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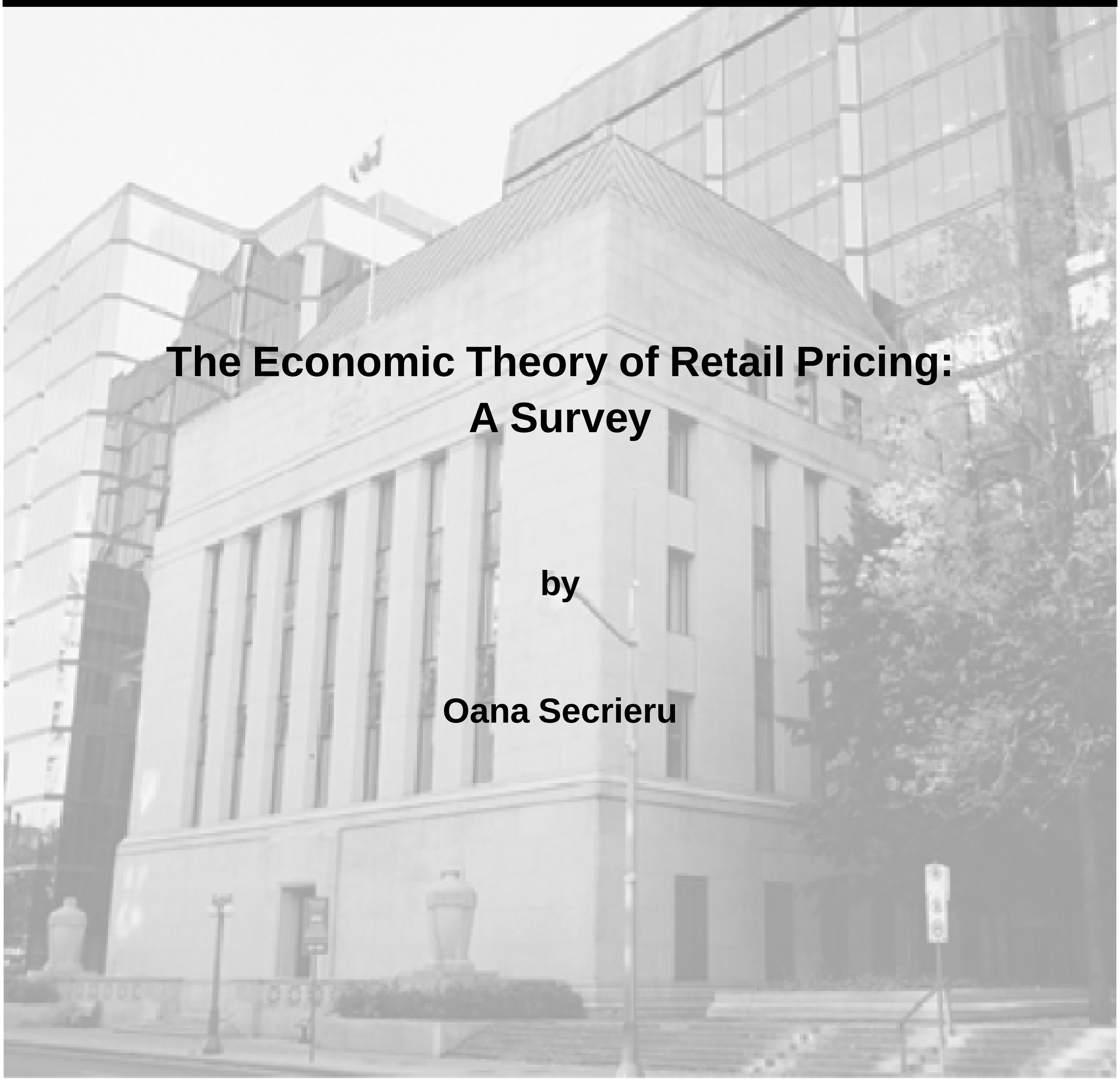

The Economic Theory of Retail Pricing: A Survey

by

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Abstract

The types of contracts that arise in a typical vertical manufacturer–retailer relationship are more sophisticated than usually assumed in standard macroeconomic models. In addition to setting per-unit prices, manufacturers and retailers revert to non-linear pricing and non-price instruments. These instruments or contracts are referred to as vertical restraints and can take the form of franchise fees, resale-price maintenance, exclusive dealing, exclusive territories, and slotting allowances. The use and the effects of one type of instrument versus another depend crucially on specific market assumptions upstream and downstream and on the division of bargaining power between manufacturers and retailers. The author surveys the industrial organization literature on retail pricing and shows that vertical restraint instruments have important effects on producer and consumer prices, market structure, efficiency, and welfare. Some potentially important macroeconomic implications of vertical restraints are suggested.

JEL classification: D40, L22, L42
Bank classification: Market structure and pricing

Résumé

La relation verticale entre fabricants et détaillants donne lieu à des types de contrats plus complexes que ceux qui sont généralement postulés dans les modèles macroéconomiques courants. Fabricants et détaillants ne font pas que fixer des prix unitaires, ils recourent aussi à une tarification non linéaire et à des modalités non tarifaires. Ces modalités contractuelles constituent ce qu'on appelle des contraintes verticales et peuvent inclure le paiement de redevances de franchisage, l'imposition de prix de revente plafond ou plancher, la signature d'accords de vente exclusive et d'exclusivité territoriale ou le versement de frais de référencement. Le choix d'un type de contrainte de préférence à un autre et ses répercussions dépendent avant tout des hypothèses formulées concernant la structure du marché, en amont comme en aval, et du rapport de forces entre fabricants et détaillants. L'auteure brosse un tableau de ce que la littérature relative à l'organisation industrielle nous apprend sur l'établissement des prix de détail. Elle montre que les contraintes verticales ont un effet notable sur les prix à la production et à la consommation, de même que sur la structure du marché, l'efficience et le bien-être. Elle relève aussi d'autres implications susceptibles de revêtir de l'importance sur le plan macroéconomique.

Classification JEL : D40, L22, L42
Classification de la Banque : Structure de marché et fixation des prix

1 Introduction

The industrial organization literature on retail pricing is extensive. It focuses on the price-setting behaviour in vertical structures that consist of upstream manufacturers who sell their products through downstream retailers. The types of contracts that arise in a vertical manufacturer–retailer relationship are more sophisticated than a simple uniform-price contract. In addition to setting per-unit prices, manufacturers and retailers revert to vertical restraints to maximize profits. Vertical restraints can be defined as price and non-price restrictions arising in a typical relationship between upstream manufacturers and downstream retailers. The most common vertical restraints, in practice, are briefly described below.

- A two-part tariff: The manufacturer charges a fixed fee and a per-unit price. The fixed fee is referred to as a franchise fee.
- Resale-price maintenance (RPM): The manufacturer imposes a price ceiling ($p \leq \overline{p}$) or a price floor ($p \geq \overline{p}$). Although RPM is now illegal in most countries, it is still allowed in some European markets for books, newspapers, and similar cultural products.[1]
- Quantity fixing: The retailer must sell a minimum amount of the product. This type of vertical control is common in beer distribution in licensed restaurants and pubs.
- Exclusive territories (ETs): The retailer is granted exclusivity (monopoly) within a geographical area or over a particular class of consumer or goods. Newspaper distribution is an example of the use of exclusive territories.
- Exclusive dealing (ED): The retailer must sell only the manufacturer's brand within a product market. This type of restraint is commonly used in the automobile industry. Coca-Cola and Pepsi also impose this type of restriction on their retailers. Although exclusive dealing was initially forbidden in the United States, it is currently judged according to a rule of reason.
- Slotting allowances: The manufacturer pays the retailer a fee for carrying new products or allocating shelf space to their products. The fees can be cash gifts or payments in

[1] See Beck (2003) and Backhaus and Hansen (2000) for more on RPM in the German book market. RPM was commonly used in the book market and the retail chemist and drugstore markets in the United Kingdom until 1995 and 2001, respectively, when it was abolished.

kind. Because the fees are negotiated in private, data on slotting allowances are almost impossible to obtain. Slotting allowances, however, are commonly used in the grocery industry and, according to a study by Deloitte & Touche (1990), they account for up to $9 billion in annual grocery expenditures and about 16 per cent of all costs associated with the introduction of a new product on the market.

Empirical work on the use and effects of vertical restraints on pricing is scarce. To the author's knowledge, the only empirical evidence that exists deals with the use of slotting allowances in the food and pharmaceuticals industries. Despite this lack of empirical analyses, other types of vertical restraints, such as exclusive dealing and exclusive territories, are commonly used in the automobile and transportation industries. Given the importance of these industries for the economy, more empirical work is needed to quantify the effects of exclusive dealing and territories on pricing and market structure.

For decades, vertical restraints have been the subject of vehement debate among antitrust economists and practitioners. The debate concerns the effects of vertical restraints on consumer and producer prices, welfare, and competition. The use and the effects of one type of restraint versus another depend crucially on specific market structure assumptions upstream and downstream, and on which has the bargaining power: the upstream or downstream firms.

To see how vertical restraints can arise in equilibrium, consider the simple vertical structure with one manufacturer and one retailer. Under simple uniform-price contracts, the manufacturer chooses the wholesale price paid by the retailer for the intermediate product and the retailer chooses the retail (consumer, final) price for the product sold to consumers. In this case, each firm prices above marginal cost, giving rise to "double marginalization." The equilibrium retail price is above the price that would maximize the profits of the vertically integrated structure (the profits of the manufacturer and retailer together). This is a typical vertical externality problem. When the retailer increases the retail price, a negative externality is imposed on the manufacturer, because the retailer ignores the reduction in the manufacturer's profits as a consequence of lower sales. Similarly, the manufacturer sets the wholesale price above marginal cost, ignoring the effect this will have on the retailer's profits. The double markup problem results in a retail price that is too high, and lower social welfare than with the vertically integrated structure. A manufacturer that has all the bargaining power has incentives to use vertical restraints such as franchise fees and RPM to capture the entire surplus (that is, the profits of the vertical structure). Vertical restraints are essentially a means of capturing the profits of the vertically integrated structure without actual integration. In this simple framework, by imposing a franchise fee or RPM to set a price ceiling, the manufacturer can capture the entire surplus of the vertical structure. The result is a lower consumer price and higher welfare than when only uniform pricing is allowed. Thus, vertical restraints can be welfare-improving, while they do not have any effect on competition.

In a more general set-up, with one manufacturer and n retailers, in addition to the vertical externality already discussed, a horizontal externality can be identified. It results from the fact that one retailer cannot capture the entire benefit of increasing the retail price. An increase in the retail price by one retailer has a positive externality on the rival retailers because consumers shift to the rivals. Since the retailer does not take this effect into account, the consumer price is typically too low from the viewpoint of the vertical structure. The vertical and the horizontal externalities work in opposite directions; the overall effect depends on which externality dominates. It is straightforward that, in this context, competition at the retail level gives rise to horizontal externalities. The manufacturer can eliminate the horizontal externality by reducing downstream competition. One way this can be achieved is by granting retailers exclusive territories; that is, granting each retailer a monopoly position over a geographical area or class of consumers. This is a situation where the use of vertical restraints has anti-competitive effects, and it can also be shown that the restraints reduce welfare.

In the last three decades, the retail industry has undergone important changes. The appearance of big-box retailers and increased concentration in the retail industry has shifted bargaining power downstream. The early literature on retail market power argues that bigger retailers are desirable because they can exercise countervailing power over manufacturers to lower wholesale prices and they can pass the savings on to consumers. Subsequent work has shown, however, that countervailing power does not always lead to lower consumer prices. As will be discussed in section 4, the effects of countervailing power depend on the type of competition at the retail level.

The shift of bargaining power at the retail level over the last three decades has been accompanied by the emergence of new vertical restraint instruments, such as slotting allowances. Slotting allowances are fees that manufacturers pay retailers for carrying new products or allocating shelf space to their products. As with other vertical restraints, slotting allowances have ambiguous effects on prices and welfare. When manufacturers willingly offer slotting allowances, welfare is lower than with no slotting allowances. On the other hand, when retailers require slotting allowances, low-quality manufacturers are screened out of the market and this increases social welfare more than in cases with no-slotting allowances.

Table 1 summarizes the effects of various vertical restraints examined in the literature and surveyed in this paper. The importance of vertical restraints pertains to market structure, pricing decisions, efficiency, and welfare. Besides their significance for competition policy, vertical restraints have potentially important macroeconomic implications via their effects on market structure. Market power has important consequences for the interpretation of the business cycles (Rotemberg and Woodford, 1995) and can reduce inflation volatility (Amano and Hendry, 2003). In an international context, market share also influences pricing decisions and has implications for the exchange rate pass-through (Froot and Klemperer, 1989). Therefore, a better understanding of the microeconomics of price-setting behaviour is needed to fully explain price adjustment in macroeconomics models.

The rest of the paper is organized as follows. In section 2, vertical restraints are examined in a framework where the upstream market is monopolistic and the manufacturer has all the bargaining power. In section 3, the assumption is made that the upstream market is competitive, while manufacturers maintain their bargaining power. In section 4, retailers are allowed to have all the bargaining power and the types of vertical restraints that arise in equilibrium are examined. Section 5 concludes.

2 Upstream Monopoly and Vertical Restraints

Consider a monopolist who produces a good at marginal cost, c, and sells it downstream to n retailers. Assume that the upstream monopolist has all the bargaining power and moves first by announcing the wholesale price, p_w. Upon observing p_w, retailers choose consumer prices, p^i, and retail services, s^i, $i = \overline{1, n}$, independently. Denote the demand for good i by $D^i(\mathbf{p}, \mathbf{s})$, where $\mathbf{p} = (p^1, .., p^n) \in \Re^n_+$ and $\mathbf{s} = (s^1, .., s^n) \in \Re^n_+$. Providing retail services costs retailer i, $\Phi(s^i)$ per unit, where $\Phi'(\cdot) > 0$, $\Phi''(\cdot) > 0$. Assume that the demand function satisfies

$$\partial D^i/\partial p^i < 0, \quad \partial D^i/\partial s^i > 0, \quad \partial^2 D^i/\partial^2 p^i \leq 0, \quad \partial^2 D^i/\partial p^i \partial p^j > 0. \tag{1}$$

The relationship between manufacturer and retailers is of a principal-agent type, with the manufacturer acting as a principal and a Stackelberg price leader. Retailer i's problem is to choose the retail price, p^i, and service, s^i, to maximize profits:

$$\Pi^{R_i} = (p^i - p_w - \Phi(s^i))D^i(\mathbf{p}, \mathbf{s}), \tag{2}$$

taking p_w as given. The Nash equilibrium retail prices, $\mathbf{p}(p_w) = (p^1(p_w), .., p^n(p_w))$, and services, $\mathbf{s}(p_w) = (s^1(p_w), .., s^n(p_w))$, then solve the first-order conditions:

$$D^i(\mathbf{p}, \mathbf{s}) + (p^i - p_w - \Phi(s^i))\frac{\partial D^i(\mathbf{p}, \mathbf{s})}{\partial p^i} = 0, \quad \forall i = \overline{1, n}, \tag{3}$$

$$-\Phi'(s^i)D^i(\mathbf{p}, \mathbf{s}) + (p^i - p_w - \Phi(s^i))\frac{\partial D^i(\mathbf{p}, \mathbf{s})}{\partial s^i} = 0, \quad \forall i = \overline{1, n}. \tag{4}$$

The manufacturer anticipates the retail prices and services chosen at the second stage and chooses the wholesale price to maximize profits:

$$\Pi^M = (p_w - c)D^i(\mathbf{p}(p_w), \mathbf{s}(p_w)). \tag{5}$$

The equilibrium wholesale price then solves the first-order condition:

$$D^i(\mathbf{p}, \mathbf{s}) + (p_w - c)\left[\frac{\partial D^i}{\partial p^i}\frac{dp^i}{dp_w} + \frac{\partial D^i}{\partial s^i}\frac{ds^i}{dp_w}\right] = 0. \tag{6}$$

Denote by Π^{VI} the profit of the vertically integrated structure (or the monopoly profit):

$$\Pi^{VI} = \sum_{i=1}^{n}(p^i - c - \Phi(s^i))D^i(\mathbf{p}, \mathbf{s}). \tag{7}$$

To compare the outcomes of the non-integrated and the fully integrated markets, retailer i's profit can be written as a function of the vertically integrated profit:

$$\Pi^{R_i} = \Pi^{VI} - (p_w - c)D^i(\mathbf{p}, \mathbf{s}) - \sum_{j \neq i}(p^j - c - \Phi(s^j))D^j(\mathbf{p}, \mathbf{s}). \tag{8}$$

Differentiating (8) with respect to p^i and s^i gives:

$$\frac{\partial \Pi^{R_i}}{\partial p^i} = \frac{\partial \Pi^{VI}}{\partial p^i} - (p_w - c)\frac{\partial D^i(\mathbf{p}, \mathbf{s})}{\partial p^i} - \sum_{j \neq i}(p^j - c - \Phi(s^j))\frac{\partial D^j(\mathbf{p}, \mathbf{s})}{\partial p^i}, \tag{9}$$

$$\frac{\partial \Pi^{R_i}}{\partial s^i} = \frac{\partial \Pi^{VI}}{\partial s^i} - (p_w - c)\frac{\partial D^i(\mathbf{p}, \mathbf{s})}{\partial s^i} - \sum_{j \neq i}(p^j - c - \Phi(s^j))\frac{\partial D^j(\mathbf{p}, \mathbf{s})}{\partial s^i}. \tag{10}$$

Expressions (9) and (10) are key to understanding the outcomes of the decentralized and vertically integrated markets. They reveal two types of externalities present in the decentralized market: a vertical externality that arises between the upstream and downstream markets, and a horizontal externality that arises in the downstream market. In what follows, each type of externality is discussed in turn. The profit of the vertically integrated structure is maximized when the first terms on the right-hand side of (9) and (10) are both equal to zero. The second and third terms on the right-hand side of each expression are what differentiates the outcomes of the non-integrated and fully integrated structure. The second terms in (9) and (10) represent the vertical pricing and service externalities, respectively. The vertical externality is due to the fact that the retailer, when choosing the resale price and retail service, ignores the effect of this choice on the manufacturer's profit, and chooses a lower retail price than the one that maximizes joint profits. The extra profit the manufacturer obtains when the retailer sells an additional unit of the good is $(p_w - c)$. The manufacturer thus chooses a price level that is too high and a service level that is too low compared with those of the vertical structure. The vertical externality disappears when the retailer's marginal cost, p_w, coincides with the marginal cost of the vertically integrated market, c. The third terms are the horizontal externalities—pricing and service. The horizontal externality results from the fact that the retailer cannot appropriate the entire benefit of increasing retail prices and services: when retailer i changes prices and services, the demand faced by retailer j is affected. This effect is captured by the cross-elasticity of demand in the third term in (9) and (10). Since each retailer i ignores the effect of their choice on the other retailers' profits, each retailer tends to choose a retail price that is too low and a service level that is too high compared with those of the vertical market. The vertical and horizontal pricing externalities work in opposite directions: the vertical externality induces retailers to set retail prices that are too high, whereas horizontal externalities result in prices that are too low. Whether the final retail price in the decentralized market is higher or lower than that of the vertically integrated market depends on which externality dominates — the vertical or the horizontal. The same is true for the service externality, except that the vertical externality pushes service levels too low, whereas the horizontal externality pushes them too high compared with the vertical market.

There are cases where retailers provide pre-sale services that cannot be monitored or contracted upon. Pre-sale services and information can be particularly important in the sale of durable goods; for example, a test-drive of an automobile, demonstrations by salespeople, or the trying on of clothing before a purchase. Besides vertical externalities, competition in the retail market gives rise to horizontal pricing and service externalities among retailers. The idea is similar to that of public goods. Providing a retail service is costly and thus forces the retailer who provides it to charge a higher price than a retailer who does not provide it. This gives consumers incentives to obtain the pre-sale service (information) from the retailer who offers it and then to buy the good from the retailer who does not offer the service but charges a lower price. Tesler (1960) argues that retailers have incentives to free ride on each other's pre-sale information and services, and that this results in underprovision of services.

In this environment, retailers have incentives to set excessively high retail prices and underprovide retail service compared with those levels that maximize the profit of the vertically integrated market. It is evident that the wholesale price alone is not a sufficient instrument to bring price and service levels to the optimal levels that maximize integrated profits. The manufacturer can choose the wholesale price to eliminate the vertical externality; that is, to induce the retailer to set the retail price at the optimal level of the integrated market. To eliminate the horizontal externality, the manufacturer can then use either one of the instruments or vertical restraints identified in Proposition 1, which is adapted from Winter (1993).

Proposition 1 *The manufacturer can appropriate the vertically integrated profit either by: (i) a two-part tariff and a price floor, or (ii) a wholesale price equal to the marginal cost, c, and ETs.*

To see how RPM and ETs work in this environment, use p^m to denote the optimal price that maximizes profits of the integrated market. Start by examining how the manufacturer can appropriate the vertically integrated profit by using a two-part tariff and a price floor. It is easy to see that imposing a price floor, $p \geq p^m$, would induce the retailer to choose the retail price optimally equal to p^m. The manufacturer can then adjust the wholesale price to induce the retailer to provide the optimal level of service in the integrated market. Finally, the manufacturer chooses the lump-sum fee (or the franchise fee) to appropriate the retailers' surplus. The rationale for using ETs is even simpler. Essentially, in this environment, competition is a bad thing: competition between retailers gives rise to vertical and horizontal externalities. The manufacturer can eliminate these externalities by eliminating competition in the retail sector. One way to achieve this is by granting a monopoly position to one of the retailers. This eliminates the horizontal externality. The manufacturer can then set the wholesale price equal to the marginal cost and thus eliminate the vertical externality.

Although vertical integration or sufficient vertical restraints eliminate both types of externalities, they do not necessarily increase welfare. In fact, Winter (1993) shows that there are many parameter values for which welfare is increased if the manufacturer is not allowed to use any vertical restraints. This is not surprising, given that the manufacturer uses vertical restraints to support an excessively high level of service compared with the level that maximizes total profits plus consumer surplus. Total welfare can thus be increased by prohibiting vertical restraints.

The above discussion has shown that competition in pre-sale services gives rise to free riding by retailers. In contrast, in Bolton and Bonanno (1988), retailers provide cum-sales or post-sales services, or both. In this case, there is no free-rider problem, since the consumer can get the service only if they buy the good. This type of service, however, gives rise to vertical differentiation: if two distinct products are offered at the same price, then all consumers will buy from the retailer that offers the product of higher quality. Bolton and Bonanno show that, under a linear-price contract, the profit of the decentralized market is less than that of the vertically integrated market, because the horizontal externality outweighs the vertical externality, which makes retail prices too low compared with the vertical structure. Although franchise fees and RPM dominate the optimal linear-price contract, they are not sufficient to replicate the outcome of the vertically integrated structure. The intuition is as follows. Franchise fees are transfers from the retailers to the manufacturer, and therefore they do not change the total profit of the decentralized structure. RPM is inefficient because it precludes differentiation, which would be chosen by the vertically integrated structure.

2.1 The "double marginalization" problem

To understand the basic vertical externality, consider the special case with one manufacturer and one retailer. The decentralized market consists of a chain of monopolies. In this case, $n = 1$ and the subscript i above can be dropped. Also assume that the retailer does not provide any retail service. The demand function is then $D(p)$, with $D'(\cdot) < 0$, $D''(\cdot) < 0$. The sequence of decisions is the same as before.

Since both the manufacturer and retailer are monopolists, they price above marginal cost.

Therefore, $p_w > c$ and $p > p_w$. The two monopolists, acting independently, set prices above marginal costs. This is the "double marginalization" problem identified by Spengler (1950). The upstream monopolist chooses a wholesale price above marginal cost. The downstream monopolist takes this wholesale price as the marginal cost and sets the retail price above it. The basic vertical externality is due to the fact that the retailer ignores the effect of their choice of retail price on the manufacturer's profit. For every additional unit of the good the retailer succeeds in selling as a result of their pricing strategy, the manufacturer obtains an extra profit of $(p_w - c)$. Since the retailer maximizes their own profit, ignoring the effect of their choice on the manufacturer's profit, the retailer tends to choose a retail price that is too high from the manufacturer's viewpoint. The vertical externality is a result of the difference between the retailer's marginal cost, p_w, and that of the vertical structure, c. This implies that the decentralized market generates a higher retail price and lower profit than the vertically integrated market. To see this, consider pricing decisions in the vertically integrated market. Denote by p^{VI} the monopoly price that maximizes the profit of the vertically integrated market:

$$\max_p (p - c)D(p). \tag{11}$$

The monopoly price, p^{VI}, then solves the first-order condition:

$$D(p^{VI}) + (p^{VI} - c)D'(p^{VI}) = 0, \tag{12}$$

which can be written in the well-known form

$$\frac{p^{VI} - c}{p^{VI}} = \frac{1}{\varepsilon}, \tag{13}$$

where $\varepsilon = -p^{VI} D'(p^{VI})/D(p^{VI})$ is the demand elasticity at the monopoly price.

Proposition 2 *The profits of the integrated market are higher than the profits of the non-integrated market; the consumer price in the integrated market is lower than the consumer price in the non-integrated market.*

If either the upstream or the downstream market is competitive, the vertical externality vanishes, because the competitive market does not introduce price distortion. In this case, Proposition 2 is no longer true; that is, vertical integration does not generate higher profits than the decentralized market.

When both the upstream and the downstream market are monopolies, as above, the manufacturer has incentives to acquire the downstream market and eliminate the vertical externality. If a merger is not possible—for example, because of high costs or regulation—the manufacturer can sometimes reproduce the outcome of the fully integrated structure by using a set of vertical control instruments of the type identified in section 1. Proposition 3 identifies those contracts (or instruments) that allow the manufacturer to replicate the outcome of the vertical structure.

Proposition 3 *The manufacturer can realize the profit of the integrated market without integration by using a two-part tariff or by imposing RPM.*

The imediate implication of Propositions 2 and 3 is as follows:

Corollary 1 *Welfare can be increased by vertical integration or by using sufficient vertical restraints.*

2.2 Monopolistically competitive retailers

Dixit (1983) and Gallini and Winter (1983) extend the analysis to the case of a monopolistically competitive retail market. Assume that the retail market is monopolistically competitive and retailers do not provide any retail service. Denote by $q_i = D(p_1, .., p_n; n)$ the demand facing retailer i, where n is the number of retailers in the market. Let $q = D(p, n) \equiv \sum_{i=1}^{n} D(p, .., p; n)$. Retailer i chooses the retail price to maximize profits, and in equilibrium profits are driven to zero. Retailers are assumed to be identical; therefore, in a symmetric equilibrium they charge the same retail price, p. The equilibrium retail price and number of retailers then solve

$$(p - p_w)/p = 1/\varepsilon_d, \tag{14}$$

$$(p - p_w)q/n - F = 0, \tag{15}$$

where ε_d is retailer i's perceived elasticity of demand and F is the franchise fee. The manufacturer sets the wholesale price, p_w, to maximize profits:

$$\Pi^M = (p_w - c)q. \tag{16}$$

Gallini and Winter derive conditions under which the upstream monopolist can replicate the outcome of full integration by imposing RPM: price ceilings or price floors. Under a price floor, $\overline{p}$ greater than the decentralized p, retailers enter the market until downstream profits become zero. The new equilibrium number of retailers is $\overline{n} \geq n$. A price floor thus has two opposing effects on the total demand $q = D(p, n)$: a negative effect due to the price increase and a positive effect due to the bigger number of retailers. The total effect depends on which of these two effects dominates. This, in turn, depends on the magnitude of retailer i's perceived elasticity of demand, ε_d. If ε_d is high, a price floor slightly above the decentralized retail price has a large negative effect on the equilibrium output of each retailer. Consequently, a large number of retailers enter the market until profits are driven to zero. The large increase in the equilibrium number of retailers has a positive effect on demand. The overall effect of a price floor is thus positive. Gallini and Winter also derive some conditions under which the private profitability of RPM is sufficient for social desirability. For a price floor to be welfare-improving at the margin, the marginal rate of substitution in terms of consumer surplus between greater product diversity and lower price must exceed the marginal rate of substitution for the monopolist, which is the slope of the iso-demand curve.

Dixit (1983) compares the private and social desirability of vertical integration and finds that the fully integrated equilibrium has a higher social welfare than the outcome of monopolistic competition. The upstream monopolist can use vertical restraints to shift their average cost function, and hence the final equilibrium. If vertical integration is not feasible, the upstream monopolist can sometimes use a two-part tariff to replicate the outcome of full integration. Even if a two-part tariff cannot perfectly replicate full integration, it can be used with other instruments to produce outcomes that are more desirable than non-integration, from a social viewpoint.

The previous results are derived on the assumption that contracts between manufacturers and retailers are observable. O'Brien and Shaffer (1992) show that, when the upstream firm engages in secret bilateral contracts with downstream retailers, the vertically integrated outcome can no longer be achieved with non-linear pricing. The intuition is that, for any contract that induces the vertically integrated outcome, the manufacturer can engage in secret negotiations with any retailer to reduce the retail price and thus shift consumers and profits away from rival retailers. O'Brien and Shaffer also consider the case where bargaining power is more evenly distributed and show that there is no bargaining equilibrium that maximizes joint profits.

2.3 Market uncertainty

The following uses the analysis in Rey and Tirole (1986) and Tirole (1988) to examine the role of uncertainty in determining the optimal contract between the manufacturer and retailers.

Retailers face two types of uncertainty:

(i) Demand uncertainty: demand depends on a random variable $\theta \in [\underline{\theta}, \overline{\theta}]$, which can refer to consumer tastes and demographics.

(ii) Retail-cost uncertainty: retail cost is affected by technological changes, wages, and input prices. The retail cost γ is a random variable distributed on $[\underline{\gamma}, \overline{\gamma}]$.

There are n identical retailers and each of them signs a contract with the manufacturer before θ and γ are realized. The manufacturer does not observe the realizations of θ and γ, the quantity sold by an individual retailer and the retailers' prices and profits.[2] The uncertainty is observed by the retailers after their contract is signed but before they take their pricing decisions.

In this environment, Rey and Tirole (1986) show that RPM is not sufficient to eliminate the vertical price distortion. To see this, recall that, in a deterministic environment, the manufacturer can appropriate the profits of the vertically integrated market by setting either a price floor or a price ceiling. With uncertainty, this is no longer feasible, since the retailer makes pricing decisions before the demand uncertainty is resolved and this makes the retail price unresponsive to demand and retail-cost conditions. Furthermore, when the retailer is risk-averse, the retailer is not able to pass the cost uncertainty on to consumers and bears too much risk.

Since RPM does not work in this environment, the manufacturer can resort to a two-part tariff to realize the profit of the integrated structure. To see how a two-part tariff works, consider a simple model adapted from Rey and Tirole (1986). Denote the demand function by $D(p, \theta)$, with $(\partial D/\partial p) < 0$, $(\partial D/\partial \theta) > 0$. After observing θ and γ, the retailer chooses the retail price to maximize profits according to

$$\max_{p}(p - p_w - \gamma)D(p, \theta). \tag{17}$$

[2]The manufacturer might not be able to observe retail prices when retailers offer secret price discounts to consumers, or when they offer service packages that are not directly observable.

The contract between the manufacturer and retailers must satisfy a participation constraint. The expected utility the retailer obtains by signing the contract must be at least as high as that from not signing the contract:

$$Eu[(p - p_w - \gamma)D(p, \theta) - F] \geq u(0), \tag{18}$$

where $u(\cdot)$ is the von Neumann-Morgenstern utility function and it is assumed that the retailer obtains zero profits if they do not sign the contract.

The problem for the manufacturer is to induce the retailers to choose the retail price, p^{VI}, that maximizes the ex post profits of the integrated market:

$$p^{VI} = \arg\max_p (p - c - \gamma)D(p, \theta). \tag{19}$$

If it is further assumed that the manufacturer can observe the areas of distribution of the retailers, the manufacturer can use ETs to create local monopolies. ETs divide the market into n territories; each retailer has a monopoly power in one part of the market and faces demand $D(p, \gamma)/n$. With ETs arrangements, the manufacturer can set the wholesale price to marginal cost, $p_w = c$, in which case the problem of the individual retailer becomes

$$\max_p (p - c - \gamma)D(p, \theta)/n - F, \tag{20}$$

the solution to which gives the optimal retail price, p^{VI}.

The participation constraint (18) shows that, if retailers are risk-averse, the manufacturer is concerned with the amount of risk the retailer bears. The more risk the retailer takes, the lower the lump-sum fee, F, the manufacturer can charge. The manufacturer has incentives to share the risk of the retailer. One way to do this is to increase the wholesale price and reduce the lump-sum fee. Under demand uncertainty, an increase in the wholesale price reduces the retailer's profit margin and risk. In order to keep the participation constraint satisfied, the manufacturer must reduce the lump-sump fee. Under cost uncertainty, an increase in the wholesale price increases the retail price and reduces demand. The lower demand reduces the retailer's risk. Proposition 4 summarizes the results.

Proposition 4 *Under uncertainty and risk-averse retailers, competition, RPM, and ETs are not equivalent. Under demand uncertainty, the manufacturer prefers RPM to competition and competition to ETs. Under cost uncertainty, the manufacturer prefers competition to ETs, and ETs to RPM.*

To understand the result in Proposition 4, recall that the manufacturer has two objectives: to ensure optimal exploitation of monopoly power by the vertical structure, and to provide adequate insurance to retailers. Proposition 4 allows the outcomes of competition, ETs, and RPM to be ranked according to these two objectives. Thus, ETs make better use of decentralized information than competition and RPM. Competition has very good insurance properties under both types of uncertainty, and RPM gives perfect insurance under demand uncertainty, but it lets retailers bear the whole risk under cost uncertainty. ETs also have mediocre insurance properties.

In the previous subsections it was shown that, in a deterministic environment, vertical restraints that reduce competition are welfare-improving: not only are the manufacturer and the retailer better off when competition is reduced, but so are consumers. This is no longer the case under uncertainty. Proposition 5 gives the welfare implications of uncertainty.

Proposition 5 *Under uncertainty, both the expected net consumer surplus and the aggregate welfare are higher under competition than under ETs.*

Consumers prefer competition in this environment because the expected retail price is lower under competition and the variance of consumption is higher under competition. The intuition for this is as follows. Under uncertainty, the manufacturer may want to change the wholesale price to reduce the retailer's risk. Under competition, the retailer's profit is independent of the wholesale price and, therefore, a wholesale price adjustment does not reduce risk. Under ETs or RPM, the manufacturer can decrease the retailer's risk by increasing the wholesale price; a lower profit margin means a lower variance of profits. With respect to the variance of consumption, the following argument applies. Under demand uncertainty, the competition price is determined entirely by cost conditions. Therefore, the price does not adjust to demand shocks. The same is true under RPM. Under ETs, the consumer partially adjusts to demand conditions, so consumption varies more under competition and RPM. Under cost uncertainty, the competitive price adjusts perfectly, partially under ETs and not at all under RPM.

Blair and Lewis (1994) develop a model where the manufacturer can observe neither the level of service provided by the retailer nor the state of the demand. In this framework, both adverse selection and moral hazard problems arise: the retailer can claim that high sales are due to a high level of service, while low sales are due to an adverse-demand shock. In this case, Blair and Lewis show that the optimal contract involves resale-price maintenance and quantity fixing. The choice of price and quantity enables the manufacturer to determine more accurately whether an increase in sales is attributable to promotional effort or a high demand realization. The main difference between Rey and Tirole (1986) and Blair and Lewis (1994) is that, in the latter, the manufacturer offers the retailer a menu of contracts contingent on the realization of θ. By the revelation principle, attention can be restricted to those contracts that induce the retailer to truthfully reveal θ. This again makes RPM effective, as opposed to the Rey and Tirole result.

3 Upstream Competition and Vertical Restraints

In this section, it is assumed that manufacturers are engaging in interbrand competition. The most common type of vertical restraint manufacturers revert to in this context is ED, which stipulates that a retailer may not sell a brand that competes with the manufacturer's product. Early work on ED began with Bork (1978), who claims that ED is welfare-improving. He argues that ED essentially reduces consumer choices but is compensated for by a lower wholesale price and possibly a lower retailer price. The retailer, who acts as an agent for consumers, accepts the contract only if the reduction in the wholesale price more than compensates for the reduction in variety. Thus, ED benefits consumers and increases competition.

On the other hand, Comanor and Frech (1985) show that ED can be anti-competitive: the incumbent manufacturer can use ED strategically to deter entry by raising rivals' costs. There are two types of consumers in this model: (i) those who are brand loyal and purchase the dominant manufacturer's product rather than a competiting brand as long as the price does not exceed that of the rival's by some fixed amount, and (ii) those who view the products of all sellers as identical. At the same time, incumbent retailers have lower costs than new entrants. The incumbent can impose ED on its retailers and can thus set a limit price from the differential distribution costs. When the manufacturer imposes ED on the incumbent retailers, the manufacturer can either deter entry or set a high limit price and allow entrants to serve only undiscriminating consumers. As a result, consumers generally pay higher prices. Comanor and Frech thus view ED as anti-competitive.

One of the criticisms of Comanor and Frech (1985) is that they do not describe a subgameperfect equilibrium. Schwartz (1987) points out that the manufacturer has a potential commitment problem in Comanor and Frech (1985): if the retailer holds out, the manufacturer is better off choosing non-exclusive dealing (NED) than turning to high-cost entrants. Comanor and Frech, however, assume that, once the manufacturer has chosen between ED and NED, they can commit to their choice even if it is not optimal.

Mathewson and Winter (1987), in their comment on the Comanor and Frech paper, try to reconcile the two earlier views on ED. They consider an environment in which two manufacturers supply differentiated products to a single retailer, who is a local monopolist. Following Mathewson and Winter (1987), denote by $\Pi^R(p_w^1, p_w^2)$ the retailer's profit without ED; that is, both products are bought at wholesale prices p_w^1 and p_w^2. Denote by $\hat{\Pi}^R(p_w^i)$ the retailer's profit under ED with manufacturer i. Manufacturer i's profit when both products are carried is denoted by $\Pi^{M_i}(p_w^1, p_w^2)$. Finally, $\hat{\Pi}^{M_i}(p_w^i)$ denotes manufacturer i's profit under ED. Mathewson and Winter address two questions: (i) whether ED is observed in equilibrium, and (ii) what the effects are of prohibiting ED on prices, profits, and welfare.

In the absence of ED, the game is reduced to the simple Bertrand duopoly price game. Denote by a "star" the equilibrium prices when neither manufacturer offers ED, the profit of manufacturer i is $\Pi^{M_i}({p_w^1}^*, {p_w^2}^*)$, $i = 1, 2$.

Let c_i denote the marginal cost of manufacturer i. Assume that one product has a larger market than the other:

$$\hat{\Pi}^{R_1}(c_1) > \hat{\Pi}^{R_2}(c_2). \tag{21}$$

The two manufacturers compete by offering contracts that consist of wholesale prices, p_w^i, and ED. When at least one of the manufacturers offers ED, the retailer must choose between them, given their wholesale price offers. In equilibrium, manufacturer 1 offers a limit price, $\hat{p}_w^1$, such that

$$\hat{\Pi}^{R_1}(\hat{p}_w^1) = \hat{\Pi}^{R_2}(c_2), \tag{22}$$

and manufacturer 2 offers a wholesale price equal to c_2. Only manufacturer 1 has incentives to offer ED in equilibrium as long as

$$\hat{\Pi}^{M_1}(\hat{p}_w^1) > \Pi^{M_1}({p_w^1}^*, {p_w^2}^*). \tag{23}$$

It is easy to see that the wholesale price of the dominant firm falls with an ED contract. Given the equilibrium wholesale price, $\hat{p}_w^1$, as defined in (22), it can be seen that $\hat{p}_w^1 < {p_w^1}^*$ if and only if $\hat{\Pi}^{R_1}(p_w^{1\,*}) < \hat{\Pi}^{R_2}(c_2)$, which is consistent with ED in equilibrium. The reduction in the wholesale price below the equilibrium price under NED is essentially an implicit bribe to the retailer for exclusivity.

Mathewson and Winter use simulated examples to examine the effects of ED on welfare and show that welfare could rise or fall in the presence of ED compared with the case when this type of arrangement is prohibited. They show that welfare is more likely to fall with ED when demand for the two products is very asymmetric. When the market is nearly symmetric, the bribe to the retailer necessary to meet firm 2's best ED offer is so large that the Bertrand profits exceed manufacturer 1's ED profits. The wholesale price of manufacturer 1 falls far enough with ED that it makes ED unprofitable. As the market becomes less symmetric, however, the fall in manufacturer 1's wholesale price is sufficiently small that the manufacturer can capture the entire market and ED would become profitable. Proposition mathwinter below summarizes these results.

Proposition 6 *(Mathewson and Winter, 1987) When manufacturers compete in price and by offering ED contracts, the equilibrium is characterized by the dominant manufacturer offering an ED contract. The wholesale price of the dominant firm falls with an ED contract, and welfare is more likely to fall with an ED when the market is nearly symmetric.*

The results of Mathewson and Winter depend on the assumption that the retailer is a local monopolist. When the area is large enough to accommodate more than one retailer, ED introduces spatial differentiation by retailers. This possibility is examined in Besanko and Perry (1994) and Dobson and Waterson (1994). In those two papers, two manufacturers produce differentiated brands that are sold to consumers through spatially differentiated retailers. The authors find that ED always generates higher profits for manufacturers and results in higher prices and higher transportation costs for consumers. Even so, exclusive dealing may still increase welfare, because it reduces the fixed costs of retailing, such as the cost of inventory and store space. Numerical examples show that welfare is most likely to increase when economies of scope in retailing are weak.

In Mathewson and Winter (1987), the incentive for ED critically depends on the assumption that the manufacturer is restricted to linear pricing. Perry and Besanko (1991) allow manufacturers to use a two-part tariff and RPM. The model consists of two manufacturers competing for ED contracts with a fixed but large number of retailers. Manufacturers offer retailers contracts that consist of a wholesale price (above marginal cost) and a positive franchise fee. If RPM is allowed, manufacturers essentially also set the retail price. The brands of the two manufacturers are imperfect substitutes, and so are the retailers who carry those brands. Perry and Besanko first characterize the equilibrium with ED and compare the outcomes with and without RPM. Their results show that minimum RPM results in higher retail prices, higher retail profits, and higher manufacturer profits if manufacturers cannot set a wholesale price above marginal cost and can use only a franchise fee. Minimum RPM allows manufacturers to eliminate the retail price competition among retailers who carry the brand. Manufacturers essentially use RPM to compete with each other on the retail price. When manufacturers can charge only a wholesale price, maximum RPM results in lower retail prices and lower retail profits, but higher manufacturing profits. Maximum RPM allows manufacturers to reduce the retail price that the retailers can charge. Lower consumer prices increase sales and this finally increases manufacturers' profits even if the wholesale price remains unchanged. Retail profits decrease because the reduction in the retail margin dominates the increase in sales from lower retail prices. These two results are reversed when manufacturers can set both a wholesale price and a franchise fee in the equilibrium without RPM, because the form of RPM (minimum or maximum) depends only on the relationship between the wholesale and the retail prices in the RPM equilibrium. The effect of RPM on the retail price depends on the relationship between the reference equilibrium without RPM and the appropriate equilibrium with RPM. As Perry and Besanko argue, these results suggest that, when discussing the legality of RPM, one should focus not only on the form of RPM but also on the change in the retail price when RPM is allowed. Proposition 7 summarizes Perry and Besanko's results.

Proposition 7 *(Perry and Besanko, 1991)* (*i*) *When manufacturers can charge only a wholesale price, maximum RPM results in lower retail prices and lower retail profits, but higher manufacturer profits.* (*ii*) *When manufacturers can charge only a franchise fee, minimum RPM results in higher retail prices, higher retail profits, and higher manufacturing profits.*

The results in O'Brien and Shaffer (1997) contrast sharply with those in Mathewson and Winter (1987). The latter study finds that ED makes manufacturers better off when non-linear pricing is not feasible. O'Brien and Shaffer allow for non-linear pricing in the upstream market and show that, although market foreclosure equilibria—a situation in which one manufacturer is excluded from the market even though a fully integrated firm would sell both goods—exist, they are Pareto-dominated by all non-foreclosure equilibria. The analysis suggests that ED arrangements offer manufacturers no advantage: if a fully integrated firm would sell only one good, the unique equilibrium outcome replicates the integrated solution and can be supported by non-linear pricing alone. This renders ED redundant. If a fully integrated firm would sell both goods, there exist foreclosure and non-foreclosure equilibria. In this case, ED is not redundant; however, manufacturers would be better off without these arrangements, because they widen the set of foreclosure equilibria to include situations in which foreclosure would not have been possible. Therefore, the incidence of market foreclosure is reduced in the absence of ED.

Rasmusen, Ramseyer, and Wiley (1991) consider a situation in which a manufacturer who is a monopolist can use ED arrangements to exploit the coordination problem of consumers so as to exclude potential entrants. The monopolist cannot sign a contract with each consumer not to deal with potential competitors. If there is a minimum efficiency scale that is necessary for the potential rival to operate, however, the monopolist need only lock up a sufficient number of consumers so that the minimum scale is not achieved. If each consumer believes that the others will sign, each consumer will also believe that no rival seller would enter. Each consumer would thus sign the exclusionary agreement. Lack of coordination renders "naked" exclusion profitable.

A related study by Bernheim and Whinston (1998) provides a more general analysis of ED by allowing for a general class of contracts between manufacturers and the retailer. Bernheim and Whinston show that these arrangements can be irrelevant, anti-competitive, or efficiency-enhancing, depending on the setting. They consider a situation where manufacturers compete for a single downstream retailer. In this case, ED leads to monopolization of the upstream market, because one of the manufacturers can choose the wholesale price to foreclose their potential rival from access to the downstream market. In contrast, Martimort (1996) considers the case where all manufacturers have access to the downstream market and find a retailer to sell their products. In Martimort's model, manufacturers have a choice between distributing their products through a common retailer or through a single retailer who accepts an ED contract. Manufacturers face an incentive problem, because they do not observe the final demand for their product (or the retailer's cost of selling it). In the case where manufacturers choose to sell through a common retailer, each manufacturer becomes a principal for the common agent-cum-retailer. Martimort's analysis shows that, depending on the extent of the adverse selection problem and on the substitutability of their brands, manufacturers prefer to use a common or an exclusive retailer.

Besanko and Perry (1993) identify an interbrand externality that arises because brand-enhancing investments made by one manufacturer may benefit the brands of other manufacturers: services and investments by a manufacturer are not specific to the brand. ED can eliminate this externality by excluding other brands from the retailer's set, but manufacturers do not always choose ED in equilibrium. ED eliminates the externality and provides incentives to invest in brand-enhancing. Manufacturers, however, might be better off without ED, because it eliminates competition in brand-enhancing investments. Besanko and Perry find cases in which NED is the dominant strategy, and cases in which some, but not all, manufacturers choose ED. Another possible equilibrium is that in which all manufacturers choose ED. When comparing consumer surplus under the three equilibria, Besanko and Perry find that it is highest in the case in which all manufacturers choose ED, next highest in the mixed case, and lowest in the case in which all manufacturers choose NED. Social welfare in the case in which all manufacturers adopt ED exceeds social welfare in the mixed case and in the case in which all manufacturers adopt NED. This implies that a ban on ED would benefit manufacturers at the expense of consumers, with the increase in industry profits being less than the loss in consumer surplus.

The papers reviewed so far in this section show that manufacturers have incentives to adopt ED contracts in order to reduce downstream competition. Rey and Stiglitz (1988, 1995) show that, when manufacturers are imperfectly competing upstream and retailers are imperfectly competing downstream, ED reduces not only downstream competition (interbrand), but also upstream competition (intrabrand). ED reduces competition between manufacturers by making wholesale price cuts less attractive. At the same time, ED essentially grants monopoly power to the retailer over a fraction of the final demand. Therefore, the retailer charges a higher price than they would in the absence of ED. The resulting wholesale prices are also higher compared with those in the absence of ED. When they are allowed to, manufacturers use franchise fees to extract the surplus from their exclusive retailers. Slade (1998) finds empirical evidence for the results of Rey and Stiglitz.

Lin (1990) examines the same problem as Rey and Stiglitz (1988). He assumes that two competing manufacturers can choose to distribute their products through a common retailer or use a specialist retailer who agrees to carry the manufacturer's product exclusively. When manufacturers distribute their products through a common retailer, competition among manufacturers drives wholesale prices below marginal costs. Manufacturers use franchise fees to obtain positive profits. They therefore prefer to distribute through an exclusive retailer. This allows them to price above marginal cost. As a result, consumer prices are higher and social welfare is lower than when manufacturers sell to a common retailer.

The results in Lin (1990) depend on the ability of manufacturers to exploit a common retailer. The common retailer in Lin's model internalizes any pricing externalities between the two manufacturers and joint profits are maximized. Manufacturers can then employ franchise fees and extract all the surplus, leaving the retailer with zero profits. O'Brien and Shaffer (1993) argue that the common retailer can credibly threaten to stop carrying any one product and earn a positive surplus. In this case, both manufacturers prefer to sell through independent retailers and welfare is higher under ED than when products are sold through a common retailer.

Raff and Schmitt (2000) analyze the use of vertical restraints in an international trade context. They build a model with one domestic and one foreign manufacturer, each of whom market their products through retailers in a given country or region. Raff and Schmitt investigate the extent to which trade liberalization can lead to increased use of ETs. In their model, the choice of ETs by the manufacturers is determined endogenously by trading off costs and benefits. The benefit of using ETs is that it reduces competition between domestic and foreign manufacturers. Its cost is that it exposes risk-averse retailers to uncertainties, such as trade barriers. This type of uncertainty arises in international trade mainly because policies and regulations are vague and ambiguous. The equilibrium choice of ETs is thus the optimal trade-off between reducing price competition and insuring retailers. Raff and Schmitt show that trade policy has non-trivial effects on the choice of ETs. More specifically, they determine conditions under which trade liberalization can lead manufacturers to use ETs, and conditions under which it induces manufacturers to stop using ETs. In the former scenario, manufacturers substitute private anti-competitive arrangements for government-imposed barriers.

4 Retail Market Power

In the previous sections, it has been assumed that the manufacturers have all the bargaining power and that they use this power to impose vertical restraints on retailers to extract all the surplus. The literature has focused on vertical restraints imposed by manufacturers because, until recently, they had more bargaining power than retailers. However, the bargaining power has shifted at the retail level over the last three decades. Retailers have become bigger due to economies of scale and scope. This has given rise to chain stores and big-box stores, which now dominate most areas of retail activity.[3] The shift in bargaining power to the retail level allows retailers to impose vertical restraints on manufacturers. Such restraints, as seen in practice, usually take the form of "negative" fixed fees: manufacturers basically provide cheap loans and technology or pay retailers slotting allowances to encourage them to carry a new product or allocate minimum shelf space to a product.

The literature is mixed with respect to the welfare effects of vertical restraints imposed by retailers. The earliest work to address this question is by Galbraith (1952). He argues that bigger retailers are able to exercise countervailing power over manufacturers to lower wholesale prices and they are willing to pass these savings to consumers. Galbraith thus claims that countervailing power is socially desirable because it increases the consumer surplus (it reduces consumer prices). Galbraith does not, however, explain why big retailers would have incentives to pass on the cost-savings to consumers. A number of recent papers that analyze Galbraith's claim both theoretically and empirically find that countervailing power does not always lead to lower consumer prices.

Consider a simple environment with one manufacturer and n retailers. As before, p_w^i is the wholesale price that retailer i has to pay the manufacturer and p_i is the consumer price charged by retailer i. In vector notation, $\mathbf{p_w} = (p_w^1, .., p_w^n)$ and $\mathbf{p} = (p^1, .., p^n)$. Also, $\mathbf{p_w^{-i}} = (p_w^1, .., p_w^{i-1}, p_w^{i+1}, .., p_w^n)$ and $\mathbf{p^{-i}} = (p^1, .., p^{i-1}, p^{i+1}, .., p^n)$. The sequence of decisions is as follows:

- Stage 1: Wholesale prices p_w^i, $i = \overline{1, n}$, are negotiated between the manufacturer and each retailer.

[3] See, for example, Genest-Laplante (2000), OECD (1999), and *The Economist* (1997, 1998, 1999) for more on trends in retailing.

- Stage 2: Retailers compete for consumers.

The most common assumption regarding negotiation at the first stage is that of Nash bargaining. Different assumptions, however, can be made on the type of competition between retailers at the second stage. Consider, in turn, three different assumptions for the second-stage competition:

(i) Bertrand competition: retailers choose consumer prices simultaneously and independently (Dobson and Waterson, 1997).

(ii) Cournot competition: retailers compete by choosing quantities to sell (von Ungern-Sternberg, 1996).

(iii) Perfect competition: retailers are price takers on the market for the final product (von Ungern-Sternberg, 1996).

4.1 Bertrand competition

Having agreed on the wholesale price with the manufacturer, each retailer chooses the consumer price, p^i, to maximize profits, taking consumer prices chosen by other retailers as given:

$$\max_{p^i} \Pi^{R_i} = (p^i - p^i_w) D^i(\mathbf{p}), \tag{24}$$

where $q^i = D^i(\mathbf{p})$ is the demand function faced by retailer i. Assume a linear (inverse) demand function of the form

$$p^i = 1 - q^i - \gamma \sum_{i \neq j}^{n} q^j, \quad \gamma \in [0, 1), \quad i, j = \overline{1, n}, \quad i \neq j, \tag{25}$$

where γ measures the degree of intrabrand rivalry. A higher γ indicates that retailer services are closer substitutes.

The first-order conditions for the maximization problem (24) determine the Nash equilibrium consumer prices, $p^i(\mathbf{p_w})$, which can then be used to determine the profits of the manufacturer and retailer i as functions of the wholesale price: $\Pi^M(\mathbf{p_w})$ and $\Pi^{R_i}(\mathbf{p_w})$.

Return to the bargaining stage to determine the equilibrium wholesale prices, ${p^i_w}^*$. At stage one, the manufacturer engages in separate bargaining with each retailer over the wholesale price, ${p^i_w}^*$. The equilibrium wholesale price, ${p^i_w}^*$, is obtained as the solution to the Nash bargaining problem:

$$p_w^{i\,*} = \arg\max_{p_w^i} [\Pi^M(\mathbf{p_w}) - \Pi_o^M(\mathbf{p_w^{-i}})]^{1-\beta}[\Pi^{R_i}(\mathbf{p_w})]^{\beta}, \tag{26}$$

where $\Pi_o^M(\mathbf{p_w^{-i}})$ is the manufacturer's threat point (or outside option), which represents the profit the manufacturer can obtain by dealing only with the other $n-1$ retailers, and $\alpha \equiv \beta/(1-\beta)$ is the retailer's bargaining power.[4] The retailer's threat point is zero, since they do not have any other outside option, given that the manufacturer is a monopolist. Solving the bargaining problem (26) gives the equilibrium wholesale prices $p_w^{i\,*}$, $i = \overline{1,n}$. Symmetry implies that $p_w^{i\,*} = p_w^*$, $\forall i$.

With the equilibrium wholesale price having been determined, the equilibrium consumer price can be obtained as a function of $p^*(\gamma, n)$, where γ is a measure of how similar the retailers' services are perceived to be when they are selling the product. In a simulation exercise, Dobson and Waterson (1997) show that, when retailer services are regarded as very close substitutes (γ is high), consumer prices fall close to the competitive level and social welfare increases with the decline in the number of retailers in the market. The reverse is true when γ is low.

The results imply that, when retailers compete in a Bertrand fashion, it is beneficial to allow concentration in the retail market only when retailer services are very close substitutes. If, however, retailer services are weak substitutes, greater concentration leads to higher consumer prices and lower social welfare.

4.2 Cournot competition

At the second stage, retailers compete by choosing quantities q^i:

$$\max_{q^i} \Pi^{R_i} = (p^i - p_w^i)q^i. \tag{27}$$

The first-order condition determines the equilibrium quantity, q, the same for all retailers (by symmetry). The consumer price is then $p(p_w, n)$, which is increasing in the wholesale price, p_w, and decreasing in the number of retailers, n.

[4] Dobson and Waterson (1997) take $\beta = 1/2$ and examine the effects of retail market concentration on consumer prices and social welfare. Thus, they do not consider the direct effect of retailer bargaining power on final prices and welfare.

Anticipating $p(p_w, n)$, the manufacturer bargains with each retailer over the wholesale price. The Nash bargaining problem is similar to (26) and allows one to obtain the equilibrium wholesale price $p_w(\alpha, n)$, which is decreasing in bargaining power α and increasing in the number of retailers n. The idea is that, for any bargaining power α, an increase in the number of retailers reduces the manufacturer's dependence on any one of them, and this leads to a higher wholesale price.

Substituting the wholesale price back into $p(p_w, n)$ gives the equilibrium consumer price $p(\alpha, n)$, decreasing in both α and n. An increase in the retailers' bargaining power allows them to extract lower wholesale prices from the manufacturer and pass them on to the consumer. However, greater downstream concentration (lower n) leads to higher consumer prices, which refutes Galbraith's claim that retailer countervailing power leads to lower final prices. The intuition for this result is as follows. In order for the retailer to extract lower wholesale prices from the manufacturer, it is necessary that the latter has a lot to lose in terms of sales if they do not deal with the retailer; that is, the manufacturer has a low threat point. This also means that the retailer faces a relatively inelastic demand curve, which leads to high markups.

4.3 Perfect competition

Under perfect competition, retailers are price takers in the downstream market. Assume that retailer i's marginal cost is of the form

$$c(q^i, n) = g + hnq^i, \tag{28}$$

which reflects the fact that the slope of each retailer's marginal cost depends on the total number of retailers, n. Retailer i's problem becomes

$$\max_{q^i} \Pi^{R_i} = (p^i - p_w^i - c(q^i, n))q^i, \tag{29}$$

where the retailer takes p^i as given. The first-order condition gives the equilibrium quantity, $q(p_w)$, which is the same for all retailers. The (linear) demand function then determines the equilibrium consumer price, $p(p_w)$, which is increasing in the wholesale price. For a linear demand function, the consumer price does not depend directly on the number of retailers, as in the case of Cournot competition.

Going back to the first stage and solving the Nash bargaining problem, the equilibrium wholesale price, $p_w(\alpha, n)$, can be obtained, which is increasing in n. This implies that greater concentration in the retail market leads to lower consumer prices. Although one could conclude that this result supports Galbraith's claim, von Ungern-Sternberg argues that it is in fact perfect competition at the retail level that leads to lower prices, rather than retailer countervailing power.

Chen (2001) examines the same question by assuming that the market structure at the retail level is characterized by a dominant firm facing a competitive fringe. Within this setting, Chen shows that countervailing power makes consumers better off by reducing retail prices, but that it does not always increase social welfare, because of possible efficiency losses in retailing. The existence of the competitive fringe at the retail level is key for countervailing power to benefit consumers. The lower retail price is not caused by a dominant retailer passing on the cost-savings they have obtained from the manufacturer, as Galbraith predicted; rather, the lower price is the result of a manufacturer trying to offset the reduction in profits caused by the rise in countervailing power. This works as follows. An increase in the power of the dominant retailer reduces the manufacturer's share of joint profits. As a result, the manufacturer charges retailers a lower wholesale price, thus boosting their sales. The fall in the wholesale price paid by the fringe retailers shifts their supply curve to the right, which results in a lower retail price.

Ellison and Snyder (2001) test Galbraith's claim empirically using data on wholesale prices for antibiotics sold through various distribution channels in the United States for the period 1990–96. The empirical analysis provides evidence that substitution opportunities among different suppliers are a more important source of countervailing power than buyer size. Ellison and Snyder find that hospitals and health maintenance organizations (HMOs), which can use restrictive formularies to increase their substitution opportunities, obtain lower prices than drugstores. Hospitals and HMOs essentially control which drugs their affiliated doctors prescribe by allowing their managers to substitute branded drugs for drugs on patent, and to substitute branded for generic manufacturers in the case of off-patent drugs. Drugstore substitution opportunities are, however, more limited, because drugstores need to fill the prescriptions their customers bring in as written.

Only Snyder (1996) examines countervailing power in a dynamic framework. In his paper, the retailer is able to alter their intertemporal consumption pattern. The retailer receives a steady stream of orders from manufacturers, but may wait and satisfy those orders at the same time. By accumulating a backlog of orders and purchasing all of them at once, the retailer may obtain a strategic advantage over the manufacturers. Snyder argues that this off-equilibrium-path threat is enough to constrain the price the manufacturer charges the retailer, even if the retailer purchases every period.

Another stream of literature examines the effects of slotting allowances on consumer prices and welfare. A slotting allowance is a fee that manufacturers pay retailers for carrying new products or allocating shelf space to their products. Shaffer (1991) develops a three-stage model where manufacturers compete for retailers. At the first stage, manufacturers simultaneously choose a two-part tariff that specifies the wholesale price and a fixed fee. The fixed fee can be negative, in which case it corresponds to a slotting allowance. The manufacturer can also specify an RPM requirement. At the second stage, retailers choose which manufacturer to buy from and, at the third stage, they simultaneously choose their resale prices. Shaffer shows that, in equilibrium, manufacturers can offer retailers both RPM and slotting allowances, and that the result is a lower total surplus compared with the case of no RPM, no slotting allowances. RPM and slotting allowances are used strategically to reduce competition at the retail level. The idea is simple. Slotting allowances represent fixed costs that force manufacturers to increase the wholesale price above marginal cost. It follows that retailers, in turn, set resale prices above marginal cost (i.e., the wholesale price). Retailers therefore have incentives to commit to positive slotting allowances, because they effectively reduce downstream competition and increase profits.

Chu (1992) turns Shaffer's results on their head by showing that, unless advance advertising is sufficiently effective, slotting allowances yield higher total profits and higher social welfare. In Chu's framework, manufacturers can signal their quality through advertising and retailers screen the manufacturers' quality by requiring slotting allowances. In equilibrium, only high-quality manufacturers offer slotting allowances and low-quality manufacturers are screened out of the market, which results in higher social welfare. What distinguishes Chu (1992) from Shaffer (1991) is the fact that the former assumes that retailers require slotting allowances, whereas the latter takes manufacturers to offer slotting allowance willingly. Lariviere and Padmanabhan (1997) assume, like Shaffer (1991), that the manufacturer can willingly choose to offer a slotting allowance. Offering slotting allowances serves two purposes: it signals product quality and it enables a share in the retailer's cost associated with stocking the product. The main result of the paper is that, in equilibrium, the high-demand manufacturer offers a positive slotting allowance and a lower wholesale price.

Sullivan (1997) argues that slotting allowances are consistent with competitive behaviour and might have been a result of an increase in the supply of products. She develops a consumer search cost model to show that, when an increase in the supply of products is not accompanied by an increase in sales per store, the equilibrium slotting allowance will increase.

Rennhoff (2002) allows for different manufacturer brands (or quality) in the slotting allowance game. His sequence of decisions differs from that in Shaffer (1991). At stage one, manufacturers offer slotting allowances to the retailers. At the second stage, upon observing these offers, retailers choose which brand to carry. At the third stage, manufacturers observe the retailer's choice of brand and choose wholesale prices. At the last stage, the retailer sets resale prices for the brands they choose to carry. Rennhoff's analysis shows that an increase in the brand quality increases retailer markups, but has an ambiguous effect on optimal slotting allowances. The intuition for the ambiguous result is as follows. On the one hand, an increase in the brand quality increases the manufacturer's expected profits. This, in turn, increases the slotting allowance the manufacturer would be willing to offer to increase the probability of receiving the premium shelf space. On the other hand, an increase in the brand quality also increases the retailer's expected payoff from offering the manufacturer the premium shelf space. This would push the optimal slotting allowance down. The overall effect is ambiguous due to the two effects working in opposite directions. Rennhoff further estimates the model using quarterly data from the ketchup industry in 40 metropolitan areas of the United States for the period 1988–92. The preliminary results support the predictions of the theoretical model. Rennhoff's study is interesting in that not all manufacturers offer slotting allowances in equilibrium. The empirical results show that, depending on their brand quality, some manufacturers have more incentive than others to offer slotting allowances.

5 Conclusions

This survey has shown that, in equilibrium, both the upstream and downstream firms can use vertical restraints as a means of capturing the surplus of the vertical structure. The choice of one vertical restraint over others depends critically on the specific market structure assumptions and the division of bargaining power. It has been shown that vertical restraints have important effects on consumer and producer prices, market structure, efficiency, and welfare; the initial market structure downstream and upstream provides incentives for retailers and manufacturers to use vertical restraints. The use of these restraints determines, in turn, the final market structure. To see this, recall the case where the upstream market is monopolistic and the downstream market is competitive. In this framework, the manufacturer has incentives to impose vertical restraints, such as exclusive territories, to eliminate the horizontal externality. Competition among retailers gives rise to horizontal externalities. The manufacturer can eliminate the externality by reducing downstream competition. Exclusive territories serve this purpose by granting each retailer a monopoly position over a geographical area or a class of consumers. Thus, exclusive territories have anti-competitive effects and reduce welfare.

Although the industrial organization literature on retail pricing is extensive, it is almost entirely static. More research is required on price-setting behaviour in a dynamic framework to allow a better understanding of the role of non-linear pricing and non-price instruments in the frequency of price changes at the manufacturing and retail level. At the same time, more empirical research is needed to quantify the importance of vertical restraints for price-setting at the industry level. Another area of interest is that of electronic markets. The introduction of electronic markets into the standard models of vertical restraints might change dramatically some of the predictions of those models. For example, retailers might get around ETs arrangements by reverting to electronic markets. Electronic markets can also provide manufacturers with a way of reaching consumers without an intermediary. More analysis needs to be done along these lines both at the micro- and macroeconomic levels.

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Table 1: Effects of Vertical Restraints

Author(s) and year	Vertical restraint(s)	Setting	Effects of vertical restraint(s)
Bernheim and Whinston (1998)	ED Franchise fees	Two manufacturers, one retailer; manufacturers have bargaining power	ED can be irrelevant, anti-competitive, or efficiency-enhancing
Besanko and Perry (1994) Dobson and Waterson (1994)	ED	Two manufacturers; manufacturers have bargaining power; spatially differentiated retailers	Higher profits for manufacturers; higher consumer prices; higher transportation costs for consumers; lower fixed costs of retailing; welfare may or may not increase
Blair and Lewis (1994)	RPM quantity fixing	One manufacturer, one retailer; manufacturer does not observe the state of demand or the level of retail service	RPM and quantity fixing restore efficiency
Bolton and Bonanno (1988)	Franchise fees RPM	One manufacturer, two retailers; manufacturer has bargaining power	Vertical restraints dominate uniform pricing from the viewpoint of the manufacturer; however, vertical restraints do not restore efficiency
Chen (2001)	Countervailing power	One manufacturer, $(n+1)$ retailers; one dominant retailer, n competitive fringe of retailers	Lower consumer prices; welfare may or may not increase
Chu (1992)	Slotting allowances	One manufacturer, one retailer	Only high-quality manufacturers offer slotting allowances, low-quality manufacturers are screened out of the market; welfare is increased
Comanor and Frech (1985)	ED	One manufacturer, class of brand-loyal consumers, class of consumers who view products as identical	Reduced competition; higher consumer prices
Dixit (1983)	Franchise fees RPM	One manufacturer; monopolistically competitive retailers	Vertical restraints enhance efficiency
Dobson and Waterson (1997)	Countervailing power	One manufacturer, n retailers retailers have bargaining power retailers engage in Bertrand competition	Greater retail concentration is beneficial only when retail services are close substitutes
Ellison and Snyder (2001)	Countervailing power	Empirical analysis of data on wholesale prices for antibiotics in the U.S. during the 1990s	Price discounts depend on the ability to substitute among alternative suppliers, rather than on buyer size

Table 1: Effects of Vertical Restraints (continued)

Author(s) and year	Vertical restraint(s)	Setting	Effects of vertical restraint(s)
Gallini and Winter (1983)	RPM	One manufacturer, monopolistically competitive retailers	A price floor is profitable to manufacturer; price floors improve welfare if demand elasticity is constant; profitable price ceilings may decrease welfare
Lariviere and Padmanabhan (1997)	Slotting allowances	One manufacturer, one retailer	In equilibrium, the high-demand manufacturer offers a positive slotting allowance and lower wholesale price
Lin (1990)	ED ETs	Two manufacturers, one retailer	Higher consumer prices and lower welfare than NED
Martimort (1996)	ED	Two manufacturers, two retailers	ED might be chosen under specific assumptions
Mathewson and Winter (1987)	ED	Two manufacturers, large number of retailers	Welfare can increase or decrease by using ED; welfare is likely to decrease when demand for the two products is very asymmetric
O'Brien and Shaffer (1992)	General non-linear contract	One manufacturer, n retailers; manufacturer signs bilateral contracts with each retailer, which cannot be observed by other retailers	Non-linear contracts cannot achieve efficiency
O'Brien and Shaffer (1993)	ED	Two manufacturers, one retailer	Higher welfare compared with NED
O'Brien and Shaffer (1997)	Non-linear pricing ED	Two manufacturers, one retailer	ED may be redundant: outcome can be replicated by non-linear pricing; even if not redundant, it does not make the manufacturer better off
Perry and Besanko (1991)	ED RPM Franchise fees	Two manufacturers	
Raff and Schmitt (2000)	ETs	Foreign manufacturer, domestic retailers	In equilibrium, manufacturers might substitute ETs for gov't trade barriers
Rasmusen, Ramseyer, and Wiley (1991)	ED	One manufacturer, n identical retailers;	ED used to deter entry

Table 1: Effects of Vertical Restraints (continued)

Author(s) and year	Vertical restraint(s)	Setting	Effects of vertical restraint(s)
		two periods	
Rennhoff (2002)	Slotting allowances	Theoretical/empirical analysis, data from the ketchup industry in the U.S. for 1988–92	An increase in brand quality increases retailer markups and has ambiguous effect on optimal slotting allowances
Rey and Stiglitz (1988) Rey and Stiglitz (1995)	ED ETs Franchise fees	Two manufacturers, competitive retailers	Higher prices and profits; lower consumer surplus lower total welfare
Rey and Tirole (1986)	Franchise fees RPM ETs	One manufacturer, two retailers, competitive supply of identical retailers, demand/cost uncertainty	Under demand uncertainty, RPM is preferred to competition and competition to ETs; under cost uncertainty, competition is preferred to ETs and ETs to RPM from the private and social points of view
Schwartz (1987)	ED	One dominant manufacturer, two rival manufacturers, one class of loyal consumers, one class of consumers views the product identical	NED may make the manufacturer better off
Shaffer (1991)	Slotting allowances RPM	Perfectly competitive manufacturers, differentiated retail duopoly	Slotting allowances and RPM reduce total surplus
Snyder (1996)	Countervailing power	One manufacturer, n retailers; dynamic model	Retailers exercise countervailing power by accumulating a backlog of orders
Sullivan (1997)	Slotting allowances	m manufacturers, n retailers; consumer search model	An increase in the supply of products increases the slotting allowance if sales per store do not increase
von Ungern-Sternberg (1996)	Countervailing power	One manufacturer, n retailers; Cournot/perfect competition at retail	Greater retail concentration increases/decreases consumer prices under Cournot/perfect competition
Winter (1993)	Franchise fees RPM ETs	One manufacturer; manufacturer has bargaining power; n retailers	Lower welfare; anti-competitive effects at retail level; eliminate vertical and horizontal externalities

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