The Economics of Vertical Non-price Restraints: The Research Legacy of Continental T.V. v. GTE Sylvania*

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Abstract

We review the empirical literature related to the economics of vertical non-price restraints that were placed under the rule of reason by the *Continental T.V. v. GTE Sylvania* decision. To help organize the empirical literature, we develop a conceptual framework that represents the economics of non-price vertical externalities as diversion ratios and margins, and sorts classic theoretical models of these restraints into mechanisms that correct channel externalities and those that create or protect market power. The empirical literature built on equilibrium models has made great strides developing tools and analyzing specific markets where these forces are important. We conclude that (a) the effects of exclusive territories and other non-price restraints are complex and depend on varying offsetting economic forces, (b) economists have the tools to measure these forces with the appropriate data, and (c) there are successful case studies that quantify the welfare implications of vertical restraints. Two gaps remain. First, the literature has largely decomposed restraints into efficiency and foreclosure effects rather than testing the Court's claim that suppressing intrabrand competition strengthens interbrand competition. Second, the restraint at issue in *Sylvania* itself, the use of exclusive territories, has received little direct attention.

1 Introduction

Non-price vertical restraints are restrictions placed by suppliers on how independent retailers may sell their products, such as an exclusive territory granted by a producer to a dealer, a

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cap on the number of dealers in an area, a requirement that a dealer carry the producer's full line or deal exclusively in its brand, or a requirement for how a product is displayed and sold. What these restraints have in common is that they suppress *intrabrand* competition, or rivalry among the retailers of a single brand. Their effect on *interbrand* competition, rivalry between brands, is less uniform: some restraints have no effect, while others, such as a requirement to deal exclusively in one brand, act on it directly.[1] Whether such restraints are good or bad for consumers is not obvious, and this is the question the U.S. Supreme Court confronted in *Continental T.V., Inc. v. GTE Sylvania Inc.* (1977). We review the empirical literature that has grown up around the tradeoff identified by the Court in *Sylvania*, and we ask how much of the Court's economic reasoning has been confirmed or refuted by the literature.

The case itself is a useful illustration. In the early 1960s GTE Sylvania accounted for only one to two percent of national television sales, far behind the dominant players at the time, RCA and Zenith. In an attempt to compete with its larger rivals, Sylvania overhauled its distribution practices: it cut the number of retailers it sold to and required each dealer to sell Sylvania television sets only from its designated location. This location clause left every dealer facing fewer nearby rivals who sold Sylvania sets. The strategy appeared to work: the company's share rose to roughly five percent by 1965. Continental T.V., a San Francisco dealer, objected to the arrangement and shipped Sylvania merchandise to a co-owned but unapproved Sacramento location. In response, Sylvania terminated Continental's dealership. The resulting antitrust suit put Sylvania's location clause before the Court.

To see how such a restraint might help rather than harm consumers, consider a manufacturer of specialty bicycles sold through independent bike shops. More shops carrying the brand in a city means sharper competition among them, lower retail markups, and more convenient availability, resulting in a direct gain for consumers. But the retail margin also funds the services that sell a bicycle: floor space for a range of models, staff who can fit a rider to a frame, the provision of test rides, and after-sale adjustments. In principle a discounter who offers none of this can free-ride on a full-service shop's effort, with the consumer sizing the bike at the full-service store and subsequently ordering it from a discounter for a lower price. Where such retail service spillovers are strong, shops will invest less in the services that help the brand compete against rival producers, so that a restraint that suppresses intrabrand competition may provide a means of strengthening the brand's ability to compete against rival producers.[2]

The law did not always view vertical restraints with such nuance. Under *Dr. Miles*

[1]Throughout the paper, a "brand" is always an upstream brand: intrabrand and interbrand competition, as in *Sylvania*, concern the branded products of manufacturers. The models and empirical settings we review do not feature retailer brands.

[2]The example is not idle: bicycles were the setting of *Schwinn*, the precedent *Sylvania* overruled.

(1911), minimum resale price maintenance (minimum RPM) was a per se violation of the Sherman Act, and in *United States v. Arnold, Schwinn & Co.* (1967) the Court extended per se condemnation to non-price restraints, holding that a manufacturer could not restrict the territories or customers of a dealer once title to the goods had passed.[3] *Sylvania* overruled *Schwinn* and held that non-price vertical restraints must instead be judged under a rule of reason, so that courts weigh their procompetitive benefits against their anticompetitive effects.[4]

Writing for the majority in *Sylvania*, Justice Powell recognized that the suppression of intrabrand competition can be a mechanism through which interbrand competition is strengthened, as a manufacturer must induce its dealers to invest in promotion and pre-sale service. The Court's argument was based on three premises. First, the manufacturer imposing the restraint is not dominant, so that interbrand rivalry still disciplines the manufacturer.[5] Second, interbrand competition impacts market outcomes more strongly than the intrabrand competition suppressed by the restraint.[6] Third, demand-enhancing, pre-sale service, which is provided by retailers and protected by the restraint, matters for sales.

A single restraint can bundle an efficiency gain together with an anticompetitive effect, and because both service-provision and anticompetitive effects can move price in the same direction, reduced-form evidence on whether a restraint raised or lowered prices cannot determine which force dominates. The role of empirical equilibrium analysis is to separate these effects and provide estimates of consumer and producer surplus. The dissent in *Sylvania* objected that courts lack the institutional competence to weigh competing intrabrand and interbrand effects case by case, and so would do better with a bright-line rule. Fortunately, advances in empirical equilibrium modeling have built credible competence in the analysis of these types of markets.

We focus on empirical work that uses equilibrium models to study the non-price restraints placed under the rule of reason standard by *Sylvania*. We organize our review around the three premises above rather than by industries or empirical methods. In this sense we complement rather than duplicate existing surveys. Lafontaine and Slade (2008) survey the broader empirical landscape, much of it reduced-form; Rey and Vergé (2008) survey the theory; and

[3]The rule turned on the formality of who held title: identical restraints were judged under a rule of reason if the manufacturer retained ownership, as in a consignment arrangement.

[4]Minimum resale price maintenance remained per se illegal for another three decades, until *Leegin* (2007) overruled *Dr. Miles* as well; maximum RPM had already been moved to a rule of reason standard by *State Oil v. Khan* (1997).

[5]Our conceptual framework does not assume that the manufacturer (as opposed to the retailer) imposes the restraint, or that restraints arise endogenously. Much of the empirical literature studies restraints imposed by manufacturers.

[6]By market outcomes, we mean impacts on both the contracting and non-contracting parties, such as rival manufacturers and consumers.

Lee et al. (2021) review and organize the modeling toolkit, particularly empirical bargaining models. Section 2 develops a conceptual framework that recasts the classic theories of these restraints (such as Spengler (1950), Telser (1960), Mathewson and Winter (1984), and Rey and Stiglitz (1995)) through the lens of diversion ratios and margins. It decomposes the effects of these restraints into two parts: effects within the distribution channel and effects on the market more generally, including on rival brands. We then sort the theoretical models into two regimes: those focused on a restraint's ability to correct externalities between a brand and its retailers, and those focused on a restraint's ability to create or protect market power. A single restraint often appears in both regimes.

Our treatment departs from the classic theoretical models because we take retailers that carry several competing brands as our baseline. This matches most of the markets we review and *Sylvania* itself, and it allows us to explicitly consider diversion between rival brands on a single retailer's shelf. This brings exclusive dealing inside the framework, where it turns out to have an efficiency rationale not examined by the previous literature on foreclosure. The Court's three premises map directly onto our framework. The extent of a manufacturer's dominance governs a restraint's potential effect on market power. The relative significance of interbrand versus intrabrand competition for market outcomes (including for rival brands and consumers) depends on the relative magnitudes of three types of diversion: diversion across retailer locations within a given brand, diversion across brands within a given retailer, and diversion across both brands and retailers. Finally, the question of whether service incentives are significant depends on whether demand responds strongly to retailer effort and whether the returns to effort spill across a brand's retailers. Section 3 reviews the empirical evidence as measurements of these objects. Section 4 concludes.

We reach three conclusions. First, the competing forces identified by theory are real, and the welfare sign of a restraint depends on which of them dominates in the market at hand. Second, economists now have the tools and, in several markets, the data to measure these forces. Third, a number of case studies have done so successfully: the procompetitive service channel has been credibly quantified (Murry, 2017, 2018; Asker, 2016), anticompetitive foreclosure has been documented (Nurski and Verboven, 2016; Yuan, 2025; Le, 2026), and a small number of papers measure both channels for the same restraint and net them against each other (Conlon and Mortimer, 2021; Ho et al., 2012a,b).

There are three caveats to our conclusions. First, the literature has largely not focused on testing the Court's actual claim: economists have decomposed restraints into efficiency and foreclosure effects rather than asking whether softening intrabrand competition strengthens interbrand competition. Second, intrabrand competition has been documented to be substantial and spatially local where it has been measured (Thomadsen, 2005; Davis, 2006), so the

Court's presumption that interbrand rivalry will compensate for its loss cannot simply be assumed. Third, the specific restraint at issue in *Sylvania*, the use of exclusive territories, has received strikingly little direct attention, as have cooperative advertising efforts frequently used by manufacturers to fund retailer service.

2 Conceptual Background

The empirical literature we review in Section 3 examines whether specific non-price restraints in a particular context raise or lower welfare. The theoretical literature analyzes the mechanisms behind these welfare effects by examining externalities between manufacturers and retailers within the distribution channel. This section develops a framework that represents those externalities as diversion ratios, recoverable via demand estimation, and sorts the theoretical literature into two regimes: restraints that correct externalities within the distribution channel (with efficiency-inducing procompetitive effects), and restraints that create or protect market power (with the potential for anticompetitive effects). In reality most restraints contain elements of both procompetitive and anticompetitive mechanisms and their net welfare effects depend on which force dominates. That is precisely the tradeoff the Court invoked when placing *Sylvania*'s restraint under the rule of reason.

2.1 Channel externalities as diversion

Consider one or more manufacturers, each producing a brand j at constant marginal cost c_j and distributing through independent retailers. Retailer r carries a set of brands $\mathcal{B}_r$. We take $|\mathcal{B}_r| > 1$ as the baseline: the retailer who stocks several competing brands is the empirically relevant case in most of the markets we review below, and it matches the *Sylvania* case, in which a television retailer carried both Sylvania and rival brands.

A product is a brand-retailer pair (j, r); consumers make a discrete choice over the available products and an outside option, generating demand $q_{jr}(\mathbf{p}, \mathbf{a})$ that depends on a vector of prices, $\mathbf{p}$, and a vector of demand-enhancing retailer efforts, $\mathbf{a}$, such as service, advertising, promotion, or shelf space.

A retailer r that raises its price or reduces its demand-enhancing effort on brand j reduces demand for the product (j, r). Diversion ratios record how consumers who leave (j, r) substitute to alternatives. For a price change we denote diversion from (j, r) to (k, s) as

$$D^{p}_{jr \to ks} \;=\; \frac{\partial q_{ks}/\partial p_{jr}}{|\partial q_{jr}/\partial p_{jr}|} \;\geq\; 0, \tag{1}$$

which reports the share of the sales retailer r loses on brand j when it raises p_{jr} that divert to product (k, s), where either k or s may be the same retailer or brand. For a non-price dimension of demand-enhancing effort the analogous expression is:

$$D^a_{jr \to ks} = \frac{\partial q_{ks}/\partial a_{jr}}{|\partial q_{jr}/\partial a_{jr}|}, \tag{2}$$

where $\partial q_{jr}/\partial a_{jr}$ is positive by definition. Unlike price diversion, effort diversion can be either positive or negative. Effort can create a positive spillover to help another product ($D^a > 0$) or it can steal demand from another product ($D^a < 0$).

If $D^a_{jr \to js} > 0$, retailer r's effort promoting brand j raises sales of brand j at a competing retailer s. This possibility was first recognized by Telser (1960) and affects intrabrand competition. On the other hand, if $D^a_{jr \to ks} < 0$ for $k \neq j$, retail effort exerted on behalf of brand j steals business from brand k and affects upstream interbrand competition. Interbrand competition can occur both within a retailer or across retailers. When it occurs within a retailer, we refer to it as intra-retailer, with competition between brands being understood implicitly. If consumers divert to the outside good as the result of a reduction in retail effort, then effort has a market expansion effect.

Sorting the entries (k, s) of (1) and (2) by whether diversion is between the same brand and/or the same retailer partitions diversion into three types: cross-retailer (diversion to the same brand at competing retailers), cross-brand (diversion to rival brands at the same retailer), and cross-retailer, cross-brand (diversion to rival brands at competing retailers).

Table 1: Types of diversion

	Same retailer ($s = r$)	Competing retailers ($s \neq r$)
Same brand ($k = j$)	[own effect]	cross-retailer
Competing brands ($k \neq j$)	cross-brand	cross-retailer, cross-brand

Table 1 documents these distinctions. In the top left position, we label the focal retailer-brand pair (j, r) as the *own effect*; diversion is not defined here. Consumers who leave (j, r) either divert according to one of the other three options in Table 1, or exit to the outside good. Diversion to the outside good differs from diversion to any inside good because when a consumer leaves the market, no producer or retailer earns a margin. This is the clearest case of a second externality inside the distribution channel, which arises from the presence of a mark-up (or margin) by both the retailer and the manufacturer. This is referred to as double marginalization (Spengler, 1950).

To make double marginalization precise, suppose retailer r chooses price, p_{jr}, and demand-enhancing effort, a_{jr}, and purchases brand j at a linear wholesale price, w_{jr}. We define three

margins: a retail margin $p_{jr} - w_{jr}$, a wholesale margin $w_{jr} - c_j$, and the total channel margin $p_{jr} - c_j$.[7] For every unit the retailer sells, the manufacturer earns a margin $w_{jr} - c_j$ that the retailer does not value. This vertical externality is imposed on the manufacturer for every unit the retailer fails to sell, and it is present whether or not the retailer carries any rival brands.

In order to illustrate the impact that a retailer's choice of price or effort has on market outcomes, we hold one of these choices fixed and compare the marginal value of the other choice to three parties: the retailer, whose own first-order condition sets its marginal revenue equal to its wholesale cost; the channel, which records the value created by a vertically-integrated manufacturer-retailer pair that sets the marginal revenue of selling a unit of brand j equal to the cost of producing a unit of brand j; and society, which accounts for the channel's value plus the value created for rival brands and consumers. Writing V^{ret}, V^{ch}, V^{soc} for these three objects, the private–social gap can be described by two wedges:

$$\begin{aligned} \Delta_A &\equiv V^{\text{ch}} - V^{\text{ret}} \qquad \text{(what a restraint corrects within the distribution channel)}, \\ \Delta_B &\equiv V^{\text{soc}} - V^{\text{ch}} \qquad \text{(whether it improves social welfare)}. \end{aligned} \tag{3}$$

The first wedge, Δ_A, denotes the difference between the value created by an independent retailer and a vertically integrated retailer-manufacturer channel. The second wedge, Δ_B, denotes the difference between the value created by the channel and the total social value. Each wedge can be expressed as a sum of margin-times-diversion terms (see Appendix A.1 for derivations). We denote the action being varied with a superscript, so Δ_A^a and Δ_B^a are the two effort wedges and Δ_A^p and Δ_B^p are the price wedges.

Holding price fixed and defining the own response of non-price effort as $q'^a_{jr} \equiv \partial q_{jr}/\partial a_{jr} >$

[7]The wholesale margin $(w_{jr} - c_j)$ that weights the vertical term is itself an equilibrium object. Under Nash-in-Nash bargaining (Horn and Wolinsky, 1988; Collard-Wexler et al., 2019), each pair (j, r) splits its bilateral surplus taking other agreements as given. The wholesale price balances the retailer's marginal loss $\partial \pi_r / \partial w_{jr} = -q_{jr}$ against the manufacturer's marginal gain $(w_{jr} - c_j)$, with w_{jr} increasing in the manufacturer's bargaining weight, τ_{jr}. The contracting space matters: with a two-part tariff w_{jr} is set for efficiency and the fixed fee splits the surplus. In this case the wholesale margin reflects diversion but not bargaining power. Under linear contracting, the wholesale margin contains the bargaining weight. Counterfactuals that change the contracting space or the disagreement points must re-solve for w_{jr} rather than hold the observed wholesale margin fixed.

0, we write the non-price (effort) wedges as:

$$\Delta_A^a = q_{jr}'^a \cdot \left(\underbrace{(w_{jr} - c_j)}_{\text{vertical}} + \underbrace{\sum_{s \neq r} (p_{js} - c_j)\, D^a_{jr \to js}}_{\text{intrabrand}} - \underbrace{\sum_{k \in \mathcal{B}_r,\, k \neq j} (p_{kr} - w_{kr})\, D^a_{jr \to kr}}_{\text{intra-retailer}} \right), \quad (4)$$

$$\Delta_B^a = \underbrace{q_{jr}'^a \sum_{s,\, k \neq j} (p_{ks} - c_k)\, D^a_{jr \to ks}}_{\text{rival-brand}} + \frac{\partial \, \text{CS}}{\partial a_{jr}}. \quad (5)$$

The vertical term of Δ_A^a in (4) captures double marginalization applied to effort instead of price.[8] The second term, labeled intrabrand, is retailer free-riding, first introduced by Telser (1960). This term is positive when effort spills over to competing retailers ($D^a_{jr \to js} > 0$) so the manufacturer (and thus the channel overall) wants a higher level of effort than the retailer is willing to supply. The final term, labeled intra-retailer, exists only when $|\mathcal{B}_r| > 1$ and captures the fact that, when a retailer's effort steals from a rival brand in the same store ($D^a_{jr \to kr} < 0$), the retailer bears a loss that brand j does not. Thus, the retailer supplies less effort on brand j than brand j would optimally choose.

The first term of Δ_B^a in (5) captures effects of rival brands across all retailers. We refer to this as the 'rival-brand' term. This term is negative when retail effort steals business from rivals ($D^a_{jr \to ks} < 0$), in which case, the channel's optimal choice of effort is higher than the social optimum. The second term in (5) captures the response of consumer surplus to retail effort and allows for the possibility that effort may expand the market overall. Correspondingly, this is the only term in either (4) and (5) that is not scaled by the responsiveness of demand to effort, $q_{jr}'^a$.

Judge Powell's majority opinion in *Sylvania* focused on the possibility that softening "intrabrand" competition could be a mechanism for strengthening "interbrand" competition. In the framework above, intrabrand effects on competition are easily identified as the second term in (4), and they do not appear in (5). Interbrand competition, on the other hand, enters in both (4) and (5) because interbrand competition arises from the combination of the intra-retailer term in (4) and the rival-brand term in (5).

If instead we hold retail effort fixed and analyze the impact of retail price changes, with

[8] Double marginalization's impact on price was first articulated by Spengler (1950).

own slope $q'^{p}_{jr} \equiv \partial q_{jr}/\partial p_{jr} < 0$, we find:

$$\Delta^p_A = |q'^{p}_{jr}|\Big[\underbrace{-(w_{jr}-c_j)}_{\text{vertical}} + \underbrace{\textstyle\sum_{s\neq r}(p_{js}-c_j)\,D^p_{jr\to js}}_{\text{intrabrand}} - \underbrace{\textstyle\sum_{k\in\mathcal{B}_r,\,k\neq j}(p_{kr}-w_{kr})\,D^p_{jr\to kr}}_{\text{intra-retailer}}\Big], \tag{6}$$

$$\Delta^p_B = \underbrace{|q'^{p}_{jr}|\textstyle\sum_{s,\,k\neq j}(p_{ks}-c_k)\,D^p_{jr\to ks}}_{\text{rival-brand}} - q_{jr}. \tag{7}$$

The first two terms of Δ^p_A are the offsetting forces documented in Mathewson and Winter (1984): the vertical term captures double marginalization, which results in a final price that is too high from the perspective of the manufacturer and channel. The second term captures the impact of intrabrand diversion: a brand selling through multiple retailers values sales at competing retailers even though the focal retailer does not. This leads the focal retailer to price too low relative to the manufacturer and channel optimum (working against double marginalization). The third term (intra-retailer) captures the incentive that a multi-brand retailer has to set the price of brand j higher to protect the retailer's sales of rival brands. This effect inflates the price of j relative to the manufacturer's optimum for reasons that have nothing to do with double marginalization.

The first term of (7) is the price analog of the rival-brand effect in (5): a price increase by retailer r increases sales of product j at competing retailers, which is valued by brand j but not by retailer r (who correspondingly sets price too low from the perspective of both brand j and a social planner). The second term of (7) captures market power.

Comparing (6) and (4) shows that the two Δ_A's are analogous and reflect the fact that, relative to the objective of the retailer alone, the channel as a whole benefits from a lower price (6) and more demand-enhancing effort (4). When retailers carry multiple brands, cross-brand diversion appears in both wedges, but at different margins: in Δ_A cross-brand diversion interacts with the retail margin $p_{kr} - w_{kr}$, whereas in Δ_B cross-brand diversion (as well as cross-brand, cross-retailer diversion) interacts with the channel margin $p_{ks} - c_k$.

Vertical restraints allow a manufacturer to move the retailer toward the optimal outcome for the channel as a whole by reducing Δ_A.[9] Whether this improves or reduces social surplus depends on the sign of Δ_B. If the retailer's action mainly expands the market or supplies under-provided service by reducing or eliminating the first two terms in Δ_A (vertical and

[9]A single contractual instrument typically targets a single term. For example, a two-part tariff targets the vertical term, an exclusive territory targets the intrabrand term, and exclusive dealing targets the intra-retailer term. So Δ_A goes to zero only under a sufficient combination of instruments, as in Mathewson and Winter (1984). See Appendix B.

intrabrand), the restraint increases social surplus and improves welfare. We refer to restraints that lead to this outcome as belonging to **Regime A**. These restraints are necessarily restricted to retailers that carry only one brand. On the other hand, we refer to restraints that change the nature of competition between manufacturers (via the rival-brand term of Δ_B and the intra-retailer term of Δ_A for retailers that carry multiple brands) as belonging to **Regime B**. Table 2 summarizes the theoretical papers we review in the rest of Section 2.

We end this subsection with a note on antitrust standards. Equation (3) analyzes total social surplus. US antitrust more often applies a consumer-welfare standard, which drops producer surplus and analyzes only consumer surplus. To a first-order approximation, a vertical restraint helps consumers when it leads to lower prices or better service. A restraint can raise total surplus while lowering consumer surplus.

2.2 Regime A: restraints that correct channel externalities

For models in Regime A, the intra-retailer term of (4) is absent by construction. This is a substantive restriction because it treats the retailer as a pure conduit for a single brand. We address multi-brand retailers in the next section; vertical restraints with multi-brand retailers belong to Regime B.

The vertical externality (Spengler, 1950). The oldest distortion between a manufacturer and a retailer within a distribution channel is the cleanest instance of the vertical term of (4). A monopolist manufacturer selling to a monopolist retailer at a linear wholesale price $w > c$ induces double marginalization: the retailer marks up over w, so the retail price is above the level that maximizes their joint profit and quantity is below it. The same wedge distorts every retailer choice that shifts demand, not only price. If the retailer chooses a demand-enhancing effort a at cost $\Phi(a)$, its first-order condition $(p - w)\, q_a = \Phi'(a)$ falls short of the integrated firm's $(p - c)\, q_a = \Phi'(a)$ by the wholesale margin $w - c$: the retailer under-provides effort because it ignores the manufacturer's margin on the sales that effort would generate. Effort of this kind is typically neither observable to the manufacturer nor verifiable by a court, so the efficient level cannot simply be written into a contract. The under-provision is therefore a problem of moral hazard, in the sense familiar from the franchising literature. Every instrument in this section works indirectly, changing the margin the retailer earns on the sales its effort generates rather than specifying effort itself. A two-part tariff that prices the marginal unit at cost ($w = c$) and recovers rents through a fixed fee closes the vertical term for both price and effort. However, the classic result of taxing the entire profit of the retailer would leave no incentive for retail effort.

Horizontal free-riding (Telser, 1960). A two-part tariff does not address the intrabrand

term of (4) that appears once a brand sells through several competing retailers. Suppose demand depends on pre-sale services that are costly, brand specific, and observable to consumers before purchase. Examples include demonstrations, explanations by knowledgeable staff, showroom displays, and some types of advertising. A consumer can obtain the service at a full-service retailer and buy from a discounter who provides no costly effort. In the notation of (2), retailer r's effort raises sales at rival retailer s: the intrabrand spillover $D^a_{jr\to js} > 0$. Anticipating this, retailers under-provide service relative to the brand's joint optimum, and the shortfall worsens as the spillover grows or as retail price competition erodes the margin that funds service. Telser (1960) argued that minimum RPM restores retailers' incentive to provide demand-enhancing effort and that shutting down retail price competition leads retailers to compete on service instead. This free-riding rationale is the one the *Sylvania* Court invoked, with location clauses standing in for minimum RPM.[10] Telser's mechanism can be thought of as a lower bound on the under-provision of service generated by a multi-brand retailer.

The spatial equilibrium (Mathewson and Winter, 1984). Mathewson and Winter (1984) consider a full equilibrium of the distribution channel. A monopolist manufacturer sells through spatially differentiated retailers with free entry; consumers must be reached by retailer advertising in order to make a purchase, and a fraction of each retailer's advertising spills into rivals' market areas. Taking the vertically integrated configuration as the benchmark, they show that a linear wholesale price leaves three externalities in place: the vertical externality (retailers price too high and advertise too little); a horizontal advertising externality (the intrabrand spillover, which further suppresses the amount of advertising that each retailer chooses); and a retail-competition externality (competing retailers price below the manufacturer's preferred level). No single instrument neutralizes all three, so the manufacturer combines different restraints, and the minimally sufficient combination depends on which externalities are active. Two features are relevant for *Sylvania*. Exclusive territories address the retail-competition externality because they remove the cross-demand that leads to underpricing by making retailers local monopolists. Exclusive territories must then be paired with a franchise fee or quantity forcing to close the vertical term. Additionally, minimum RPM and exclusive territories emerge as substitutes for the retail-competition externality, which led Mathewson and Winter (1984) to argue that the then-prevailing legal asymmetry between price and non-price restraints was difficult to defend on economic grounds.[11]

[10]Telser's argument is informal and isolates a single friction. Winter (1993) and Perry and Porter (1990) analyze the service externality and the contracts that correct it formally.

[11]At odds with the *Sylvania* narrative, territories in their model are not a response to informational free-riding: because advertising spills geographically, beyond any sales territory, that externality is met by minimum RPM, not territories. This distinction falls directly out of (1)–(2): an exclusive territory zeroes out

Efficiency rationales for minimum RPM (Klein and Murphy, 1988; Marvel and McCafferty, 1984; Deneckere et al., 1997). Three further rationales extend the efficiency case for minimum RPM beyond pre-sale service, and each one is an instance of the channel using a guaranteed retail margin to elicit a non-contractible retailer input. Klein and Murphy (1988) treat minimum RPM as a contract-enforcement device: the margin it protects is a quasi-rent stream the manufacturer can threaten to withdraw (by terminating the dealer), which disciplines non-verifiable retailer performance more broadly than free-riding alone. Marvel and McCafferty (1984) treat minimum RPM as quality certification: a high-reputation retailer's willingness to stock a product certifies its quality, which is a public signal subject to free-riding that the guaranteed margin restores. Deneckere et al. (1997) treat minimum RPM as inventory insurance: when retailers must stock before demand is known, a price floor prevents the ex-post markdowns that would otherwise destroy their incentive to carry adequate inventory. Each is procompetitive in the sense of (3), and each has a non-price analog: territories, quantity forcing, or restricted distribution.[12]

2.3 Regime B: restraints that create or protect market power

The restraints above move a retailer toward the distribution channel's joint optimum for a single manufacturer. In the presence of competing manufacturers, the same instruments can affect competition between manufacturers within retailer locations as well as the equilibrium of the manufacturers' game.

Softening interbrand competition (Rey and Stiglitz, 1995). Suppose manufacturers producing imperfect substitutes distribute through competitive retailers, who price at wholesale cost, so the manufacturers effectively compete directly. Granting each retailer an exclusive territory makes it a local monopolist, reintroducing double marginalization but also changing the manufacturers' strategic problem: because the retailer passes a wholesale cost increase through by less than one-for-one, each manufacturer perceives a less elastic residual demand and competes less aggressively. Rey and Stiglitz (1995) show that equilibrium wholesale and retail prices, and manufacturer profits, can rise while consumer and total surplus fall. This holds even without franchise fees to recover downstream rents.[13] This is a Regime-B use of the same restraint that resolves the retail-competition externality in

intrabrand *price*-diversion (a customer in r's territory cannot switch retailers), but zeroes out intrabrand *effort*-diversion only when effort stays within the territory. See Appendix B.

[12]These are price restraints, and thus outside *Sylvania*'s immediate scope; we include them because they round out the Regime-A account of what a protected retail margin delivers in terms of efficiency, and because the same logic recurs for the non-price restraints we emphasize.

[13]This result was anticipated by Lin (1988), who shows that selling through an exclusive distributor dampens interbrand competition, and Bonanno and Vickers (1988), who obtain the effect through a two-part tariff that commits the retailer to a soft pricing posture; Rey and Stiglitz (1995) generalize the result.

Regime A: it operates via the rival-brand term of (7), but as an equilibrium effect on the manufacturers' pricing game rather than a static externality. It requires that retail prices be strategic complements, that the brands be reasonably close substitutes, and that demand not be too convex; and it depends on contracts being observable because a secret contract cannot serve as a commitment. Rey and Stiglitz (1995) do not consider any effects of retail effort.

Manufacturer opportunism under secret contracts (Hart and Tirole, 1990; O'Brien and Shaffer, 1992; Rey and Vergé, 2004). The softening of interbrand competition in Rey and Stiglitz (1995) depends on rivals being able to observe the contract. Secrecy removes that commitment, but it does not merely cancel the effect. It introduces a different problem, one that works in the opposite direction and pushes prices below the monopoly level. A manufacturer selling through competing retailers values the intrabrand term of (6). That term is the sales recaptured by its own brand at retailer s when retailer r sells fewer units. Contracting secretly and bilaterally with each retailer, the manufacturer cannot commit to act on that valuation. When negotiating with r, it ignores the effect that expanding r's quantity has on the margin it earns at s, and so it undercuts its own earlier deals. The result is that the manufacturer cannot sustain the monopoly outcome even when it faces no rival (Hart and Tirole, 1990). Two-part tariffs do not repair this. Resale price maintenance does, but not the minimum RPM invoked in Section 2.2, which sets a price floor. O'Brien and Shaffer (1992) and Rey and Vergé (2004) analyze maximum RPM, or a price ceiling. Maximum RPM compresses the retail margin toward zero and makes the manufacturer the residual claimant on retail sales. Thus, the manufacturer internalizes the intrabrand recapture and monopoly profits are restored.[14]

This is the mirror image of Rey and Stiglitz (1995): in that case, with observable contracts, vertical separation softens rivalry and lifts prices above the competitive level, while with secret contracts, opportunism erodes the manufacturer's power and maximum RPM restores it. In the classification of Section 2.1 the mechanism of Hart and Tirole (1990) operates through the intrabrand term of (4). There is only one manufacturer, so there is no interbrand competition to soften.[15]

[14]The result turns on retailers' out-of-equilibrium beliefs and on the mode of downstream competition. Under passive beliefs an equilibrium may fail to exist when the two retailers' products are close substitutes; Rey and Vergé (2004) work instead with the wary beliefs of McAfee and Schwartz (1994), under which a retailer anticipates that the manufacturer responds optimally to the offer it has just received. Maximum RPM restores the monopoly outcome under price competition but not under quantity competition, where buy-back or return provisions are needed instead. Nondiscrimination and most-favored-customer clauses limit opportunism by a different route.

[15]Note that with a single brand the rival-brand term of Δ_B^p is empty, leaving $\Delta_B^p = -q_{jr} < 0$. The channel optimum therefore sits above the social optimum, and setting Δ_A to zero results in the monopoly price. What classifies a mechanism into Regime B is not which terms are non-zero, but whether Δ_B is negative.

Interlocking relationships (Rey and Vergé, 2010). The one theoretical model built on multi-brand retailers is also the one closest to our baseline. Rey and Vergé (2010) study interlocking relationships, in which competing manufacturers each sell through the same competing retailers, so $|\mathcal{B}_r| > 1$ by construction and the intra-retailer term of (6) is active throughout. A retailer carrying both brands prices each one internalizing substitution to the other. This strict form of RPM, where the contract fixes the resale price rather than setting a minimum or maximum, is effective because it prevents the retailer from internalizing rival-brand, intra-retailer substitution when setting prices.

Exclusion (Asker and Bar-Isaac, 2014). Vertical restrictions can also be used by incumbent manufacturers to foreclose potential entrants without using an explicit exclusivity clause. Asker and Bar-Isaac (2014) show that transferring rents to retailers, via minimum RPM, franchise fees, slotting allowances, or an exclusive territory, gives retailers a stake in an incumbent manufacturer's monopoly profits. As a result, retailers decline to stock a potential entrant's products because accommodating entry competes away those rents. Their condition for an exclusionary equilibrium is a collusion-sustainability inequality, and minimum RPM and exclusive territories deliver it identically. Strikingly, an incumbent may even be able to exclude a rival that is more efficient than itself. This connects to the broader literature on exclusion through exclusive-dealing contracts, where an incumbent forecloses a more efficient entrant by signing up buyers (Rasmusen et al., 1991; Segal and Whinston, 2000); when the buyers are downstream competitors, exclusion is harder but far from impossible (Fumagalli and Motta, 2006; Wright, 2009).[16]

Using a multi-brand retailer as our baseline connects exclusive dealing to the framework we have developed. An exclusive-dealing contract shrinks $\mathcal{B}_r$ to a singleton, and in doing so zeroes out the intra-retailer terms of (4) and (6). This is the counterpart to what an exclusive territory does to the intrabrand term of (4) and (6). Understood in this way, our framework implies that a vertical restraint that removes rival brands from the shelf (such as exclusive dealing) should raise the retailer's brand-j effort and lower its brand-j price, because the retailer no longer has rival-brand sales to protect.[17] We are not aware of a paper that develops this argument, and we offer it as an implication of (6) rather than as a result in the literature. Whether efficiency or the anticompetitive effects dominate is, once again, a question of magnitudes and depends on the size of the intra-retailer diversion the contract eliminates and the losses of the excluded rival. The distinction also clarifies what is genuinely

[16] Jing and Winter (2014) unify these theories by recasting the incumbent's contract as a call option on its product, and add a third theory in which the contract lowers the price the incumbent pays an upstream supplier. Their model's mechanism works through a margin rather than diversion. Our wedges take the wholesale price as given, which is the object Jing and Winter use to explain exclusion.

[17] See Appendix B for further discussion.

different about exclusive dealing: it acts on a retailer's assortment, and so represents an effect on the extensive margin. Thus, unlike exclusive territories or RPM in any form, exclusive dealing changes the set of products that consumers are able to switch to, rather than affecting the relative importance of consumer switching across the existing set of products.

2.4 Discussion in the context of *Sylvania*

Our framework delivers two lessons that are directly related to *Sylvania*. The first is that the same restraint can appear in both regimes. Exclusive territories resolve the retail-competition externality (Regime A) and soften interbrand competition or foreclose rivals (Regime B); minimum RPM supports service provision, enforces contracts, and ensures retail inventory (Regime A) and facilitates exclusion (Regime B); maximum RPM limits double marginalization (Regime A) and restores monopoly under opportunism (Regime B); exclusive dealing raises a retailer's brand-j effort by removing the rival-brand sales it would otherwise be incentivized to protect (Regime A) and denies an entrant distribution (Regime B). A restraint's economic consequences are not determined by its form. Furthermore, as every mechanism has both a price and a non-price implementation, there is not an economic justification for distinguishing between price and non-price restraints.[18]

The second lesson is that the sign of a restraint's welfare effect depends on the magnitudes of these different forces in the specific setting under consideration. Whether a territorial restraint helps or harms consumers depends on the closeness of interbrand substitutes, the strength of the service or free-riding spillover, the observability of contracts, and the efficiency and scale of potential entrants. Theory can identify trade-offs but cannot sign the overall effect, and reduced-form evidence that a restraint raised or lowered prices cannot separate a procompetitive service effect from an anticompetitive softening effect because both move prices in the same way.

The Court's own reasoning can be restated in this language. Its three premises, introduced in Section 1, are claims about the magnitudes of specific mechanisms in the framework introduced in Section 2.1. Whether a manufacturer is dominant or not is a claim about the market-power term of (7) (i.e., that q_{jr} is small relative to the cross-brand diversion that disciplines it). Whether interbrand competition matters more than the intrabrand competition the restraint suppresses is a claim about the relative magnitude of the intrabrand term of (4) or (6) relative to the intra-retailer and rival-brand terms, which in turn depend on the diversion matrix. And whether service incentives are real is a claim that (a) the own effort response q'^{a}_{jr} is large (if effort barely moves demand, no composition of diversion rescues

[18] See also Jullien and Rey (2007). For a comprehensive survey of the theory, see Rey and Vergé (2008).

the efficiency defense) and (b) its returns spill across a brand's retailers, $D^a_{jr \to js} > 0$.

The second part of this last claim is easier to assume than to establish. In much empirical work, retailer effort enters demand the same way price does, shifting the utility of the promoted product upon purchase. Proposition 1 in Appendix A.2 makes this precise, showing that such "own-index" effort forces the two diversion matrices to be mirror images, $D^a_{jr \to ks} = -D^p_{jr \to ks} \leq 0$. This is retail effort without spillovers, and in this case, the positive intrabrand diversion that free-riding requires cannot arise. In contrast, Telser (1960) considers a different type of pre-sale effort, which informs or persuades a consumer before a purchase happens (potentially somewhere else). Thus, comparing an estimate of D^a to $-D^p$ speaks directly to whether the Court's presumed spillover is present.

Before turning to the empirical literature, we point out a gap in the current framework. In reality, manufacturers routinely pay for a share of their retailers' promotional effort directly through the use of cooperative advertising allowances, display and demonstration support, or co-funded local media. However, there has been little attention paid to this behavior in the economics literature.[19] This is striking, because in terms of (4) a cooperative subsidy is the most direct instrument available: it addresses the vertical effort term directly, reimbursing the retailer for the manufacturer margin $(w_{jr} - c_j)\, q'^a_{jr}$, and it does so without the price distortion that a linear wholesale markup or a price floor introduces. It is also the natural instrument for the case that Mathewson and Winter (1984) single out as beyond the reach of territories.

Our framework sorts procompetitive restraints from anticompetitive ones using margins, diversion ratios, and pass-through. These are exactly the objects an empirical equilibrium model of demand and supply recovers. Thus, understanding whether a restraint helps or harms in a given market becomes an empirical measurement problem. In the next section, we review the empirical literature related to these issues and the *Sylvania* decision.

3 Evidence from Empirical Equilibrium Models on Non-Price Vertical Restraints

The framework of the previous section highlights some potential competing effects of non-price vertical restraints, but leaves their welfare effects as an empirical question. A restraint may reduce Δ_A (the difference between channel and retailer surplus), its welfare sign is determined by the sign of Δ_B (the difference between social and channel surplus), and both wedges

[19] There is a (mostly older) literature in marketing that examines co-operative advertising. For example, see Bergen and John (1997) for a theoretical treatment related to Telser, and Nagler (2006) for an empirical cross-industry descriptive analysis.

are sums of margins times diversion ratios, which are objects that an equilibrium model of demand and supply recovers. Indeed, a single restraint may induce both efficiency and anticompetitive effects, and the outcome of the same restraint may differ when used in different market settings or by different firms. Recovering the magnitudes of such competing effects is exactly what a rule of reason standard requires, and translating these magnitudes into conclusions about consumer and total surplus is the role of empirical equilibrium analysis. Table 3 summarizes the papers we review.

We frame the literature as a series of tests of the three premises on which *Sylvania*'s logic rests, introduced in Section 1: that the manufacturer imposing the restraint is not dominant, that interbrand competition matters more for market outcomes than the intrabrand competition the restraint suppresses, and that retailers provide the pre-sale, demand-enhancing service the restraint protects. Section 2.4 restated each premise through the framework of Section 2, detailing the market-power term of the price wedge, the relative magnitude of the inter- and intrabrand elements of the diversion matrix, and a large own-effort response q'^{a}_{jr} with intrabrand spillovers $D^{a}_{jr \to js} > 0$.

We organize the literature accordingly, following the order of the previous section. After discussing the use of equilibrium modeling in Section 3.1, Section 3.2 takes up the second premise directly, asking how strong intrabrand competition is relative to interbrand. Section 3.3 takes up the third premise, quantifying the service channel. The framework gives retailer effort two separate sources of under-provision, and the papers there measure both. The first is the vertical term of (4), which is present whenever the wholesale margin is positive; this requires no spillovers between retailers. The second is the intrabrand effort term, which the Court invoked in *Sylvania*. We note which of the two sources each paper identifies. Section 3.4 turns to the competition-softening channel that exclusive territories can trigger when the premises fail, and Section 3.5 explores the related restraint of exclusive dealing. This leads to an efficiency-versus-foreclosure question, in which the first premise, the market position of the manufacturer imposing the restraint, returns. Section 4 assesses what the body of work has, and has not, settled. The same restraint often speaks to more than one mechanism.

3.1 Why estimate an equilibrium model?

The defining feature of the restraint at issue in *Sylvania* is the potential for offsetting effects, so that observed changes in prices, service levels, or quantities may be consistent with both efficiency-based and anticompetitive mechanisms. Empirical papers using equilibrium models address this in three ways. First, the combination of data and an equilibrium model makes

welfare measurable: by recovering demand and costs, it maps an estimated change in prices and service levels into consumer and producer surplus, which are the objects by which a rule-of-reason analysis is determined. Second, it permits decomposition: by specifying externalities among retailers and the strategic interaction among manufacturers explicitly, the model can switch a single channel on or off via a counterfactual exercise and report its separate contribution, rather than reporting only the net effect observed in data. Third, the exercise is predictive: an estimated model can be re-solved under a restraint that has not yet been observed (e.g., a contractual form at issue in a pending case, or a proposed merger remedy), which allows one to consider the types of forward-looking questions often posed in litigation.

The papers we review share a common toolkit. On the demand side they estimate differentiated-products discrete-choice systems, often with a spatial component so that intrabrand and interbrand substitution can be told apart. On the supply side they specify how prices, service, and contract terms are chosen (through posted prices, retailer effort, or, in some settings, Nash-in-Nash bargaining over the terms of trade), and invert the model to recover marginal costs and the parameters of the contracting problem. Lee et al. (2021) synthesize some of these modeling approaches, focusing on empirical bargaining models. Lafontaine and Slade (2008) survey the broader empirical landscape, including earlier reduced-form empirical work that preceded the equilibrium models reviewed here. They find that vertical restraints adopted voluntarily by firms are systematically associated with lower costs, greater output, and better service (or at worst no harm), with little robust evidence of foreclosure, whereas restraints mandated by government tend to raise prices and reduce consumer welfare. They read this as a justification for the lenient, *Sylvania*-style rule of reason, combined with safe harbors for low-share manufacturers (i.e., the presumption of legality). We view the literature built on equilibrium models as an effort to confirm and assign magnitudes and a welfare decomposition behind that qualitative regularity, and in some places to test its limits.

This is also the sense in which the literature answers the *Sylvania* dissent's institutional-competence objection, raised in Section 1. The dissent doubted that courts could weigh the strength of intrabrand competition against interbrand competition in a particular market, or weigh efficiency against anticompetitive effects, as the rule of reason approach calls for. This is precisely what the models discussed below are built to do.

3.2 Measuring intrabrand versus interbrand competition

A focus of the Court's opinion in *Sylvania* was the potential for the restraint at issue to affect the relative strengths of intrabrand and interbrand competition. A small spatial market equilibrium literature takes on this question through geography and ownership by analyzing how a retailer's price or demand responds to actions of a nearby outlet of the same chain versus a different chain, and how the retailer responds when nearby same-chain outlets come under common ownership. These designs measure the intrabrand element of the diversion matrix directly, and as we note in Section 2.1, a retailer's response to a same-chain neighbor, compared with its response to a different-chain neighbor at like distance, isolates this effect. None of the papers below studies a restraint. Instead, they represent credible equilibrium models that measure the objects that non-price vertical restraints act on. Thus, they act as a blueprint for how to incorporate spatial competition into the canon of demand estimation.

Thomadsen (2005). Thomadsen (2005) estimates a spatial discrete-choice demand model and a Bertrand pricing model for the two leading hamburger chains, McDonald's and Burger King, across all outlets in Santa Clara County, California. The author observes each outlet's franchisee, so the pricing first-order conditions internalize cross-price effects only between commonly owned outlets. This enables him to ask how price depends on ownership structure, which is the question at the center of *Sylvania*. The headline result is that suppressing intrabrand competition moves prices substantially: in counterfactual mergers, having a single franchisee internalize the business stolen among several nearby same-chain outlets raises price by as much as \$0.70 (about 23 percent) at one McDonald's, and by more for McDonald's than for Burger King (because McDonald's is the stronger brand, to which diverted customers are the more likely to return). The lesson for *Sylvania* is not that interbrand competition is weak (McDonald's and Burger King are themselves rival brands that discipline one another) but that the intrabrand competition suppressed by a territorial restraint may not be a negligible quantity: eliminating it, here through common ownership, raises prices by a double-digit percentage. In terms of the framework of Section 2, common ownership internalizes intrabrand diversion in the same way that a territorial assignment removes it, so the counterfactual is a direct measurement of how much the intrabrand recapture term of (6) affects price.

Davis (2006). Davis (2006) reaches a complementary conclusion for movie theaters, estimating a random-coefficients spatial demand model over thirty-six U.S. markets. Same-chain (same-circuit) theaters absorb more of a focal theater's diverted demand than different-chain theaters at comparable distance, and competitive effects are sharply localized (and in fact, negligible once theaters are roughly twenty miles apart). Together, Thomadsen and Davis establish that intrabrand competition among nearby same-brand outlets may be strong empirically in some settings. They also provide evidence that competition is spatially local

for fast food and movie theaters.

Villas-Boas (2007). Villas-Boas (2007) provides an early approach for measuring retail and manufacturer market power. She analyzes the grocery channel of yogurt sales, using scanner data from five manufacturers and three retail stores in a US city. Wholesale prices are unobserved, so her main challenge is figuring out how to back out retail vs. manufacturer margins. She does this using a three-step approach. In the first step, she uses demand-based moments to generate elasticities and substitution patterns without any supply-side moment restrictions. Second, she backs out implied retailer and manufacturer margins under different supply-side models of upstream and downstream competition. Finally, she tests which model best fits the observed data on retail prices and input costs. She finds that the models that fit best are those where the wholesale margin is essentially zero (manufacturers price at marginal cost) and retailers capture the residual profit through Nash-Bertrand retail pricing. Unfortunately, she cannot rule out the possibility of non-linear contracts that allow the manufacturer to extract profits via fixed fees, although she points out that there is no evidence of retailers paying fixed fees to manufacturers. In terms of our framework, she recovers the margins that weight every diversion term in the Δ_A and Δ_B wedges: the split of the channel margin into its retail and wholesale parts is what the three-step procedure delivers, and a near-zero wholesale wedge implies that the vertical term is small in her setting.

Taken together, all three papers indicate that intrabrand competition between retailers may be a key determinant of market outcomes, at least in settings where shopping habits are spatially local. This is precisely why a geographic restraint that suppresses intrabrand competition can have an important impact on market outcomes. The papers also supply the basic building blocks needed for empirical models of market equilibrium to measure intrabrand versus interbrand effects of policies: the intra- and interbrand elements of the price diversion matrix, and the margins that weight them. Xia (2025) puts these building blocks together: exploiting a Chinese antitrust decision that terminated a manufacturer's fixed-price RPM in retail pharmacies, he estimates demand and Nash-in-Nash bargaining and decomposes the restraint's effect into the elimination of double marginalization (the vertical term of (6)) and the coordination of prices across the brand's retailers (its intrabrand term). The restraint raised consumer surplus on net, but the gain would have been 77 percent larger absent the coordination motive, and a 40 percent larger intrabrand price-diversion ratio would have reversed the sign. This is important because the magnitude of the intrabrand element, not the form of the contract, ultimately determines the welfare effect. All of these papers connect to the pricing dimension of the framework in Section 2, but none of them observe retailer effort or attempt to model it. We turn to this next.

3.3 The service and free-riding channel

The majority opinion in *Sylvania* invokes the idea that protecting a retailer or dealer's investment from intrabrand competition restores its incentive to exert effort à la the procompetitive pre-sale service channel of Telser and Mathewson–Winter. This relates to the effort wedge (4), in which the objects to measure are the own-effort response q'^{a}_{jr}, the vertical term, and effort diversion D^{a}. Several papers estimate equilibrium models that quantify this service provision directly.

Murry (2017). Murry (2017) quantifies dealers' service externalities in the U.S. new-car market, where state franchise laws require manufacturers to sell through independent dealers at linear wholesale prices. These same laws also bar nonlinear contracts such as two-part tariffs, quantity forcing, and resale price maintenance that could in principle address vertical externalities.

Using data on new car sales in Virginia, Murry (2017) observes wholesale prices, retail transactions, dealer and manufacturer advertising, and the geographic locations of both dealers and consumers. The demand side is a discrete-choice model in which consumers incur a disutility of travel (generating spatial demand and intrabrand competition among dealers) and in which both dealer-specific and manufacturer (brand) advertising shift utility. Advertising is endogenous, an optimal choice of both dealers and manufacturers, and its causal effect on demand is identified using instruments built from local dealer geography and the competitiveness of local advertising markets. The supply side is a two-stage full-information game: manufacturers set wholesale prices and brand advertising in the first stage, anticipating that dealers will set retail prices and dealer advertising in the second. The model recovers marginal costs at both levels as well as the parameters of an advertising-cost function, in the vertical-inference tradition of Villas-Boas (2007).

Two features of the estimates relate to *Sylvania*. First, accounting for advertising matters quantitatively: the estimated average manufacturer markup is \$2,151 per car, which is less than half the \$5,420 implied by an otherwise-comparable model without advertising. The reason for this is that low wholesale prices are rationalized by the model as the manufacturer's tool for encouraging dealer effort. Second, the counterfactual replaces the mandated linear contract with a two-part tariff (a wholesale price at marginal cost plus a fixed fee), the instrument that theory says should resolve the vertical externality. When all dealers adopt it, retail prices fall by roughly ten percent and dealer advertising rises by about eight percent, implying a lower-bound consumer-surplus gain on the order of \$75 million in this single market. Tellingly, total producer surplus falls by about twenty percent: with competition at both levels, undoing double marginalization sharpens rather than softens brand rivalry à la the logic of Lin (1988) and Rey and Stiglitz (1995). Murry (2017) measures the procompetitive

channel's magnitude: the service externality is large, and mitigating it is good for consumers (although it is debatable whether advertising should be directly interpreted as surplus).

A reduced-form companion paper, Murry (2018), addresses the idea of territories. It confirms that thinner dealer networks are associated with higher advertising effort. It instruments for the number of same-brand dealers with historical population growth (variation that is plausibly exogenous because state dealer-termination laws froze incumbent U.S. brands' networks at their historical levels). A one-percent increase in same-brand competitors lowers a dealer's advertising by roughly 0.8 percent. Stronger intrabrand competition implies lower levels of relationship-specific investment, which is exactly the free-riding behavior that the location clause in *Sylvania* was meant to address.

Conlon and Mortimer (2021). Conlon and Mortimer (2021) provide the literature's cleanest separation of the efficiency and foreclosure channels for a single restraint when service is present because they can measure both in the industry they study. The setting is a vending operator's snack food machines, and the restraint is an all-units discount (a vertical rebate) offered by Mars: once the retailer's quarterly Mars purchases exceed a sales threshold, Mars pays the operator a per-unit discount retroactively on all units. The authors combine a mixed-logit demand model with a dynamic model of the retailer's restocking effort à la Rust (1987), and, crucially, a field experiment in which drivers exogenously remove top-selling Mars products from sixty-six machines, generating variation in choice sets that identifies substitution and allows the authors to measure who bears the cost of a stock-out. The experiment supplies what almost no other setting does: exogenous effort variation (a stock-out is negative effort), which identifies effort-diversion D^a directly and the incidence of the terms in (4).

The retailer makes two distinct choices: how often to restock (effort) and which products to carry (assortment). On effort, the experiment shows that, absent the rebate, Mars bears most of the cost of foregone sales when its products stock out (on the order of ninety percent when its two best sellers are removed together), giving the retailer an incentive to underinvest in restocking. The rebate lowers the effective wholesale price and shifts more of the cost of stock-out events onto the retailer, whose share of the cost of stocking out of Mars' products rises from about ten percent to roughly half. This reduces the retailer's moral hazard problem and increases its restocking frequency, which represents an efficiency gain via improved availability for all products in the machine, not only Mars'. However, the rebate also induces the retailer to drop a rival Hershey product (Reese's), thus foreclosing Hershey's flagship product, which is more popular than the Mars item that displaces it. This assortment response is a partial move toward exclusive dealing that operates directly on $\mathcal{B}_r$. Indeed, the authors find that the benefit to Mars of avoiding the cost of stock-out

events cannot on its own justify the observed generosity of the rebate; it is only rational for Mars to offer the rebate if it forecloses Hershey's Reese's product. The net welfare effect, however, is sign-indeterminate and depends on the contract's parameters: at a low effort level the foreclosure of Hershey's Reese's product dominates and consumer surplus falls slightly, whereas a contract requiring a higher level of effort can lead to an outcome in which the efficiency gain dominates and consumer surplus increases. The single observed rebate simultaneously addresses an effort externality and forecloses a rival, but determining which effect dominates is a quantitative question about the contractual terms, rather than a matter that per-se reasoning or a Chicago-style presumption of efficiency can settle.

3.4 Exclusive territories and the softening of competition

Several papers evaluate exclusive territories through the lens of Rey and Stiglitz's theory that this restraint can induce anticompetitive behavior at both upstream and downstream levels. The softening motive lives in the equilibrium aspect of Δ_B: it is a comparative static of the manufacturers' pricing game, and testing it requires re-solving the equilibrium rather than measuring static elements of the diversion matrix.

Brenkers and Verboven (2006). Brenkers and Verboven (2006) is an empirical test of the Rey–Stiglitz mechanism and evaluates how the theory fares empirically. Using data from five European countries, the paper studies the European Union's selective-and-exclusive dealer system for new cars (in place from 1985 to 2002), which allowed manufacturers to combine selective dealer criteria with territorial exclusivity. The authors ask: if selective distribution or exclusive territories were forbidden, what would happen to prices, profits, and welfare, via two channels: international intrabrand competition — the system blocked cross-border arbitrage, enabling international price discrimination across the five countries studied; and national intrabrand competition — territorial exclusivity may also have given each domestic dealer local monopoly power, generating double marginalization and softening competition among manufacturers.

There is no clean evidence on the nature of the second channel (national intrabrand competition), so Brenkers and Verboven (2006) consider two extremes: in scenario 1, dealers within a country are fully competitive with no double marginalization, and in scenario 2, dealers sell only within an exclusive territory (so the Rey–Stiglitz mechanism applies). The authors find that under scenario 2 (with limited national intrabrand competition), eliminating exclusive territories makes manufacturers worse off. They attribute this to the estimated degree of interbrand substitutability not being strong enough for the mechanism to bite.[20]

[20]Recall from Section 2 that Rey–Stiglitz requires reasonably close substitutes and strategic complementarity for the softening effect to dominate double marginalization.

Symmetrically, scenario 1, with international price-discrimination alone, also turns out not to be a significant profit driver for manufacturers: the effects on manufacturer surplus are small and not statistically distinguishable from zero. As neither channel appears to have provided a first-order profit motive, the authors argue that the previous distribution system must have persisted for reasons outside of the Rey and Stiglitz (1995) model. In the framework of Section 2, those reasons would correspond to the effort wedge that is not measured by their model.

Le (2026). Le (2026) studies an early-twentieth-century exclusive territory, the Associated Press's "protest rights," under which an incumbent member newspaper could veto a competitor's admission in its market. The Supreme Court struck down this arrangement in 1945 for being "plainly designed in the interest of preventing competition." Estimating a dynamic model of newspaper entry and wire-service membership with network effects, the paper finds the restraint had both pro- and anticompetitive channels in exactly the *Sylvania* sense: territorial exclusivity reduced downstream newspaper competition and consumer welfare, yet by diverting excluded papers to the entrant United Press, it sustained a second national wire service.[21] In a counterfactual exercise, the author predicts that removing exclusivity would cause UP to collapse. It is a historical example illustrating that a non-price territorial restraint can foreclose at one margin while preserving interbrand competition at another. Crucial to the analysis is the presence of economies of scale in the costs of producing news, and network effects in the demand for news, neither of which are addressed in the theoretical literature. These two features of the market drive the author's measurement of the pro- and anticompetitive effects of the exclusive territory policy. They are also exactly the conditions under which the sales volume lost by a rival may serve to raise its costs or threaten its survival.[22] Both features are captured by the fact that Δ_B may include changes to the equilibrium play between manufacturers. For example, in the absence of network effects, the AP's rival entrant would not survive and the effect of the policy would be reversed.

3.5 Exclusive dealing: efficiency versus foreclosure

Exclusive dealing is a vertical restraint that is similarly judged under a rule of reason, and empirical work on it comprises the largest of the literatures we review. In the framework of Section 2, exclusive dealing is the extensive margin of assortment: exclusivity sets $\mathcal{B}_r = \{j\}$ and zeroes out the intra-retailer term. This pits two forces against each other. The Regime-A force raises effort and lowers price. The Regime-B force captures the effect of the lost sales of the excluded rival (Section 2.3). Once again, the empirical question is which force

[21] More than half of UP's early circulation came from AP-excluded papers.

[22] See Appendix B.

dominates.[23]

Asker (2016). Asker (2016) studies a market in which exclusivity in territories has a natural link to exclusivity in dealing. The setting is beer distribution in the greater Chicago area, where Illinois law requires each brewer to assign its distributors exclusive territories. Unlike the legislated exclusive territories, producers' exclusive dealing practices varied. Anheuser-Busch's distributors carried its brands exclusively throughout the market; Miller's distributors varied: half were exclusive, and the rest carried rival brewers alongside Miller; every other brewer used shared distributors. The paper tests whether Miller's exclusive dealing foreclosed rivals. Using 1994 scanner data on beer sales at grocery stores, the author estimates a random-coefficients demand system together with a model of supply in which the mode of conduct is observed rather than inferred. To test for foreclosure, he asks whether non-exclusive brewers face higher distribution costs (or receive worse service from their distributors) in markets for which a rival has locked up a distributor via an exclusive dealing arrangement. He uses Anheuser-Busch as a control for market-specific effects. If foreclosure is present, non-exclusive brewers should face higher distribution costs. In contrast, if exclusive dealing results in efficiency gains alone, the distribution costs of non-exclusive rivals should not change. Asker finds no evidence of foreclosure: rivals' distribution costs are no higher in territories where Miller is exclusive, and distributors in these territories provide more point-of-sale service (worth about 3.5 cents on a bottle of beer). The service finding is the Regime-A comparative static of Section 2.3 showing up in the data: an exclusive distributor has no rival-brand sales to protect, so its brand-j effort rises. The reading for *Sylvania* is direct: in this market, a per-se standard that prohibited exclusive dealing would most likely have reduced welfare.

Nurski and Verboven (2016). Nurski and Verboven (2016) analyze exclusive dealing in the Belgian new-car market, in which 95 percent of dealers carry a single brand. The authors' main conclusion is that exclusive dealing can have anticompetitive effects. The authors estimate a spatial random-coefficients demand model in which a brand's appeal depends on how close its nearest dealer is, and they treat entry as a change in the matrix of consumer-to-dealer distances. Turning off exclusive dealing (letting entrants sell through incumbents' dealer networks) raises entrants' combined market share by about 5.3 percentage points and consumer surplus by roughly 867 euros per household (some 3.8 billion euros in total). Two features drive this outcome. First, about ninety percent of the consumer gain comes from improved spatial availability (a service-access channel) rather than from

[23] An earlier case, *Tampa Electric v. Nashville Coal* (1961), established the legality of an exclusive requirements contract, in which Tampa Electric agreed to purchase all of the coal required to operate their coal-powered generators from Nashville Coal. The decision in this case, however, focused on market definition rather than the restrictions of the vertical contract. In this sense, *Sylvania*'s legacy has been more important to the way research has analyzed the impacts of non-price vertical restraints.

lower prices, so exclusive dealing harms consumers by keeping rival brands physically distant. Second, if firms are allowed to internalize pricing decisions across brands, a collective shift to multi-branding raises the profits of all firms, although a single firm joining a network does not gain. Thus, exclusive dealing emerges as a weak barrier to entry that has large consequences for consumer welfare.

Other exclusivity-based evidence. Lee (2013) studies dynamic exclusivity in the market for sixth-generation videogame consoles – a two-sided market with network effects. In contrast to the auto dealers of Nurski and Verboven (2016), Lee (2013) finds that exclusivity helped smaller entrants, who had innovated a few high-quality exclusive titles that differentiated their platform from a larger dominant incumbent. Banning exclusive dealing would instead have benefited the dominant incumbent (PlayStation 2) by allowing it to leverage its larger installed base to undermine the entrants' investment in new games. This connects to *Sylvania*'s presumption that the manufacturer imposing the restraint is not dominant; indeed, exclusivity in this market was procompetitive in large part because the firms using exclusivity were entrants rather than an incumbent.[24]

Two recent working papers extend the evidence to spatial and digital settings. Schneier (2026) studies exclusivity covenants in shopping-center leases. These covenants function as exclusive territories because they establish protected catchment areas by restricting rival stores' locations. The author finds that banning these covenants would reduce entry by large grocers and widen food deserts by about 6.6 percentage points. The results imply sharp distributional effects: a ban helps consumers in dense, high-income neighborhoods but harms those in low-income areas that lose access to grocery stores. Yuan (2025) estimates a Nash-in-Nash bargaining model (with threat of replacement) of content exclusivity among video-streaming services and finds that in the short run it is anticompetitive, with consumer surplus falling about $24 per household-year, regressively as a share of surplus.[25] However, in the long run, it is potentially procompetitive because it funds the entry and content investment of smaller streaming services and studios.

Full-line forcing and slotting fees. Two additional vertical restraints analyzed in the literature have the potential to generate a degree of exclusivity between producers and distributors: full-line forcing, and slotting fees. In a pair of papers, Ho et al. (2012a) and Ho et al. (2012b) analyze full-line forcing in the video-rental industry, which is offered

[24]There is a large literature on exclusivity in hospital networks, where insurers contract with a subset of hospitals rather than with all of them (Ho, 2009; Ho and Lee, 2019). However, exclusion in these markets can arise for a different reason than what we analyze: an insurer may exclude a hospital because of the cost of the patients it attracts, rather than to protect market power. In other words, adversely selected patients change the cost of production as well as the market-power effects we document.

[25]See Ho and Lee (2019) for details of the threat-of-replacement bargaining protocol, which is an equilibrium model of exclusion.

by some, but not all, movie studios. Under a full-line forcing contract, retailers receive preferential revenue-sharing terms in exchange for carrying a studio's full line of titles. The underlying revenue-sharing terms lower the retailer's cost of carrying inventory and align incentives with the studio, leading to improved availability and variety for consumers. By requiring the retailer to take the distributor's full line, those gains are extended to more titles, which can be especially valuable in a market where new titles are released every week. The offsetting anticompetitive concern is that the full-line requirement may crowd out rival distributors' titles. This is an intra-retailer effect, operating on the margin of product assortment. Estimating demand and bounding the value of inventory with a moment-inequalities approach, the authors find evidence that, similarly to *Sylvania*, the restraint was offered by smaller upstream studios, and not offered by dominant ones. They find evidence favoring efficiency gains over foreclosure, and conclude that full-line forcing in this setting is "unlikely to have large anti-competitive effects."

Hristakeva (2022) studies vendor-allowance (slotting) contracts between yogurt producers and grocery stores, for which scarce shelf space is the exclusive resource, or in other words, a "territory within a store." Slotting fees operate via intra-retailer diversion by changing the set of products $\mathcal{B}_r$ retailer r chooses to retain. There are offsetting effects: slotting fees can expand the assortment of the brands that pay them and can keep retail prices low, but a retailer may exclude superior or low-cost products that the three-party surplus would choose to retain, in order to increase their slotting fee revenue. In this market, established incumbents' niche products displace those of fringe producers. Recovering the unobserved allowances from observed assortments via retailers' replacement threats, Hristakeva (2022) finds that restricting contracts to linear wholesale prices would, perhaps surprisingly, raise wholesale prices on continuing products (by about five percent) while leaving consumer surplus essentially unchanged, and illustrating another instance in which the welfare sign of a vertical restraint is subtle and fact-dependent.

Vertical integration as the polar case. At the limit, exclusivity becomes ownership. We do not review the vertical-integration/foreclosure literature in depth because it lies outside the non-price-restraint focus of *Sylvania*, but we note Crawford et al. (2018) as the closest of that literature to our concerns because the regional restrictions it studies resemble territorial assignment.

Read against the three premises, the exclusivity evidence sorts less neatly than it first appears. Where the manufacturers imposing exclusivity are small, the evidence favors an efficiency effect on balance. Miller's partial exclusivity in Asker (2016), the minor studios' full-line forcing in Ho et al. (2012b), and the entrant consoles of Lee (2013) all fit that pattern. The last is the sharpest case, because exclusivity sustained entrants precisely because the dominant

platform did not use it. Here the Court's first premise does real work. The harder cases are those where the premise holds and harm follows anyway. In Nurski and Verboven (2016) no manufacturer is dominant, and no single manufacturer gains by opening its network, yet the barrier to entry is sustained collectively and consumers lose about 867 euros per household. A safe harbor keyed to the market share of the manufacturer imposing the restraint would not have caught it. Yuan (2025) distinguishes effects by horizon rather than by dominance, with short-run harm to consumers and long-run gains that fund smaller entrants. In contrast, Schneier (2026) finds that banning covenants reduces grocer entry and widens food deserts. What no paper in this cluster measures is the effort side of the framework. The Regime-A force of exclusive dealing appears in the data only as Asker's point-of-sale service finding, and the effort-diversion that would determine how much weight to give it remains unmeasured.

4 Conclusion

There is a growing body of empirical work using equilibrium models to assess vertical restraints relating to the *Sylvania* decision across many industries. The existing theory, which we review and organize, suggests that there are competing mechanisms at play within any single restraint. We discuss several successful attempts by empirical researchers to include these mechanisms in empirical models. The procompetitive service and free-riding channel has been credibly measured: it is an important force in new-car retailing (Murry, 2017, 2018), the efficiency half of the vending rebate (Conlon and Mortimer, 2021), and the most likely explanation of exclusive dealing in beer (Asker, 2016), and of full-line forcing in movies (Ho et al., 2012b). The anticompetitive channels are real but more contingent: clean foreclosure shows up where it operates through spatial availability and collective incentives (Nurski and Verboven, 2016), through contract design (Conlon and Mortimer, 2021), or in the short run before entry responds (Yuan, 2025; Le, 2026); and the Rey–Stiglitz competition-softening motive, where it has been tested directly, is empirically weak (Brenkers and Verboven, 2006), although there is less evidence on this.

The empirical literature has largely not pursued the claim in *Sylvania* that softening intrabrand competition would, on net, strengthen interbrand competition. Instead, economists have used empirical models to decompose each restraint into an efficiency effect and a foreclosure or anticompetitive effect. Most of the procompetitive findings above establish that a restraint generated real efficiencies (more service, lower costs, greater variety), not that rival brands came to compete more vigorously: the exclusive distributors in Asker (2016) provide more service and the retailers in Ho et al. (2012b) using full-line forcing increase their variety, but neither paper shows that interbrand rivalry intensified as a result. The

clearest exception is Lee (2013), where exclusivity sustained an entrant that would otherwise have failed, the one setting in which a restraint demonstrably created interbrand competition, with the closest empirical justification of the Court's hypothesized mechanism. In contrast to the premise of the majority opinion in *Sylvania*, a restraint may simultaneously soften both intra- and interbrand competition (as in Rey and Stiglitz (1995)), although demonstrated instances of this are scarce. Brenkers and Verboven (2006) searched for the effect and found it negligible. A different kind of exclusion appears on the assortment margin. In Hristakeva (2022) the products left out are the strong ones rather than weak entrants, which is not the foreclosure the Court had in mind.

There are limits to what this evidence settles. Intrabrand competition can be locally strong (Thomadsen, 2005; Davis, 2006), so a territorial restraint may suppress an important dimension of competition. Whether interbrand rivalry makes up for the loss has not been measured directly. Two gaps in the literature follow. First, and most important for future work, few papers estimate both the procompetitive and the anticompetitive channel for the same restraint in the same market and net them against each other. Conlon and Mortimer (2021), Ho et al. (2012b), and Le (2026) are the exceptions. The remaining literature tends to identify one channel cleanly and argue that the other is absent. Second, and noted already in the previous section, cooperative advertising and shared service provision (ubiquitous in franchised distribution) are absent from essentially all of these models. Additionally, the settings differ in a way that bears on interpretation: in some, the restraint is itself the instrument that softens intrabrand competition (e.g., shopping-center covenants, European car territories); in others, the nature of intrabrand competition is fixed elsewhere (e.g., by procurement auctions for vending routes, or by legislation), so that the contract studied is not the source of an intrabrand restraint at all.

The role of empirical equilibrium research is to capture existing institutions credibly, measure the mechanisms at work, and predict what would happen under a different policy. The tools and examples we review put the profession in a confident position to inform rule-of-reason inquiries into the general class of non-price vertical restraints. What remains to be done is to compile more evidence for the specific type of restraint at issue in *Sylvania*.

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A Technical Appendix

A.1 Derivation of the wedges

We derive equations (4)–(7) from the following objects.

- *Products.* Brand–retailer pairs (j, r) with demand $q_{jr}(\mathbf{p}, \mathbf{a})$. Retailer r carries the set of brands $\mathcal{B}_r$. $\mathbf{p}$ is a vector of prices for all retailer-brand pairs, and $\mathbf{a}$ is a vector of retailer effort for each retailer-brand pair.
- *Retailer profit.* $\pi_r = \sum_{k \in \mathcal{B}_r} (p_{kr} - w_{kr}) q_{kr} - \sum_k \Phi_{kr}(a_{kr})$.
- *Brand-j channel profit.* Manufacturer j integrated with its retailers' brand-j margins, bearing their brand-j effort costs: $\Pi_j = \sum_s \left[(p_{js} - c_j) q_{js} - \Phi_{js}(a_{js}) \right]$.
- *Producer surplus.* $\text{PS} = \sum_{\text{all}(ks)} \left[(p_{ks} - c_k) q_{ks} - \Phi_{ks}(a_{ks}) \right]$.
- *Total welfare.* $W = \text{PS} + \text{CS}$.
- *Marginal values.* For a retailer action $x_{jr} \in \{p_{jr}, a_{jr}\}$, define $V^{\text{ret}} \equiv \partial \pi_r / \partial x_{jr}$, $V^{\text{ch}} \equiv \partial \Pi_j / \partial x_{jr}$, and $V^{\text{soc}} \equiv \partial W / \partial x_{jr}$, all evaluated at the observed allocation.
- *Wedges.* $\Delta_A = V^{\text{ch}} - V^{\text{ret}}$ and $\Delta_B = V^{\text{soc}} - V^{\text{ch}}$.

Effort. Using $\partial q_{ks} / \partial a_{jr} = q'^a_{jr} D^a_{jr \to ks}$ with $q'^a_{jr} \equiv \partial q_{jr} / \partial a_{jr} > 0$;

$$
\begin{aligned}
V^{\text{ret}} &= (p_{jr} - w_{jr}) q'^a_{jr} - \Phi'_{jr} + q'^a_{jr} \sum_{k \in \mathcal{B}_r, k \neq j} (p_{kr} - w_{kr}) D^a_{jr \to kr}, \\
V^{\text{ch}} &= (p_{jr} - c_j) q'^a_{jr} - \Phi'_{jr} + q'^a_{jr} \sum_{s \neq r} (p_{js} - c_j) D^a_{jr \to js}, \\
V^{\text{soc}} &= V^{\text{ch}} + q'^a_{jr} \sum_{s, k \neq j} (p_{ks} - c_k) D^a_{jr \to ks} + \partial \text{CS} / \partial a_{jr}.
\end{aligned}
$$

Differencing as in (3) yields the Δ^a_A and Δ^a_B terms in (4)–(5). Setting $\mathcal{B}_r = \{j\}$ recovers the case of single-brand retailers.

Price. With $q'^p_{jr} \equiv \partial q_{jr}/\partial p_{jr} < 0$ and $\partial q_{ks}/\partial p_{jr} = D^p_{jr\to ks}|q'^p_{jr}|$,

$$
\begin{aligned}
V^{\text{ret}} &= q_{jr} + (p_{jr} - w_{jr})q'^p_{jr} + \sum_{k\in\mathcal{B}_r, k\neq j} (p_{kr} - w_{kr})\tfrac{\partial q_{kr}}{\partial p_{jr}}, \\
V^{\text{ch}} &= q_{jr} + (p_{jr} - c_j)q'^p_{jr} + \sum_{s\neq r} (p_{js} - c_j)\tfrac{\partial q_{js}}{\partial p_{jr}}, \\
V^{\text{soc}} &= \sum_{\text{all}(ks)} (p_{ks} - c_k)\tfrac{\partial q_{ks}}{\partial p_{jr}},
\end{aligned}
$$

with q_{jr} dropping from V^{soc} because $\partial \text{CS}/\partial p_{jr} = -q_{jr}$. Differencing as in (3) yields the Δ^p_A and Δ^p_B terms in (6)–(7). Solving $V^{\text{ret}} = 0$ gives the multi-brand retailer's first-order condition for price:

$$
p_{jr} - w_{jr} \;=\; \frac{q_{jr}}{|q'^p_{jr}|} \;+\; \underbrace{\sum_{k\in\mathcal{B}_r,\, k\neq j} (p_{kr} - w_{kr})\, D^p_{jr\to kr}}_{\text{intra-retailer recapture}}. \tag{8}
$$

Defining the effective wholesale cost $\widetilde{w}_{jr} \equiv w_{jr} + \sum_{k\in\mathcal{B}_r, k\neq j}(p_{kr} - w_{kr})D^p_{jr\to kr}$, the multi-brand retailer prices exactly as a single-brand retailer facing $\widetilde{w}_{jr}$: cutting p_{jr} cannibalizes sibling-brand sales at rate $D^p_{jr\to kr}$, forgoing the margin $(p_{kr} - w_{kr})$ on each, so recaptured diversion acts as an opportunity cost—a higher effective wholesale price.

There are two issues to point out about the derivation. First, market power in (7) comes through $q_{jr}/|q'^p_{jr}|$, which is the price increase that would exhaust current sales at the local demand slope. By (8) it equals the margin based on the effective wholesale cost, $q_{jr}/|q'^p_{jr}| = p_{jr} - \widetilde{w}_{jr}$, and coincides with the retail margin only when $|\mathcal{B}_r| = 1$. Second, (8) presumes the retailer chooses p_{jr} at an interior optimum, so it fails under any binding form of RPM.

We make two additional comments. First, the rival-brand product (k, r) on retailer r's shelf enters Δ_A at the retail margin, $-(p_{kr} - w_{kr})$, and Δ_B at the channel margin, $+(p_{kr} - c_k)$. The two sum to $(w_{kr} - c_k)$, which is the rival manufacturer's wholesale margin, so the term is counted only once in V^{soc}: what society loses on a diverted unit beyond what the retailer already internalizes is exactly what the rival manufacturer earns on it. Second, if effort costs are incurred on a per-unit basis (rather than as fixed costs), the effort provision level and its scale-dependence change, but the set of elements in the diversion matrix that enter Δ_A and Δ_B does not.

A.2 The consumer term and the own response

The own responses enter the two wedges asymmetrically. Factoring q'^{p}_{jr} out of (6), or q'^{a}_{jr} out of (4), leaves an expression in margins and diversion ratios alone: Δ_A is a pure composition object, and its sign does not depend on the elasticity of demand. Δ_B is not, in either case: it retains $q_{jr}/|q'^{p}_{jr}|$ for price and $(\partial \mathrm{CS}/\partial a_{jr})/q'^{a}_{jr}$ for effort.

Proposition 1. *Suppose (i) demand is generated by an additive random utility model (ARUM), so that the expected-maximum function $G(\mathbf{v})$ over deterministic utility indices $\mathbf{v}$ satisfies $\partial G/\partial v_{jr} = s_{jr}$; (ii) preferences are quasilinear with constant marginal utility of income α, so v_{jr} is decreasing in p_{jr} at rate α; and (iii) effort a_{jr} affects demand only through the index v_{jr}. Then*

$$\frac{q_{jr}}{|q'^{p}_{jr}|} \;=\; \frac{\partial \mathrm{CS}/\partial a_{jr}}{q'^{a}_{jr}}.$$

Proof. Write $\theta_{jr} \equiv \partial v_{jr}/\partial a_{jr}$, and note that $\partial v_{jr}/\partial p_{jr} = -\alpha$ by (ii). With M consumers, $\mathrm{CS} = (M/\alpha)G(\mathbf{v})$ and $q_{jr} = M s_{jr}$, so by (i) and the chain rule

$$\frac{\partial \mathrm{CS}}{\partial a_{jr}} = \frac{M}{\alpha} s_{jr}\theta_{jr}, \qquad q'^{a}_{jr} = M\frac{\partial s_{jr}}{\partial v_{jr}}\theta_{jr}, \qquad q'^{p}_{jr} = -\alpha M \frac{\partial s_{jr}}{\partial v_{jr}}.$$

Both ratios equal $s_{jr}\big/(\alpha\, \partial s_{jr}/\partial v_{jr})$. □

The effort channel θ_{jr} divides out, which is why no assumption on substitution patterns is required: Proposition 1 holds for nested logit, random-coefficient logit, or any other ARUM. Under IIA logit, the common object specializes to $1/(\alpha(1 - s_{jr}))$, but that closed form is an artifact of logit and does not hold more generally.

The restriction that matters is assumption (iii). With effort entering only v_{jr}, the cross responses $\partial q_{ks}/\partial a_{jr} = \theta_{jr} M\, \partial s_{ks}/\partial v_{jr}$ and $\partial q_{ks}/\partial p_{jr} = -\alpha M\, \partial s_{ks}/\partial v_{jr}$ are proportional across all (k, s), with opposite sign, so the two diversion matrices are equal and opposite element-by-element: $D^{a}_{jr\to ks} = -D^{p}_{jr\to ks} \le 0$. Own-index effort cannot generate positive intrabrand diversion (i.e., free-riding on effort). Proposition 1 therefore applies only to effort that solely affects the focal or own-index product's demand. When effort enters rival products' indices (i.e., when effort spillovers exist), both the equality $D^a = -D^p$ and the identity of Proposition 1 fail. We have verified numerically that the two sides of that identity diverge under intrabrand spillovers. A measured departure of D^a from $-D^p$ is itself direct evidence of an effort spillover.

Combining Proposition 1 with the retailer's pricing first-order condition (8) gives:

$$\frac{\partial \mathrm{CS}/\partial a_{jr}}{q'^{a}_{jr}} = p_{jr} - \widetilde{w}_{jr} = (p_{jr} - w_{jr}) - \sum_{k \in \mathcal{B}_r, k \neq j} (p_{kr} - w_{kr}) D^{p}_{jr \to kr}.$$

The marginal value that consumers place on retailer effort is recovered from the pricing margins and diversion alone. Effort variation plays two roles. First, it allows us to compare the measured D^a against $-D^p$ to assess whether the own-index restriction (i.e., no effort spillover) holds. Second, it allows for estimation from the effort responses directly, which is necessary because the price-side inversion no longer recovers the consumer term. We note that under any binding form of RPM the retailer's own pricing optimum is not observed and q'^{p}_{jr} must be estimated directly.

B Restraints as operators on the first-order condition

Each potential vertical restraint acts on the retailer's first-order condition in one of four ways: by changing a margin that weights a term, by zeroing out an element of the diversion matrix, by removing a choice variable from the retailer, or by changing the retailer's assortment, and hence the set of elements in the diversion matrix. The appropriate restraint thus depends on which term of Δ_A is active. A two-part tariff sets $w_{jr} = c_j$ and zeroes out the vertical term; the retailer, now a residual claimant on its own sales, still ignores diversion to other retailers, so the intrabrand term remains. Exclusive territories make r a local monopolist, and thus set the intrabrand price-diversion $D^{p}_{jr \to js} = 0$. They result in intrabrand effort diversion $D^{a}_{jr \to js}$ of zero only when effort stays within the territory, which is why closed territories address the pecuniary externality but do not address advertising that spills across geographic areas (Mathewson and Winter, 1984). RPM in its strictest form removes the retailer's price as a choice and lets the manufacturer set it, which closes the price wedge when the manufacturer prices to the channel optimum. If the manufacturer prices to a softened or opportunism-restoring optimum, this will appear in Δ^{p}_{B} (and the RPM contract will be in Regime B). Quantity forcing allows the manufacturer to set output, which closes the vertical externality. It will achieve the channel optimum on its own only when the vertical wedge does not distort the retailer's price-versus-effort tradeoff. Exclusive dealing sets $\mathcal{B}_r = \{j\}$, resulting in intra-retailer diversion $D^{p}_{jr \to kr} = D^{a}_{jr \to kr} = 0$ for $k \neq j$. This is the "within-retailer assortment" counterpart of what an exclusive territory does to intrabrand diversion. Exclusive dealing is the one restraint that acts on the extensive margin, by changing the set of elements included in the diversion matrix. It therefore admits the possibility that a rival manufacturer may be foreclosed in equilibrium. When foreclosure occurs, the excluded rival

loses the volume it would have sold through retailer r. If fixed costs, economies of scale, or network effects make small volumes costly to produce, the loss of retailer r may raise the rival's costs or threaten its survival. The static wedges do not account for this.

Table 2: A diversion-based classification of the theory of vertical restraints

Mechanism	Wedge term	Papers	Restraint
Regime A: externality correction			
Double marginalization	vertical	Spengler (1950)	two-part tariff
Service free-riding	intrabrand ($D^a > 0$)	Telser (1960)	Minimum RPM
Spatial equilibrium	intrabrand, vertical	Mathewson and Winter (1984)	ET, minimum RPM, FF, QF
Intra-retailer substitution	intra-retailer ($D^p_{jr \to kr}$)	Section 2.3 (this paper)	ED
Minimum RPM as efficiency	intrabrand, vertical	Klein and Murphy (1988); Marvel and McCafferty (1984); Deneckere et al. (1997)	Minimum RPM
Regime B: market power			
Interbrand softening	rival-brand (equilibrium)	Rey and Stiglitz (1995); Lin (1988); Bonanno and Vickers (1988)	ET
Opportunism	intrabrand (commitment)	Hart and Tirole (1990); O'Brien and Shaffer (1992); Rey and Vergé (2004)	Maximum RPM
Interlocking relationships	intra-retailer (equilibrium)	Rey and Vergé (2010)	Fixed RPM
Exclusion via rent transfer	rival-brand (entry)	Asker and Bar-Isaac (2014)	ET, minimum RPM
Exclusive dealing	intra-retailer $\to$ entry	Segal and Whinston (2000); Fumagalli and Motta (2006); Wright (2009)	ED

ET = exclusive territories; RPM = resale price maintenance; FF = franchise fee; QF = quantity forcing; ED = exclusive dealing.

Table 3: Recent empirical equilibrium models of non-price vertical restraints (listed in the order they are discussed in the text)

Paper	Setting	Restraint	Mechanism	Main finding
Thomadsen (2005)	Fast food	Co-ownership	Intrabrand	Removing intrabrand competition raises price up to 23%, more for the stronger brand.
Davis (2006)	Movie theaters	Location	Intrabrand	Same-chain outlets closer substitutes; competitive effects local ($\sim$20 mi).
Xia (2025)	Pharmacies (China)	Fixed-price RPM	Intrabrand	Raises consumer surplus on net; gain 77% larger absent price coordination; sign flips with higher intrabrand diversion.
Murry (2017)	New cars	Contract form	Effort wedge	Linear-price mandate; a 2PT would cut prices $\sim$10%, raise dealer effort.
Murry (2018)	New cars	Dealer network	Effort wedge	More intrabrand dealers $\rightarrow$ less dealer advertising.
Conlon & Mortimer (2021)	Vending	All-units discount	Both wedges	Cures effort externality and forecloses rival; net sign depends on threshold.
Brenkers & Verboven (2006)	EU cars	Excl. territory	Softening	Softening motive tested, found negligible; efficiencies unmeasured.
Le (2026)	News wires	Excl. territory	Foreclosure	Harms downstream competition; sustains the entrant upstream.
Asker (2016)	Beer	Excl. dealing	Foreclosure	Diagnostic test rejects foreclosure; more service.
Nurski & Verboven (2016)	EU cars	Excl. dealing	Foreclosure	Collective entry barrier; $\sim$867 euros/hh harm via availability.
Lee (2013)	Game consoles	Exclusivity	Foreclosure	Exclusivity aids small entrants, not the incumbent.
Schneier (2026)	Retail real estate	Lease covenant	Foreclosure	Ban lowers grocer entry, widens food deserts; distributional.
Yuan (2025)	Streaming	Excl. contracts	Foreclosure	Short-run harm; long-run entry/investment gains.
Ho, Ho & Mortimer (2012a,2012b)	Video rental	Full-line forcing	Both wedges	Evidence points to efficiency, not foreclosure.
Hristakeva (2022)	Grocery	Slotting	Intra-retailer	Allowances exclude superior products; can lower wholesale prices.

Mechanism denotes the Section 2 object each paper examines: an element of the diversion matrix (intrabrand, intra-retailer), the effort wedge (4), or the equilibrium layer of Δ_B (softening, foreclosure); "Both wedges" marks a paper that weighs an efficiency gain against foreclosure. The *Main finding* column reports the empirical result, which in several cases (e.g., Brenkers & Verboven, Lee) finds the examined channel weak or reversed.