lambda(\underline{x}) = 0$, so

$$P^{A*}_{mm} = \lambda(\Delta^*_{mm})\left[1 + \theta^A + \theta^A\lambda'(\Delta^*_{mm}) - \theta^B\mu'(\Delta^*_{mm})\right] \to 0,$$

while the reseller equilibrium stays strictly interior ($\Gamma_{rr}(\underline{x}) < \Gamma_{mm}(\underline{x}) = z$), so $\lambda(\Delta^*_{rr}) > 0$ and

$$P^{A*}_{rr} = \lambda(\Delta^*_{rr})\left[1 + \theta^A + \theta^A\lambda'(\Delta^*_{rr}) - \theta^A\mu'(\Delta^*_{rr})\right] > 0.$$

Thus $P^{A*}_{mm} - P^{A*}_{rr} < 0$ at the lower coexistence boundary, and by continuity $P^{A*}_{mm} < P^{A*}_{rr}$ for all z sufficiently small. Identity (30) together with $\Delta^*_{rr} - \Delta^*_{mm} > 0$ then gives $P^{B*}_{mm} < P^{B*}_{rr}$.

□ **Uniform specification.** Under the uniform specification (3) the closed-form price differences from Online Appendix E are

$$\begin{aligned}
P_{rr}^{A*} - P_{mm}^{A*} &= \frac{(1+3\theta^A)(2z+(3+6\theta^B)\sigma)}{6(\theta^A+\theta^B+1)} \\
&\quad - \frac{(1+2\theta^A+\theta^B)(2z+(3+2\theta^A+4\theta^B)\sigma)}{6(\theta^A+\theta^B+1)}, \\
P_{rr}^{B*} - P_{mm}^{B*} &= \frac{(1+3\theta^B)(-2z+(3+6\theta^A)\sigma)}{6(\theta^A+\theta^B+1)} \\
&\quad - \frac{(1+2\theta^B+\theta^A)(-2z+(3+2\theta^B+4\theta^A)\sigma)}{6(\theta^A+\theta^B+1)}.
\end{aligned}$$

Using $\theta^B - \theta^A > 0$, these reduce to the inequalities stated in the footnote of the main text.

Proof of Proposition 5

Given the uniform distribution specification, we can utilize the corresponding closed-form solutions from Online Appendix E. Throughout, $\Delta_{mm}^* < \Delta_{rr}^*$ by Proposition 4.

☐ **Intermediary profits.** For intermediary A,

$$\Pi_{rr}^{A*} - \Pi_{mm}^{A*} = \frac{(2z+(3+6\theta^B)\sigma)^2}{36(\theta^A+\theta^B+1)^2\sigma} - \frac{(2z+(3+2\theta^A+4\theta^B)\sigma)^2}{36(\theta^A+\theta^B+1)\sigma}.$$

As market shares are positive, taking a square root shows this difference is positive if and only if

$$2z+(3+6\theta^B)\sigma > \sqrt{(\theta^A+\theta^B+1)}\cdot(2z+(3+2\theta^A+4\theta^B)\sigma).$$

Rearranging, we have

$$\Pi_{rr}^{A*} - \Pi_{mm}^{A*} > 0 \iff z < \frac{\sigma[(3+6\theta^B) - \sqrt{\theta^A+\theta^B+1}\,(3+2\theta^A+4\theta^B)]}{2(\sqrt{\theta^A+\theta^B+1}-1)} \equiv \hat{z}^A$$

and this lies inside the joint coexistence region (16).

For intermediary B,

$$\begin{aligned}
\Pi_{rr}^{B*} - \Pi_{mm}^{B*} &= \frac{1}{4\sigma}(\sigma - 2\Delta_{rr}^*)^2 - \frac{1+\theta^A+\theta^B}{4\sigma}(\sigma - 2\Delta_{mm}^*)^2 \\
&< \frac{1}{4\sigma}(\sigma - 2\Delta_{rr}^*)^2 - \frac{1}{4\sigma}(\sigma - 2\Delta_{mm}^*)^2 < 0,
\end{aligned}$$

given $\Delta_{mm}^* < \Delta_{rr}^* < \sigma/2$. Hence $\Pi_{mm}^{B*} > \Pi_{rr}^{B*}$ for all z in the coexistence region.

☐ **Supplier profits.** Without loss of generality, we look at the aggregate supplier profit in each channel. For channel A,

$$\begin{aligned}
\pi_{rr}^{A*} - \pi_{mm}^{A*} &= \frac{3\theta^A}{4\sigma}(\sigma + 2\Delta_{rr}^*)^2 - \frac{\theta^A}{4\sigma}(\sigma + 2\Delta_{mm}^*)^2 \\
&> \frac{\theta^A}{4\sigma}(\sigma + 2\Delta_{rr}^*)^2 - \frac{\theta^A}{4\sigma}(\sigma + 2\Delta_{mm}^*)^2 > 0,
\end{aligned}$$

given $-\sigma/2 < \Delta_{mm}^* < \Delta_{rr}^*$. Hence $\pi_{mm}^{A*} < \pi_{rr}^{A*}$ for all z in the coexistence region.

For suppliers in channel B,

$$\pi_{rr}^{B*} - \pi_{mm}^{B*} = \frac{3\theta^B[-2z+(3+6\theta^A)\sigma]^2}{36(\theta^A+\theta^B+1)^2\sigma} - \frac{\theta^B[-2z+(3+2\theta^B+4\theta^A)\sigma]^2}{36(\theta^A+\theta^B+1)^2\sigma}.$$

As market shares are positive, taking a square root shows this difference is positive if and only if

$$\sqrt{3}\left[-2z + (3 + 6\theta^A)\sigma\right] > -2z + (3 + 2\theta^B + 4\theta^A)\sigma.$$

Therefore,

$$\pi_{rr}^{B*} - \pi_{mm}^{B*} > 0 \iff z < \frac{\sigma\left[3 + (7 + \sqrt{3})\theta^A - (1 + \sqrt{3})\theta^B\right]}{2} \equiv \hat{z}^B.$$

ONLINE APPENDIX

Competing Multiproduct Intermediaries

A A Cournot microfoundation for supplier conduct

This appendix provides a fully specified supplier game within each category of the channel based on homogeneous-good Cournot competition. It delivers the following properties that underpin our conduct-parameter approach in the main text: (i) the conduct representation is the unique equilibrium of the game, (ii) θ_i^k is constant across fee levels and across the marketplace and reseller models.

A.1 The marketplace model

Environment. We work inside the paper's environment. The market is covered, consumers one-stop shop, and a channel-A shopper buys one unit of every category $i \in \mathcal{N}^A$; the mass of channel-A shoppers is $G(\Delta)$ with

$$\Delta = z + \sum\nolimits_{j\in\mathcal{N}^B} p_j^B - \sum\nolimits_{j\in\mathcal{N}^A} p_j^A.$$

Category i of channel k contains n_i^k symmetric suppliers of a homogeneous good, each with effective marginal cost f_i^k, the per-unit fee. These suppliers compete in quantities, that is, as Cournot competitors.

Timing. We modify the timing of the baseline as follows to account for the fact that suppliers are now Cournot competitors. All decisions by intermediaries and suppliers are public information, and the solution concept is subgame-perfect Nash equilibrium. In Stage 1, the intermediaries in each channel simultaneously set their non-negative per-unit fees $\{f_i^A\}_{i\in\mathcal{N}^A}$ and $\{f_i^B\}_{i\in\mathcal{N}^B}$. In Stage 2, the n_i^k suppliers in each category simultaneously choose quantities; the category then clears at a retail price p_i^k, which a consumer observes, together with the fees, before making a one-stop channel choice that determines the channel total demand $G(\Delta)$.

This maps back to the price-choice framing of the main text: the market-clearing price p_i^k that consumers observe plays the role of the supplier's Stage-2 price, and its equilibrium markup over the fee is the Cournot miscoordination that the conduct parameter θ_i^k measures.

Category-level residual demand. Consider the Stage-2 quantity game. Without loss of generality, we focus on a category $i \in \mathcal{N}^A$ of channel A. Fix every other price (of other categories) and collect the terms facing category $i \in \mathcal{N}^A$ into

$$R_i \equiv z + \sum\nolimits_{j\in\mathcal{N}^B} p_j^B - \sum\nolimits_{j\in\mathcal{N}^A,\, j\neq i} p_j^A, \qquad \text{so that} \qquad \Delta = R_i - p_i^A.$$

Every channel-A shopper buys one unit of category i, so category-i sales equal the channel total demand, $Q_i = G(\Delta) = G(R_i - p_i^A)$. Inverting, the residual inverse demand faced by the category is

$$p_i^A(Q_i) = R_i - G^{-1}(Q_i), \qquad p_i^{A\prime}(Q_i) = -\frac{1}{g(\Delta)} < 0, \qquad p_i^{A\prime\prime}(Q_i) = \frac{g'(\Delta)}{g(\Delta)^2}\cdot\frac{d\Delta}{dQ_i} = \frac{g'(\Delta)}{g(\Delta)^3}. \quad \text{(OA.1)}$$

Equilibrium conduct. Supplier s chooses q_s to maximize

$$(p_i^A(Q_i) - f_i^A)\, q_s$$

with $Q_i = \sum_{s=1}^{n_i^A} q_s$. Its first-order condition is $p_i^A(Q_i) - f_i^A + q_s\, p_i^{A\prime}(Q_i) = 0$. At the symmetric outcome $q_s = G(\Delta)/n_i^A$, substituting (OA.1),

$$p_i^A - f_i^A = -\frac{G(\Delta)}{n_i^A}\, p_i^{A\prime}(Q_i) = \frac{1}{n_i^A}\,\frac{G(\Delta)}{g(\Delta)} = \frac{1}{n_i^A}\,\lambda(\Delta), \qquad \Longrightarrow \qquad \theta_i^A = 1/n_i^A. \tag{OA.2}$$

This delivers the paper's marketplace representation $p_i^A = f_i^A + \theta_i^A \lambda(\Delta)$ with the conduct parameter $\theta_i^A = \frac{1}{n_i^A}$, which depends only on the number of same-category suppliers in the channel.

Aggregating across categories,

$$\theta^A = \sum\nolimits_{i \in \mathcal{N}^A} \theta_i^A = \sum\nolimits_{i \in \mathcal{N}^A} \frac{1}{n_i^A}. \tag{OA.3}$$

Moreover, Assumption I implies that the second-order condition holds for Cournot competition, thereby ensuring the equilibrium exists and is unique.

A.2 The reseller model

In the reseller model the same n_i^k suppliers move first, choosing quantities at zero marginal cost, with the wholesale price clearing the category market; the intermediaries then set retail prices. The intermediaries' retail first-order conditions are those of the main text (Proposition 3), so Δ^* solves

$$\Delta^* = z + \sum\nolimits_{\mathcal{N}^B} w_j^B + \mu(\Delta^*) - \sum\nolimits_{\mathcal{N}^A} w_j^A - \lambda(\Delta^*).$$

Differentiating, a unit increase in w_i^A lowers Δ^* by $1/(1 + \lambda' - \mu')$.

Category-i suppliers therefore face the residual demand $Q_i = G(\Delta^*(w_i^A))$, whose inverse has slope

$$\frac{dw_i^A}{dQ_i} = -\frac{1 + \lambda' - \mu'}{g(\Delta^*)}.$$

The Cournot argument of Section A.1 applies unchanged: each supplier's margin equals its quantity G/n_i^A times the absolute slope of its inverse demand, so

$$w_i^A = \frac{1}{n_i^A}\,\lambda(\Delta^*)(1 + \lambda'(\Delta^*) - \mu'(\Delta^*)). \tag{OA.4}$$

Equation (OA.4) is the paper's reseller first-order condition $w_i^A = \theta_i^A\,\lambda(\Delta^*)(1 + \lambda' - \mu')$ with the same conduct:

$$\theta_i^A = 1/n_i^A$$

as in Section A.1. Hence, the move order changes the demand response the suppliers face, and hence the markup term that multiplies conduct, but not the conduct itself.

The results above make the number of suppliers the determinant of a category's conduct $\theta_i = 1/n_i^k$. It equals one for a must-stock monopoly brand and falls toward zero as category i becomes commoditized $(n_i^k \to \infty)$.

B Levers that influence the conduct index

The baseline model treats the conduct indices θ^A and θ^B as primitives. Following the discussion in Section 3.3 of the main text, this appendix analyzes three instruments through which an intermediary moves its own index, and what each instrument implies for the joint movement of θ^k and the efficiency term z.

B.1 Portfolio of categories

The first lever is assortment. To formalize this, we return to the Cournot microfoundation for the conduct parameter, as detailed in Online Appendix A. Recall that under the Cournot foundation a category's conduct is $\theta_i = 1/n_i^k$, so the categories a channel stocks determine its conduct index directly, alongside the gross utility they deliver.

For each intermediary k, let there be a wide range of candidate categories, each characterized by a pair consisting of a strictly positive real number and a positive integer:

$$(u_i, n_i) \in \mathbb{R}_{++} \times \mathbb{Z}_{++},$$

indicating a gross utility $u_i > 0$ that the category delivers to a shopper, and a number of competing suppliers $n_i \geq 1$, hence a category conduct $\theta_i = 1/n_i \in (0, 1]$. Without loss of generality, we assume this set of available candidate categories is the same for both intermediaries. Whether the intermediaries select overlapping categories is irrelevant to our analysis because consumers one-stop shop.

Intermediary k assembles a portfolio $\mathcal{N}^k$ from this range, which pins down the channel's two reduced-form parameters,

$$z = \sum\nolimits_{i \in \mathcal{N}^A} u_i - \sum\nolimits_{i \in \mathcal{N}^B} u_i \qquad \text{and} \qquad \theta^k = \sum\nolimits_{i \in \mathcal{N}^k} \frac{1}{n_i}, \tag{OA.5}$$

where z is the relative efficiency term of the baseline. In this formulation, stocking categories with relatively few suppliers boosts θ^k because a near-monopoly category contributes conduct of nearly one per slot, whereas a commoditized category contributes utility but almost no conduct. This leads to the following observation:

Corollary OA.1 *Suppose intermediary k replaces a category (u, n) in its portfolio $\mathcal{N}^k$ with a different category of the same utility but strictly fewer suppliers, (u, n') with $n' < n$. Then the efficiency difference z is unchanged, while the conduct index rises by*

$$\frac{1}{n'} - \frac{1}{n} > 0.$$

More generally, any utility-preserving reallocation from $\mathcal{N}^k$ to a portfolio $\mathcal{M}^k$ whose categories can be matched one-to-one to those of $\mathcal{N}^k$, matched categories delivering the same utility and each $\mathcal{M}^k$ category having weakly fewer suppliers than its match (at least one strictly fewer), leaves z unchanged and raises θ^k by $\sum_{i \in \mathcal{M}^k} \frac{1}{n_i} - \sum_{i \in \mathcal{N}^k} \frac{1}{n_i} > 0$.

Corollary OA.1 provides an assortment interpretation for changes in the conduct index brought about by manipulating the set of categories $\mathcal{N}^k$. It describes an intermediary k that reshuffles its portfolio $\mathcal{N}^k$ into another set $\mathcal{M}^k$, holding the gross utility delivered fixed while shifting toward categories with fewer suppliers. The result is an increase in the aggregate conduct index.

Marginal stocking decision. Another way to view the assortment problem is to ask whether to add a marginal category $j = (u_j, n_j)$ to channel A. By (OA.5), doing so raises z by u_j and θ^A by $1/n_j$.

To analyze this in more detail, we consider the uniform specification of the main paper. The marketplace profit and value difference are

$$\Pi^{A*}_{mm} = \frac{[2z + (3 + 2\theta^A + 4\theta^B)\sigma]^2}{36(1 + \theta^A + \theta^B)\sigma}, \qquad \Delta^*_{mm} = \frac{2z - \sigma(\theta^A - \theta^B)}{6(1 + \theta^A + \theta^B)}.$$

Throughout we restrict attention to parameters at which both channels hold interior shares, so that $2z + (3 + 2\theta^A + 4\theta^B)\sigma > 0$ and $-2z + (3 + 4\theta^A + 2\theta^B)\sigma > 0$.

Differentiating and evaluating the change along the portfolio locus ($dz = u_j$, $d\theta^A = 1/n_j$), the marginal category changes profit and the value difference by

$$d\Pi^{A*}_{mm} = \frac{2z + (3 + 2\theta^A + 4\theta^B)\sigma}{36(1 + \theta^A + \theta^B)\sigma} \left[4u_j + \frac{1}{n_j} \cdot \frac{\sigma(1 + 2\theta^A) - 2z}{1 + \theta^A + \theta^B}\right], \tag{OA.6}$$

$$d\Delta^*_{mm} = \frac{1}{3(1 + \theta^A + \theta^B)} \left[u_j - \frac{1}{n_j} \cdot \frac{2z + \sigma(1 + 2\theta^B)}{2(1 + \theta^A + \theta^B)}\right]. \tag{OA.7}$$

The two prefactors are positive, and the sign of each effect is carried by its bracketed term. In the profit bracket the first entry, $4u_j$, is the direct utility gain, and the second is the conduct effect, negative only when the efficiency lead $2z$ exceeds $\sigma(1+2\theta^A)$. Therefore, the inclusion choice weighs the utility gain u_j against the conduct increase $1/n_j$.

Setting each bracket to zero gives the inclusion rule in terms of the utility-to-conduct ratio $u_j n_j$.

Corollary OA.2 *Under the uniform specification, adding the category $j = (u_j, n_j)$ to channel A raises A's profit if and only if*

$$u_j n_j > \frac{2z - \sigma(1 + 2\theta^A)}{4(1 + \theta^A + \theta^B)}, \tag{OA.8}$$

and raises A's market share if and only if

$$u_j n_j > \frac{2z + \sigma(1 + 2\theta^B)}{2(1 + \theta^A + \theta^B)}. \tag{OA.9}$$

Both conditions always hold for an underdog (where $z < \bar{z} = -\sigma(\frac{1}{2} + \theta^B)$). In this case, the two right-hand sides are negative, so every category of positive utility raises profit and expands share, whatever its supplier count.

A leader (where $z \geq \bar{z}$) faces a real trade-off. From Corollary OA.2, the market share cutoff exceeds the profit cutoff by

$$\frac{2z + (3 + 2\theta^A + 4\theta^B)\sigma}{4(1 + \theta^A + \theta^B)} > 0,$$

so a leader stocks a band of categories that raise profit while ceding share. These are the intermediate-ratio categories: their conduct contribution softens the rival's pricing enough to lift profit, even as it shrinks the channel's own share.

Corollary OA.2 illustrates the co-movement of z and θ^k while leaving the main mechanism of Proposition 2 of the main text intact. It identifies the categories for which assortment-based softening pays: a leader stocks only categories whose utility is high relative to their conduct, whereas an underdog gains from stocking every category.

B.2 Quality screening

The preceding lever took the supplier count n_i as given. We now microfound it as an outcome of the intermediary's control over which suppliers reach consumers. In each category there is a large pool of potential suppliers, heterogeneous in an unobserved quality. Following Casner (2020) and Teh (2022), the intermediary operates a screening device, such as quality certification, interface design, or eligibility rules, which grants effective access to consumers only to suppliers whose quality clears a standard s_i. Conditional on qualifying, the active suppliers are symmetric and offer the same certified quality, so the Cournot derivation of Online Appendix A applies unchanged to the active set, and the category conduct is $\theta_i = 1/n_i$ evaluated at the qualified count.

Raising the standard has two effects. Let $n_i(s_i)$ denote the number of qualified suppliers and $u_i(s_i)$ the certified quality delivered to a shopper, equal to the average quality of the qualified set as perceived by consumers. Tightening the standard trims the pool from below, so

$$n_i(s_i) \text{ is strictly decreasing} \qquad \text{and} \qquad u_i(s_i) \text{ is increasing:}$$

fewer suppliers qualify, while those who remain form a higher-quality upper tail. Because the conduct is $\theta_i = 1/n_i(s_i)$, a single instrument affects the category's utility and conduct together. We allow $u_i(\cdot)$ to be constant, in which case the tightening merely reduces the number of active suppliers without raising the utility (e.g., interface design that shrinks the consumer consideration set).

Corollary OA.3 (Screening) *Raising the quality standard s_i weakly raises the category's utility contribution $u_i(s_i)$ and strictly raises its conduct $\theta_i = 1/n_i(s_i)$. A tightening that drops one qualified supplier, from n_i to $n_i - 1$, raises conduct by*

$$\frac{1}{n_i - 1} - \frac{1}{n_i} = \frac{1}{n_i(n_i - 1)} > 0$$

and raises utility by some $\delta u_i \geq 0$.

Corollary OA.3 gives a screening interpretation of a joint movement in (z, θ^k). Screening differs from the other two levers. Vertical integration and the reshuffle of Corollary OA.1 move conduct while holding utility fixed; screening instead ties the two together through the intermediary's own quality policy, with the standard s_i the single instrument that sets the pair $(u_i(s_i), 1/n_i(s_i))$.

The intermediary's standard. Consider the intermediary tightening the standard in one of its channel-A categories by a notch that drops the marginal qualified supplier, so (z, θ^A) move to $(z + \delta u_i,\ \theta^A + \delta\theta_i)$ with $\delta\theta_i = \frac{1}{n_i - 1} - \frac{1}{n_i}$. This is the discrete move of Corollary OA.2 applied to an existing category, with utility gain δu_i and conduct gain $\delta\theta_i$. The tightening raises profit if and only if the utility gain outweighs the conduct cost, that is, if and only if $\Pi^{A*}_{mm}(z + \delta u_i, \theta^A + \delta\theta_i) > \Pi^{A*}_{mm}(z, \theta^A)$. For an underdog ($z < \bar{z}$) both effects favor tightening. For a leader the conduct increase is a drag, and the intermediary stops at the standard where the next step in utility gain no longer offsets its conduct cost.

B.3 Vertical integration

In what follows, we show that vertical integration between intermediary k and the suppliers of a subset of its categories is formally equivalent to setting those categories' conduct parameters to zero. The analysis below does not explicitly rely on the Cournot conduct, unlike the previous two subsections. We maintain the non-negative pricing constraint as assumed in the baseline model setup throughout.

Suppose intermediary k becomes vertically integrated with the supply of a subset $\mathcal{F}^k \subseteq \mathcal{N}^k$ of its categories, through private-label development or acquisition, so that for each $l \in \mathcal{F}^k$ the retail price p^k_l is set to maximize the joint profit of the integrated entity, with wholesale prices or fees in those categories treated as internal transfers. The remaining categories $i \in \mathcal{N}^k \backslash \mathcal{F}^k$ continue to price independently according to their conduct parameters θ_i^k as in the baseline, so the channel's conduct index θ^k now runs only over these non-integrated categories. The timing of the game is unchanged.

Marketplace configuration. Restrict retail prices to be non-negative. Given Stage-1 fees, in Stage 2 all non-integrated categories price as in the baseline, $p_i^A = f_i^A + \theta_i^A \lambda(\Delta)$, while the integrated entity chooses $\{p_l^A\}_{l\in\mathcal{F}^A}$ to maximize

$$\Big(\sum\nolimits_{l\in\mathcal{F}^A} p_l^A + f^A\Big) G(\Delta),$$

where f^A is the channel's aggregate fee, as in the main text. The first-order condition, subject to the non-negative price constraint (NPC), yields

$$\sum\nolimits_{l\in\mathcal{F}^A} p_l^A = \max\{0,\, \lambda(\Delta^*) - f^A\}, \tag{OA.10}$$

and similarly

$$\sum\nolimits_{l\in\mathcal{F}^B} p_l^B = \max\{0,\, \mu(\Delta^*) - f^B\}.$$

Suppose the NPC binds in both channels, which requires $f^A > \lambda(\Delta^*)$ and $f^B > \mu(\Delta^*)$ and which we verify ex post. Then the integrated categories contribute zero to retail prices, the subgame value difference solves

$$\Delta^* = z + f^B + \theta^B \mu(\Delta^*) - f^A - \theta^A \lambda(\Delta^*),$$

and the Stage-1 first-order conditions give

$$f^A = \lambda(\Delta^*)(1 + \theta^A \lambda'(\Delta^*) - \theta^B \mu'(\Delta^*)), \qquad f^B = \mu(\Delta^*)(1 + \theta^A \lambda'(\Delta^*) - \theta^B \mu'(\Delta^*)), \tag{OA.11}$$

which reproduce the baseline marketplace equilibrium with conduct indices (θ^A, θ^B). Since $\lambda' > 0$ and $-\mu' > 0$, (OA.11) implies $f^A > \lambda(\Delta^*)$ and $f^B > \mu(\Delta^*)$, so the NPCs indeed bind.

It remains to check that no intermediary gains by unilaterally setting a fee low enough to relax the NPC. Fix f^B and consider intermediary A's choice of f^A. Define Δ^*_{nobind} as the subgame value difference when A's NPC is slack,

$$\Delta^*_{\text{nobind}} = z - (\theta^A + 1)\lambda(\Delta^*_{\text{nobind}}) + f^B + \theta^B \mu(\Delta^*_{\text{nobind}}) + \max\{0,\, \mu(\Delta^*_{\text{nobind}}) - f^B\},$$

which is independent of f^A, and Δ^*_{bind} as the value difference when it binds, which is continuous and strictly decreasing in f^A with

$$-1 < \frac{d\Delta^*_{\text{bind}}}{df^A} < 0. \tag{OA.12}$$

The NPC binds exactly for $f^A \ge \bar{f}^A \equiv \lambda(\Delta^*_{\text{nobind}})$, and $\Delta^*_{\text{bind}} = \Delta^*_{\text{nobind}}$ at $f^A = \bar{f}^A$. Intermediary A's Stage-1 profit (inclusive of integrated margins) is

$$\Pi^A(f^A) = \begin{cases} \lambda(\Delta^*_{\text{nobind}}) G(\Delta^*_{\text{nobind}}) & \text{if } f^A < \bar{f}^A, \\ f^A G(\Delta^*_{\text{bind}}) & \text{if } f^A \ge \bar{f}^A, \end{cases}$$

constant below the threshold. The right-hand derivative at $f^A = \bar{f}^A$ satisfies

$$\lim_{f^A \searrow \bar{f}^A} \frac{d\Pi^A}{df^A} = \lim_{f^A \searrow \bar{f}^A} \Big\{ f^A g(\Delta^*_{\text{bind}}) \frac{d\Delta^*_{\text{bind}}}{df^A} + G(\Delta^*_{\text{bind}}) \Big\} > -\lambda(\Delta^*_{\text{nobind}}) g(\Delta^*_{\text{nobind}}) + G(\Delta^*_{\text{nobind}}) = 0,$$

where the inequality uses (OA.12) and the definition of $\bar{f}^A$, and the final equality uses $\lambda = G/g$. The profit is therefore flat up to $\bar{f}^A$ and locally increasing just above it, so choosing $f^A < \bar{f}^A$ is never optimal, regardless of f^B. Since Assumption I makes the binding-branch profit quasiconcave in f^A, the interior optimum on that branch is (OA.11), which hence characterizes the equilibrium fees.

Why the NPC matters in marketplace equilibrium. Suppose we drop the NPC. Then (OA.10) gives $\sum_{l\in\mathcal{F}^A} p_l^A = \lambda(\Delta^*) - f^A$, and the total channel-$A$ retail price becomes

$$\sum_{l\in\mathcal{F}^A} p_l^A + \sum_{i\in\mathcal{N}^A\setminus\mathcal{F}^A} p_i^A = (\theta^A + 1)\lambda(\Delta^*),$$

independent of the fees. Stage-1 fees become irrelevant, and the model collapses to a one-stage game with markup functions $(\theta^A + 1)\lambda(\Delta)$ and $(\theta^B + 1)\mu(\Delta)$, in which both the within-channel and cross-channel strategic interactions (the λ' and μ' terms) vanish. Intuitively, without the NPC an integrated intermediary has no commitment power: any Stage-1 fee can be undone in Stage 2 by cutting the integrated categories' retail prices. A binding NPC restores commitment, because a high enough fee cannot later be neutralized through price cuts bounded below by zero.

Reseller configuration. No pricing constraint is needed. In Stage 2, intermediary A sets all retail prices $\{p_i^A\}_{i\in\mathcal{N}^A}$ and internalizes the profit of the integrated categories. Since the wholesale prices w_l^A for $l \in \mathcal{F}^A$ are internal transfers, the first-order condition for the aggregate retail price yields

$$\sum_{i\in\mathcal{N}^A} p_i^A = \sum_{i\in\mathcal{N}^A\setminus\mathcal{F}^A} w_i^A + \lambda(\Delta^*),$$

so it is without loss of generality to set $w_l^A = 0$: each integrated category $i \in \mathcal{F}^A$ behaves like a category with conduct parameter $\theta_i^A = 0$. In Stage 1, the remaining categories $i \in \mathcal{N}^A\setminus\mathcal{F}^A$ price as in the baseline with conduct θ_i^A. Applying the same argument to channel B, the resulting equilibrium is exactly the baseline reseller equilibrium with conduct indices (θ^A, θ^B).

Summarizing the discussion above:

Corollary OA.4 *Suppose retail prices are restricted to be non-negative. Regardless of whether an intermediary k adopts the marketplace or reseller model, vertical integration of the categories $\mathcal{F}^k \subseteq \mathcal{N}^k$ is formally equivalent to setting the conduct parameter $\theta_l^k = 0$ for all $l \in \mathcal{F}^k$. The equilibrium coincides with the baseline equilibrium at conduct indices (θ^A, θ^B).*

Corollary OA.4 provides a concrete governance interpretation for changes in the conduct index. Expanding the set of integrated categories $\mathcal{F}^k \subseteq \mathcal{N}^k$ can be achieved via private-label penetration and supplier acquisitions, which lowers the conduct parameter θ_i^k to zero, thereby lowering the aggregate conduct index $\sum_{i\in\mathcal{N}^k} \theta_i^k$. This provides a microfoundation for the comparative statics with respect to the conduct index.

C Cross-channel listing and multihoming

C.1 Setup

We relax the exclusive-supply assumption of the baseline model. In addition to the baseline categories $\mathcal{N}^A$ and $\mathcal{N}^B$, suppose there is one additional category ℓ carried by *both* channels and occupied by a single *multihoming* monopoly supplier, while all other categories remain characterized by their conduct parameters. Having a monopoly supplier in this multihoming category provides a useful benchmark for our robustness check, as it represents the case in which the supplier has the greatest control over price differences across the two channels.

For clarity of exposition, we assume symmetric utility across channels: $u_\ell^A = u_\ell^B = u_\ell$. Consumers remain one-stop shoppers, so a consumer choosing channel k obtains $u_\ell - p_\ell^k$ from category ℓ in addition to the baseline basket, and the value difference becomes

$$\Delta = z + \sum\nolimits_{i\in\mathcal{N}^B} p_i^B - \sum\nolimits_{i\in\mathcal{N}^A} p_i^A + p_\ell^B - p_\ell^A. \tag{OA.13}$$

As in the baseline model, we assume u_ℓ is large enough that the category is viable, and we maintain the per-category participation constraint $p_\ell^k \le u_\ell$: a category priced above its gross utility is dropped from the basket, in which case the supplier earns nothing from that channel.

The main results are the following. In the reseller configuration, the multihoming supplier prices at u_ℓ in both channels, so its presence does not affect the equilibrium outcome. In the marketplace configuration, the multihoming supplier generally wants to set a lower retail price in the channel that charges it a lower fee, whenever the fee difference is large enough, akin to the leakage logic of Hagiu and Wright (2024); this creates a potential non-quasiconcavity in each intermediary's objective when it deviates to a very low fee. Nonetheless, such large fee differences are infeasible in equilibrium if each channel hosts sufficiently many categories (holding the conduct indices θ^A and θ^B fixed), so the baseline equilibrium survives unchanged.

C.2 Reseller configuration

Under the reseller configuration, the multihoming supplier sets wholesale prices w_ℓ^A and w_ℓ^B in Stage 1, constrained by $w_\ell^k \le u_\ell$; otherwise the intermediaries would reject the product, as it would generate negative surplus at any retail price recovering the wholesale cost. Given (OA.13) and the intermediaries' Stage-2 pricing, the equilibrium value difference of the subgame solves

$$\Delta^* = z + \sum\nolimits_{i\in\mathcal{N}^B} w_i^B + w_\ell^B + \mu(\Delta^*) - \sum\nolimits_{i\in\mathcal{N}^A} w_i^A - w_\ell^A - \lambda(\Delta^*),$$

and the multihoming supplier's profit is

$$\pi_\ell = w_\ell^A G(\Delta^*) + w_\ell^B (1 - G(\Delta^*)).$$

The supplier can always raise w_ℓ^A and w_ℓ^B by the same amount without affecting Δ^*, strictly increasing π_ℓ, as long as the resulting retail prices do not exceed u_ℓ. Hence, in equilibrium the supplier prices each channel at the participation corner: the retail price satisfies $p_\ell^A = p_\ell^B = u_\ell$ (with the intermediary retaining its retail markup out of w_ℓ^k), and category ℓ offers the same net value (zero) on both channels. The equilibrium value difference then satisfies the baseline fixed-point equation, so the equilibrium outcome is identical to that of the baseline model.

C.3 Marketplace configuration

Under the marketplace configuration, intermediary k charges per-unit fees to its categories, including category ℓ. We maintain the equal-fee selection of footnote 7: intermediary k charges the same per-category fee f_0^k to every category it hosts, so that its fees over the baseline categories aggregate to $N^k f_0^k$ and it collects a further f_0^k from category ℓ (we discuss the role of this restriction at the end of this appendix). The multihoming supplier sets retail prices p_ℓ^A and p_ℓ^B in Stage 2, with profit

$$\pi_\ell = (p_\ell^A - f_0^A) G(\Delta) + (p_\ell^B - f_0^B)(1 - G(\Delta)),$$

where, given the baseline categories' conduct pricing $p_i^A = f_0^A + \theta_i^A \lambda(\Delta)$ and $p_i^B = f_0^B + \theta_i^B \mu(\Delta)$,

$$\Delta = z + N^B f_0^B + \theta^B \mu(\Delta) + p_\ell^B - N^A f_0^A - \theta^A \lambda(\Delta) - p_\ell^A. \tag{OA.14}$$

□ **Stage-2 multihoming pricing.** Raising p_ℓ^A and p_ℓ^B by the same amount leaves Δ unchanged and strictly raises π_ℓ, so at least one price is at the corner u_ℓ.

Case 1: $f_0^B - f_0^A \geq 0$. The supplier earns a larger margin in channel A ($u_\ell - f_0^A \geq u_\ell - f_0^B$), so $p_\ell^B = u_\ell$ and possibly $p_\ell^A < u_\ell$. Substituting $p_\ell^B = u_\ell$, the supplier's problem becomes

$$\pi_\ell = (p_\ell^A - f_0^A - (u_\ell - f_0^B))G(\Delta) + u_\ell - f_0^B,$$

a standard pricing problem with an additional opportunity-cost term $u_\ell - f_0^B$: whenever the supplier makes a channel-A sale it forgoes the channel-B margin. Assumption I (log-concavity of G) makes this objective quasiconcave in p_ℓ^A, so the first-order condition, together with the corner constraint, yields

$$p_\ell^A = u_\ell - \max\{f_0^B - f_0^A - \lambda(\Delta^*), 0\}, \qquad p_\ell^B = u_\ell. \tag{OA.15}$$

Intuitively, $f_0^B - f_0^A - \lambda(\Delta^*)$ measures the extent to which the supplier cuts its channel-A price to steer consumers toward the channel where it keeps a larger margin.

Case 2: $f_0^B - f_0^A < 0$. An analogous argument gives

$$p_\ell^A = u_\ell, \qquad p_\ell^B = u_\ell - \max\{f_0^A - f_0^B - \mu(\Delta^*), 0\}.$$

Hence the supplier prices at u_ℓ in *both* channels if and only if the fee difference is small:

$$-\lambda(\Delta^*) \leq f_0^A - f_0^B \leq \mu(\Delta^*). \tag{OA.16}$$

□ **On-path behavior.** Suppose (OA.16) holds on the equilibrium path (we verify this below). Then $p_\ell^A = p_\ell^B = u_\ell$, category ℓ contributes zero to both channels' net value, and (OA.14) reduces to the baseline fixed-point equation. Moreover, the fee charged to category ℓ is inframarginal: at the corner, a marginal change in f_0^k does not move p_ℓ^k, so intermediary k's first-order condition over its common fee is

$$f_0^A = \frac{\lambda(\Delta^*)\left(1 + \theta^A\lambda'(\Delta^*) - \theta^B\mu'(\Delta^*)\right)}{N^A}, \qquad f_0^B = \frac{\mu(\Delta^*)\left(1 + \theta^A\lambda'(\Delta^*) - \theta^B\mu'(\Delta^*)\right)}{N^B},$$

so that the aggregate fees collected from the baseline categories, $N^k f_0^k$, coincide with the baseline equilibrium aggregate fees. Consequently, Δ_{mm}^*, all baseline retail prices, market shares, and the baseline suppliers' profits are unchanged; each intermediary additionally collects $f_0^k G^k$ from category ℓ (where $G^A = G(\Delta_{mm}^*)$ and $G^B = 1 - G(\Delta_{mm}^*)$), and the multihoming supplier retains margin $u_\ell - f_0^k$ on each channel.

□ **Stage-1 deviations.** It remains to rule out fee deviations that trigger the multihoming supplier to reprice. For a given f_0^B, define the downward kink threshold $\bar{f}_{0,\text{down}}^A \equiv f_0^B - \lambda(\bar{\Delta}_{\text{down}})$, where $\bar{\Delta}_{\text{down}}$ solves the fixed point obtained by substituting $f_0^A - f_0^B = -\lambda(\Delta)$ into (OA.14) at the corner $p_\ell^A = p_\ell^B = u_\ell$:

$$\bar{\Delta}_{\text{down}} = z + (N^A - \theta^A)\lambda(\bar{\Delta}_{\text{down}}) + \theta^B\mu(\bar{\Delta}_{\text{down}}) + N^B f_0^B - N^A f_0^B,$$

taking the solution branch reached continuously from the equilibrium as f_0^A falls. Analogously define $\bar{f}_{0,\text{up}}^A \equiv f_0^B + \mu(\bar{\Delta}_{\text{up}})$. For $f_0^A \in [\bar{f}_{0,\text{down}}^A, \bar{f}_{0,\text{up}}^A]$ the supplier keeps both corners; below $\bar{f}_{0,\text{down}}^A$ it cuts p_ℓ^A (demand for channel A kinks up); above $\bar{f}_{0,\text{up}}^A$ it cuts p_ℓ^B (demand for channel A kinks down). The downward kink at $\bar{f}_{0,\text{up}}^A$ means an upward fee deviation past the kink only accelerates the loss of demand, so no upward deviation is profitable beyond the baseline logic. The relevant concern is a *downward* deviation to $f_0^A < \bar{f}_{0,\text{down}}^A$, which buys a discrete steering benefit.

Recall that per-unit fees are non-negative, $f_0^k \geq 0$ (Section 2). This restriction is innocuous in the baseline model, where equilibrium fees are strictly positive and the constraint never binds, but it does real work here by ruling out subsidized steering: if negative fees (per-unit subsidies) were admissible, intermediary A could reach the steering region at any parameter values and the infeasibility argument would have to be replaced by a direct profit comparison. Given $f_0^k \geq 0$, a meaningful downward deviation is infeasible whenever $\bar{f}^A_{0,\text{down}} < 0$, that is, whenever

$$f^{B*}_{0,mm} = \frac{\mu(\Delta^*_{mm})\left(1 + \theta^A \lambda'(\Delta^*_{mm}) - \theta^B \mu'(\Delta^*_{mm})\right)}{N^B} < \lambda(\bar{\Delta}_{\text{down}}). \tag{OA.17}$$

Because a downward deviation by A raises its demand, $\bar{\Delta}_{\text{down}} > \Delta^*_{mm}$, and λ is increasing, a sufficient condition for (OA.17) is

$$N^B > \frac{\mu(\Delta^*_{mm})}{\lambda(\Delta^*_{mm})}\left(1 + \theta^A \lambda'(\Delta^*_{mm}) - \theta^B \mu'(\Delta^*_{mm})\right). \tag{OA.18}$$

The analogous condition ruling out intermediary B's downward deviation is

$$N^A > \frac{\lambda(\Delta^*_{mm})}{\mu(\Delta^*_{mm})}\left(1 + \theta^A \lambda'(\Delta^*_{mm}) - \theta^B \mu'(\Delta^*_{mm})\right). \tag{OA.19}$$

If $\Delta^*_{mm} \geq 0$ (channel A is weakly larger), then $\mu/\lambda \leq 1 \leq \lambda/\mu$, so (OA.19) has the larger right-hand side; since the two conditions bound N^A and N^B respectively, both hold whenever $\min\{N^A, N^B\}$ exceeds the right-hand side of (OA.19). The right-hand sides of (OA.18) and (OA.19) are independent of N^A and N^B (they depend only on θ^A, θ^B, z, and the distribution G), so both conditions hold whenever each channel hosts sufficiently many categories, holding the conduct indices fixed. Under the uniform specification with $\Delta^*_{mm} = 0$, both reduce to the mild requirement

$$N^k > 1 + \theta^A + \theta^B, \qquad k \in \{A, B\}.$$

Finally, conditions (OA.18) and (OA.19) already imply the on-path corner condition (OA.16), which therefore need not be verified separately. Writing $M \equiv 1 + \theta^A \lambda' - \theta^B \mu' > 0$ and evaluating all terms at Δ^*_{mm}, the equilibrium fee difference is

$$f^{A*}_{0,mm} - f^{B*}_{0,mm} = \frac{\lambda M}{N^A} - \frac{\mu M}{N^B}.$$

Condition (OA.19), equivalently $\lambda M/N^A < \mu$, gives the upper bound $f^{A*}_{0,mm} - f^{B*}_{0,mm} \leq \lambda M/N^A < \mu$ (dropping the non-negative term $\mu M/N^B$); condition (OA.18), equivalently $\mu M/N^B < \lambda$, gives the lower bound $f^{A*}_{0,mm} - f^{B*}_{0,mm} \geq -\mu M/N^B > -\lambda$ (dropping the non-negative term $\lambda M/N^A$). Hence (OA.16) holds, so the same large-N^k requirement that rules out deviations also secures the on-path corner.

C.4 Summary

Proposition OA.1 *Add to the baseline model a category ℓ occupied by a monopoly supplier multihoming on both channels, with $u^A_\ell = u^B_\ell = u_\ell$. (i) In the reseller configuration, the supplier prices at u_ℓ on both channels and the equilibrium outcome is identical to the baseline. (ii) In the marketplace configuration, if N^A and N^B are sufficiently large holding θ^A and θ^B fixed, the baseline equilibrium remains an equilibrium: the supplier prices at u_ℓ on both channels, and the equilibrium value difference, market shares, retail prices, and baseline suppliers' profits are unchanged.*

In both configurations, the multihoming supplier offers the same net value on the two channels and therefore contributes nothing to the value difference between them. This is the sense in which exclusive supply is not essential for our results: what matters is that multihoming suppliers, who internalize both channels' margins, optimally neutralize themselves in the channel comparison.

With a multihoming category the fee allocation across categories is no longer neutral, because the fee charged to category ℓ is inframarginal at the corner while fees to baseline categories pass through to retail prices. If intermediary k could discriminate, it would raise f_ℓ^k toward u_ℓ to extract the multihoming supplier's rent, leaving all baseline pricing unchanged; the equilibrium value difference is unaffected and only the split of category-ℓ rents changes. The equal-fee restriction therefore matters for the division of rents but not for the market-share and price results.

D Endogenous business model

In this appendix, we present the analysis supporting the result statements in Section 4.3 of the main text.

D.1 Mixed configuration

As a preliminary step, let us briefly consider the case of a mixed configuration, in which intermediary A adopts the marketplace model and intermediary B adopts the reseller model. We refer to this configuration as mr, with rm denoting its mirror case. The timing of pricing decisions in this configuration proceeds as follows. In Stage 1, intermediary A sets per-unit fees $\{f_i^A\}_{i\in\mathcal{N}^A}$, while suppliers in channel B set wholesale prices $\{w_i^B\}_{i\in\mathcal{N}^B}$; in Stage 2, suppliers in channel A and intermediary B set retail prices $\{p_i^A\}_{i\in\mathcal{N}^A}$ and $\{p_i^B\}_{i\in\mathcal{N}^B}$, respectively.

Following the same steps as for configurations rr and mm, the first-order conditions for the Stage-2 pricing (by the channel-A strategic suppliers and the channel-B intermediary) are given by

$$p_i^A = f_i^A + \theta_i^A\lambda(\Delta^*) \qquad \text{and} \qquad \sum\nolimits_{i\in\mathcal{N}^B} p_i^B = \sum\nolimits_{i\in\mathcal{N}^B} w_i^B + \mu(\Delta^*),$$

where the value difference Δ^* in the equilibrium of the subgame is given by

$$\Delta^* = z + \sum\nolimits_{i\in\mathcal{N}^B} w_i^B + \mu\left(\Delta^*\right) - \sum_{i\in\mathcal{N}^A} f_i^A - \theta^A\lambda\left(\Delta^*\right). \tag{OA.20}$$

Turning to Stage 1 pricing (by the channel-A intermediary and the channel-B strategic suppliers), Assumption I guarantees the quasiconcavity of profit functions, and first-order conditions yield

$$\begin{aligned} f^A \equiv \sum_{i\in\mathcal{N}^A} f_i^A &= \frac{-\lambda(\Delta^*)}{d\Delta^*/df_i^A} = \lambda(\Delta^*)(1+\theta^A\lambda'(\Delta^*)-\mu'(\Delta^*)) \\ w^B &= \frac{\theta^B\mu\left(\Delta^*\right)}{d\Delta^*/dw_i^B} = \theta^B\mu\left(\Delta^*\right)\left(1+\theta^A\lambda'(\Delta^*)-\mu'(\Delta^*)\right). \end{aligned}$$

Substituting these back into (OA.20) yields the overall equilibrium, and the uniqueness follows from Assumption I. The equilibrium is summarized below:

Proposition OA.2 *(mixed-configuration equilibrium mr). Denote channel-A and channel-B equilibrium markup functions as*

$$\begin{array}{l} P_{mr}^A(\Delta) \equiv \\ P_{mr}^B(\Delta) \equiv \end{array} \underbrace{\begin{array}{c} \lambda(\Delta)+\theta^A\lambda(\Delta)(1+\lambda'(\Delta)) \\ \mu(\Delta)+\theta^B\mu(\Delta)(1-\mu'(\Delta)) \end{array}}_{aggregate\ within\text{-}channel\ markup} \begin{array}{c} + \\ + \end{array} \underbrace{\begin{array}{c} \lambda(\Delta)(-\mu'(\Delta)) \\ \theta^A\theta^B\mu(\Delta)\lambda'(\Delta) \end{array}}_{aggregate\ cross\text{-}channel\ markup}. \tag{OA.21}$$

The equilibrium value difference Δ^*_{mr} *is uniquely pinned down by*

$$\Delta^*_{mr} = z + P^B_{mr}(\Delta^*_{mr}) - P^A_{mr}(\Delta^*_{mr}),$$

and the aggregate retail prices are $P^A_{mr}(\Delta^*_{mr})$ *and* $P^B_{mr}(\Delta^*_{mr})$.

D.2 Proof of Lemma 1

As a preliminary step, we summarize the key equilibrium objects in the text as follows, where the case of $\omega = rm$ is obtained by reversing the roles of channels A and B in configuration mr. In what follows, we suppress the arguments of $\lambda(\Delta)$ and $\mu(\Delta)$ whenever doing so does not cause confusion.

For each configuration $\omega \in \{rr, mm, mr, rm\}$, the equilibrium difference is given by

$$\Delta^*_\omega = z + P^B_\omega(\Delta^*_\omega) - P^A_\omega(\Delta^*_\omega),$$

where

$$\begin{aligned}
P^B_{rr}(\Delta) - P^A_{rr}(\Delta) &= \mu\left[\theta^B + 1 + \theta^B(\lambda' - \mu')\right] - \lambda\left[\theta^A + 1 + \theta^A(\lambda' - \mu')\right] \\
P^B_{mr}(\Delta) - P^A_{mr}(\Delta) &= \mu\left[\theta^B + 1 + \theta^B\left(\theta^A\lambda' - \mu'\right)\right] - \lambda\left[\theta^A + 1 + \theta^A\lambda'(\Delta) - \mu'(\Delta)\right] \\
P^B_{mm}(\Delta) - P^A_{mm}(\Delta) &= \mu\left[\theta^B + 1 + \theta^A\lambda' - \theta^B\mu'\right] - \lambda\left[\theta^A + 1 + \theta^A\lambda' - \theta^B\mu'\right] \\
P^B_{rm}(\Delta) - P^A_{rm}(\Delta) &= \mu\left[\theta^B + 1 + \lambda' - \theta^B\mu'\right] - \lambda\left[\theta^A + 1 + \theta^A\left(\lambda' - \theta^B\mu'\right)\right].
\end{aligned}$$

Assumption I implies $P^B_\omega(\Delta) - P^A_\omega(\Delta)$ is decreasing in Δ for every configuration ω. Then, we have

$$\begin{aligned}
\Delta^*_{rr} \leq \Delta^*_{mr} \quad &\Leftrightarrow \quad P^B_{rr}(\Delta) - P^A_{rr}(\Delta) \leq P^B_{mr}(\Delta) - P^A_{mr}(\Delta) \text{ for all } \Delta \\
&\Leftrightarrow \quad \left(\theta^A - 1\right)\left(\theta^B\mu\lambda' - \lambda\mu'\right) \geq 0 \\
&\Leftrightarrow \quad \theta^A \geq 1,
\end{aligned}$$

and

$$\begin{aligned}
\Delta^*_{mm} \geq \Delta^*_{rm} \quad &\Leftrightarrow \quad P^B_{mm}(\Delta) - P^A_{mm}(\Delta) \geq P^B_{rm}(\Delta) - P^A_{rm}(\Delta) \text{ for all } \Delta \\
&\Leftrightarrow \quad \left(\theta^A - 1\right)\left[\mu(\Delta)\lambda'(\Delta) - \theta^B\mu'(\Delta)\lambda(\Delta)\right] \geq 0 \\
&\Leftrightarrow \quad \theta^A \geq 1.
\end{aligned}$$

D.3 Proof of Proposition 6

We denote the business model choices as $\omega^A, \omega^B \in \{r, m\}$, with r representing the reseller model and m the marketplace model. We let $BR^A(\omega^B) \in \{r, m\}$ denote intermediary A's optimal business model choice when intermediary B adopts $\omega^B \in \{r, m\}$.

Case 1: Suppose $\theta^A \geq 1$. To show $BR^A(r) = m$, we know that $\Delta^*_{mr} \geq \Delta^*_{rr}$, which implies

$$\begin{aligned}
\Pi^{A*}_{mr} &= \lambda(\Delta^*_{mr})(1 + \theta^A\lambda'(\Delta^*_{mr}) - \mu'(\Delta^*_{mr}))G(\Delta^*_{mr}) \\
&> \lambda(\Delta^*_{mr})G(\Delta^*_{mr}) \\
&\geq \lambda(\Delta^*_{rr})G(\Delta^*_{rr}) = \Pi^{A*}_{rr}.
\end{aligned}$$

To show $BR^A(m) = m$, we know that $\Delta^*_{mm} \geq \Delta^*_{rm}$, which implies

$$\begin{aligned}\Pi^{A*}_{mm} &= \lambda(\Delta^*_{mm})(1+\theta^A\lambda'(\Delta^*_{mm}) - \theta^B\mu'(\Delta^*_{mm}))G(\Delta^*_{mm}) \\ &> \lambda(\Delta^*_{mm})G(\Delta^*_{mm}) \\ &\geq \lambda(\Delta^*_{rm})G(\Delta^*_{rm}) = \Pi^{A*}_{rm}.\end{aligned}$$

Case 2: Suppose $\theta^A < 1$. With the uniform distribution specification, the closed-form value differences Δ^*_ω and the corresponding profits Π^{A*}_ω for the four configurations are collected in Online Appendix E. Using them, the two best-response comparisons reduce to

$$\begin{aligned}\Pi^{A*}_{mr} \geq \Pi^{A*}_{rr} \quad &\Leftrightarrow \quad 3(1+\theta^A+\theta^B)\left[2z+(3+4\theta^B+2\theta^A\theta^B)\sigma\right] \geq \sqrt{2+\theta^A}\,(\theta^B+2)\left[2z+(3+6\theta^B)\sigma\right] \\ \Pi^{A*}_{mm} \geq \Pi^{A*}_{rm} \quad &\Leftrightarrow \quad (\theta^A+2)(\theta^B+2)\left[2z+(3+2\theta^A+4\theta^B)\sigma\right] \geq 3\sqrt{1+\theta^A+\theta^B}\left[2z+(5+4\theta^B)\sigma\right].\end{aligned}$$

Consistent with Case 1, both inequalities hold for all admissible z once $\theta^A \geq 1$, but for $\theta^A < 1$ either may fail. Figure OA.1 traces the two best-response regions at $z = 0$: against a reseller rival, A's best response is the marketplace model throughout $[0,2]^2$, whereas against a marketplace rival the reseller model becomes A's best response when both θ^A and θ^B are small. Figure OA.2 considers the case of $z = -2\sigma$. It shows that when θ^A is small, channel A's market share $G(\Delta^*_{mr})$ is squeezed enough that the first-mover advantage no longer compensates, and the reseller model becomes A's best response even against a reseller rival.

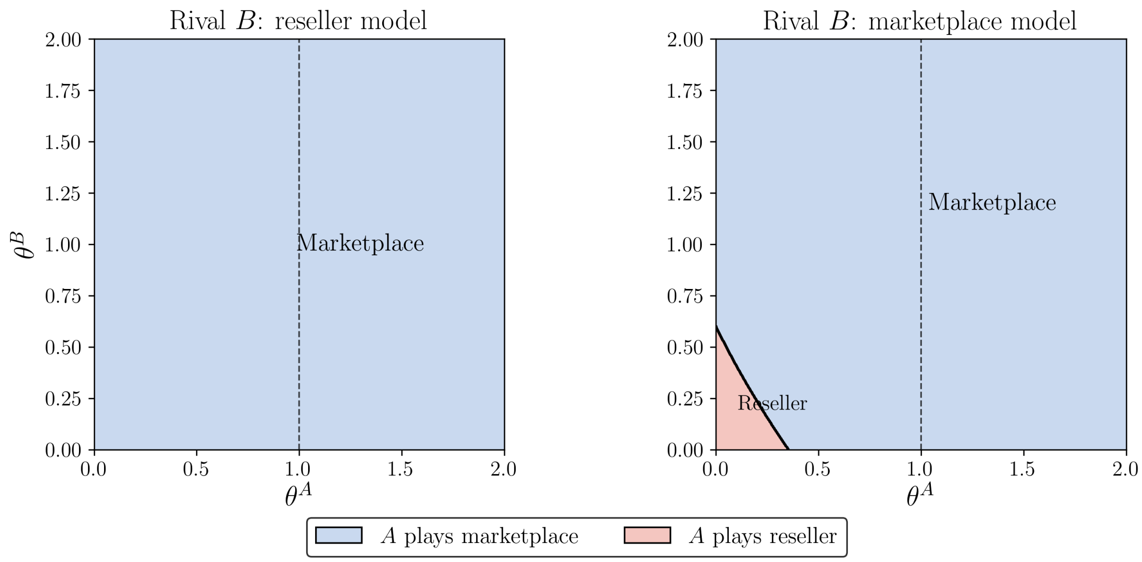

Figure OA.1: Intermediary A's best-response business model at $z = 0$, as a function of its own conduct θ^A and the rival's conduct θ^B. We choose parameter $\sigma = 1$; because $z = 0$, the two regions are independent of σ.

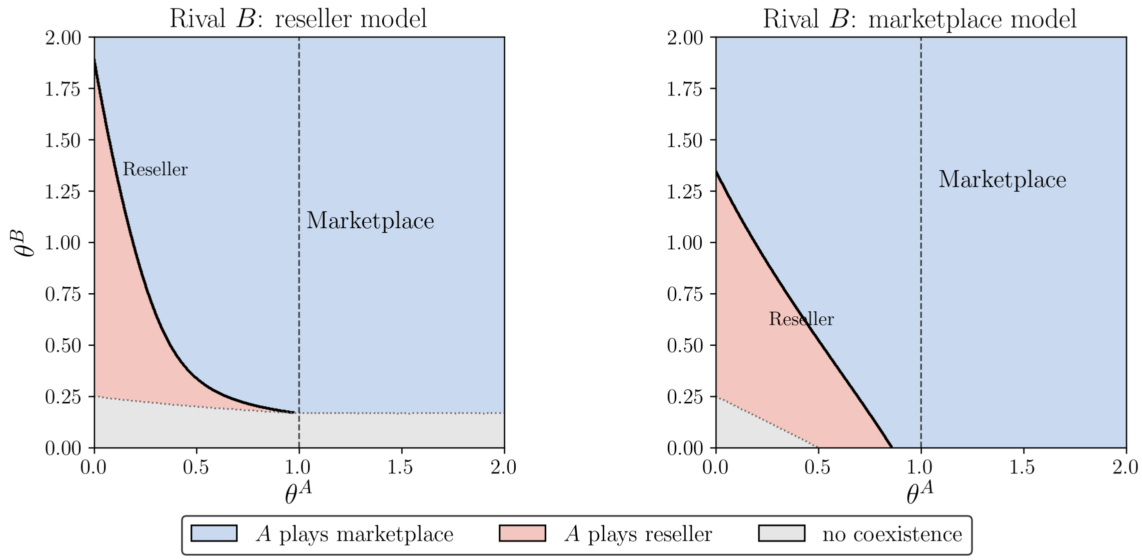

Figure OA.2: Intermediary A's best-response business model when it is efficiency-disadvantaged, $z = -2\sigma$ with $\sigma = 1$. Axes and panels are as in Figure OA.1. The gray region marks (θ^A, θ^B) for which the two channels do not coexist (one channel's equilibrium share is non-interior) in at least one of the two configurations being compared.

E Details of the uniform distribution specification

In this appendix, we present the closed-form equilibrium outcome of the uniform distribution specification (3) for all four configurations of business models $\omega \in \{rr, mm, mr, rm\}$.

$$\begin{aligned}
\Delta^*_{rr} &= \frac{2z - 3\sigma\left(\theta^A - \theta^B\right)}{6\left(1+\theta^A+\theta^B\right)} \\
\Delta^*_{mm} &= \frac{2z - \sigma\left(\theta^A - \theta^B\right)}{6\left(1+\theta^A+\theta^B\right)} \\
\Delta^*_{rm} &= \frac{2z - \sigma\left(\theta^A\theta^B + 2\theta^A - 2\theta^B - 1\right)}{2(\theta^A+2)(\theta^B+2)} \\
\Delta^*_{mr} &= \frac{2z - \sigma\left(-\theta^A\theta^B + 2\theta^A - 2\theta^B + 1\right)}{2(\theta^A+2)(\theta^B+2)}.
\end{aligned}$$

Then, interiority of equilibrium requires $\Delta^* \in \left(-\frac{\sigma}{2}, \frac{\sigma}{2}\right)$. The corresponding profits are

$$\begin{aligned}
\Pi^{A*}_{rm} &= \frac{1}{4\sigma}\left(\sigma + 2\Delta^*_{rm}\right)^2, \\
\Pi^{A*}_{mm} &= \frac{1+\theta^A+\theta^B}{4\sigma}\left(\sigma + 2\Delta^*_{mm}\right)^2, \\
\Pi^{A*}_{rr} &= \frac{1}{4\sigma}\left(\sigma + 2\Delta^*_{rr}\right)^2, \\
\Pi^{A*}_{mr} &= \frac{2+\theta^A}{4\sigma}\left(\sigma + 2\Delta^*_{mr}\right)^2.
\end{aligned}$$

Focusing on configurations rr and mm of the main text, we have

$$\begin{aligned}
\Delta^*_{rr} &\in [-\frac{\sigma}{2}, \frac{\sigma}{2}] \Leftrightarrow z \in \left[-3\sigma\left(\frac{1}{2}+\theta^B\right), 3\sigma\left(\frac{1}{2}+\theta^A\right)\right] \\
\Delta^*_{mm} &\in [-\frac{\sigma}{2}, \frac{\sigma}{2}] \Leftrightarrow z \in \left[-3\sigma\left(\frac{1}{2}+\frac{\theta^A+2\theta^B}{3}\right), 3\sigma\left(\frac{1}{2}+\frac{2\theta^A+\theta^B}{3}\right)\right].
\end{aligned}$$

A sufficient condition for both to hold is

$$z \in \left[-3\sigma\left(\frac{1}{2}+\min\{\theta^A,\theta^B\}\right), 3\sigma\left(\frac{1}{2}+\min\{\theta^A,\theta^B\}\right)\right].$$

Under configurations rr and mm, the retail prices are given by

$$\begin{aligned}
P^{A*}_{rr} &= \frac{(1+3\theta^A)(2z+(3+6\theta^B)\sigma)}{6(1+\theta^A+\theta^B)}, \\
P^{B*}_{rr} &= \frac{(1+3\theta^B)(-2z+(3+6\theta^A)\sigma)}{6(1+\theta^A+\theta^B)}, \\
P^{A*}_{mm} &= \frac{(1+2\theta^A+\theta^B)(2z+(3+2\theta^A+4\theta^B)\sigma)}{6(1+\theta^A+\theta^B)}, \\
P^{B*}_{mm} &= \frac{(1+\theta^A+2\theta^B)(-2z+(3+4\theta^A+2\theta^B)\sigma)}{6(1+\theta^A+\theta^B)},
\end{aligned}$$

and the equilibrium profits are

$$\begin{aligned}
\Pi^{A*}_{rr} &= \frac{(2z+(3+6\theta^B)\sigma)^2}{36(1+\theta^A+\theta^B)^2\sigma}, \quad \Pi^{B*}_{rr} = \frac{(-2z+(3+6\theta^A)\sigma)^2}{36(1+\theta^A+\theta^B)^2\sigma}, \\
\Pi^{A*}_{mm} &= \frac{(2z+(3+2\theta^A+4\theta^B)\sigma)^2}{36(1+\theta^A+\theta^B)\sigma}, \; \Pi^{B*}_{mm} = \frac{(-2z+(3+4\theta^A+2\theta^B)\sigma)^2}{36(1+\theta^A+\theta^B)\sigma}.
\end{aligned}$$