THE KOREAN ECONOMIC REVIEW
Volume 26, Number 2, Winter 2010

MULTI-PRODUCT RETAIL COMPETITION AND MINIMUM RESALE PRICE MAINTENANCE

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This paper examines the incentives of adopting the minimum resale price maintenance within the context of a model that incorporates inter- and intra-brand competition. When the manufacturing and retail sectors are competitive, a manufacturer would not voluntarily want to impose a minimum resale price maintenance since it would reduce the sales of the product and hence its profit, whereas a retailer with a higher price than its competitor would desire to have the minimum resale price maintenance imposed. This paper shows that a retailer with a larger market share can coerce manufacturers of less popular products into adopting minimum resale price maintenance, using it as a strategic tool for raising a rival retailer's price. The possibility of implementing such coercion depends on the extent of availability of retail shelf space and the disparity in the retailers' market shares.

JEL Classification: L42, L20
Keywords: resale price maintenance, inter-brand competition

I. INTRODUCTION

Resale price maintenance is a vertical restraint that limits the extent of retailers' pricing decisions. It is a provision in the contract restricting the choice of the final price to a certain level. It often takes the form of a

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Received: Oct. 8, 2010. Revised: Oct. 29, 2010. Accepted: Dec. 9, 2010.
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price-floor, a price-ceiling, or both.[1] The motivation behind manufacturer's use of price-ceiling is generally understood as to limit the retail price mark-up and to increase sales at a given wholesale price. The rationale behind the use of a price-floor, the minimum resale price maintenance, which prohibits setting the retail price below a certain level, is very controversial because it would seem to be against the interest of a manufacturer facing a downward sloping demand.

A number of different explanations for the adoption of minimum resale price maintenance (henceforth, RPM) has been proposed, some in support and others against its use. Not surprisingly, the antitrust policy enforcement regarding RPM also has varied over time as the sentiments of one, then the other have had more influence.[2] We are still far from reaching a consensus as to whether the effect of RPM is pro-competitive or anti-competitive.[3]

This paper re-examines the incentives behind the adoption of RPM in a context of a multi-product retail competition model. Previous studies on RPM typically employ one or more of the following assumptions: perfectly competitive retail market, single-product retailers, and/or a monopoly manufacturer product. Casual observation, however, indicates that a handful of differentiated retailers, each selling several close

[1] *See* Tirole (1988, p. 171) for more variants of the resale price maintenance practice.

[2] In the early days of American antitrust, vertical price-fixing agreements were condemned as Sherman Act Section 1 violation. In 1911, the U.S. Supreme Court in *Dr. Miles Medical Co. v. John D. Park & Sons Co.,* 220 U.S. 373 (1911) imposed a general ban on resale price maintenance on the grounds that vertical price fixing was almost always anti-competitive. In 1937, the Miller-Tydings Resale Price Maintenance Act amended the Sherman Act, giving antitrust immunity to RPM contract. In 1952, the McGuire Act extended the Miller-Tydings Act to permit the enforcement of RPM upon non-signing sellers where state laws permit. Repeal of the Miller-Tydings and McGuire Acts in 1975 effectively ended 'fair trade', as states also repealed their laws permitting RPM contracts. RPM has been illegal *per se* under the antitrust laws since 1975. However, a new wave of a 'rule of reason' approach has sprung up(see, for instance, Overstreet (1983)). The Department of Justice has filed an *amicus curiae* brief in *Monsanto Co.* v. *Spray-Rite Service Corp*., 465 U.S. 752 (1984) asking that all resale price maintenance agreements should be treated under a rule of reason. More recently, in *Business Electronics Corp.* v. *Sharp Electronics Corp.*, 99 S.Ct. 808 (1988), and also in *Leegin Creative Leather Products Inc. v. PSKS Inc.* 127 S.Ct. 2705 (2007), the Supreme court held that a manufacturer's decision to stop supplying discounters is not necessarily an antitrust violation.

[3] For the summary of contrasting views and legal cases regarding RPM, readers are referred to Ippolito (1988, 1991), Jullien and Rey (2007), Overstreet (1983), Overstreet and Fisher (1985), Perry and Besanko (1991), Pickering (1969), Scherer (1983), and Steiner (1997) and the references therein.

substitute products, enjoy substantial market shares. The above assumptions ignore what maybe the crucially relevant factors behind an outcome of market interactions, namely the retailer differentiation and inter-brand competition, and have led us to consider RPM mainly in terms of the difference in retail service.

By relaxing these three assumptions, another explanation for the adoption of RPM could arise in which RPM is utilized as a strategic tool by a stronger retailer to raise rival's price. This paper proposes a model of multi-product retail competition and explores the possibility of imposing RPM as a result of retailer coercion.[4]

The retailer coercion explanation is made through a credible threat to pull the manufacturer product off from the retail shelf unless RPM is adopted. That the RPM explanation hinges on the shelf space limitation bears some similarity with the work of Shaffer (1995) who suggests that RPM is a compensation for retailers' opportunity cost of shelf space. The main differences of our work from the Shaffer's are that in our work it is more conducive for RPM to appear when products are closer substitutes as the conditions for retailer's credible threat are easier to be met, and that RPM is initiated by retailer and forced upon an unwilling manufacturer. By contrast, in Shaffer's work, RPM is less apt to arise when the products are closer substitutes, and initiated first by a manufacturer.[5]

Before presenting the model, a summary of RPM debate and criticisms on the modeling practice is presented for those unfamiliar with the literature on RPM and modeling practice hereto.

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[4] With recent growth of e-trading, the controversy over fair trading has revived in Korea, too. As a notable example, faced with competition from low-priced online booksellers, off-line bookstores had threatened to pull the publishers books from their shelf unless publishers prevent price-shedding of online sellers. This compelled publishers to refuse to supply books to discount online booksellers, prompting controversy over the legitimacy of RPM. This conflict eventually led to a compromising regulation that limits the extent of price-discounting on newly published books.

[5] In his study, since a retailer's profit from selling an alternative of a manufacturer product is increasing in the price of the manufacturer's product at other stores, the adoption of RPM by the manufacturer makes the alternative offering by a retailer less profitable. Hence, RPM works to prevent retailers from dropping her product, although his focus is on the comparison of the manufacturer's choices of RPM with a lump-sum payment as the compensation of shelf space.

1.1. A Historic Account of the RPM Debate

The leading pro-competitive explanation of RPM is the service free-riding argument by Telser (1960). This situation arises when special dealer service is vital to the sales of a product (that the product is complex in nature), and the provision of the service cannot be tied to the condition of product purchase. Then, consumers can obtain the service at one dealer and purchase the product at a lower price from a discount dealer who does not offer the service. Unless the manufacturer protects the dealer margin through RPM, the dealer service would be dissipated amid price competition with rival retailers. Thus, Telser argues that the use of RPM is justified to ensure adequate retailer service and promote fair trade.

One objection to the free-rider explanation has been its incompleteness - there are many product areas that do not require such special services where RPM is used.[6] Marvel (1994), however, argues that the "special services" explanation, when interpreted more broadly, provides an adequate justification for permitting manufacturers to use RPM in many instances for which the explanation appears to be inapplicable.[7] Another objection is that even for such product areas where the special service is needed, RPM is not an effective tool in eliminating the free-riding problem.[8]

Marvel and McCafferty (1984) have extended Telser's "free-rider"

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[6] For example, Scherer and Ross (1989, p. 554) write, "the free-rider justification of resale price maintenance has severe limitations. Its plausability is palpably low in many product areas where RPM is used." Kleit (1993, p. 600) excerpts a statement of former FTC commissioner Robert Pitofsky to Senate subcommitee: "the 'free rider' explanation for vertical price-fixing is a totally theoretical matter. No study has ever demonstrated that manufacturers regularly or frequently engage in minimum price-fixing to ensure provision of services, and many products as to which minimum price-fixing has been tried....involve few if any services."

[7] Ironically, Telser (1960) himself seemed to have precluded any pro-competitive explanations based on broader interpretation of the special retailer service. He defines the special services as services that are specific to the commodity and unrelated to the retailer's methods of generally doing business, and writes, "If the retailers' general business methods are at issue such as whether they provide their customers with a pleasant atmosphere, delivery, credit, and the like then there is no need for the protection of resale price maintenance on the particular commodity to be sold jointly with these services."

[8] Klein and Murphy (1988) argue that free-riding explanation is based on unrealistic assumption that the sole avenue of nonprice competition available to dealers is the supply of the particular services desired by the manufacturers, and that the vertical restraints, by themselves, will not necessarily induce better service from free-riding dealers. *See* also Grimes (1995, p. 101).

theory to products that do not require tangible pre-sale retailer service. Their explanation of RPM is based on the manufacturer's desire to obtain certification of the quality of his product. If consumers regard the fact that some particular retailer carries a product as a signal of quality, "free-riding" is a problem as long as consumers care where a product is sold, but do not care where they purchase their own supplies of it. They maintain that RPM is to guarantee the quality-certifying retailer a margin sufficient to cover its cost, and it results in the provision of valuable information.

More recently, studies of RPM with models that are not based on free-riding have appeared. Aside from Shaffer (1995) who explains RPM as the manufacturer's compensation for the opportunity cost of retailer's shelf space, Deneckere, Marvel and Peck (1996) provide a model of RPM as a means to support adequate retail inventories in the presence of demand uncertainty. In a subsequent work, Deneckere, Marvel and Peck (1997) show that, for a monopolist manufacturer facing uncertain demand, using RPM to prevent "destructive" competition in retail sector can be more profitable and also socially beneficial.

Turning to the other side of the controversy, the primary anti-competitive theory of RPM is the collusion theory. Here, the RPM is suspected as a collusion-facilitating tool either by a manufacturers' cartel, or by a retailers' cartel coercing the manufacturers.[9] The plausibility of the collusion theory has been put to question in consideration of strong incentive to deviate from cartel agreement.[10] However, there are some historical evidence supporting retailers' consorted efforts to make manufacturers adopt RPM.[11]

1.2. On RPM Modeling

As much as the views regarding the RPM have been contentious, the economic models addressing the issues of RPM have also been subject to

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[9] *See* Jullien and Rey (2007) for collusion motivated RPM explanation and related works.

[10] Ippolito (1991) concludes that collusion theories do not explain most uses of resale price maintenance based on a litigation sample.

[11] A well-known example is the National Association of Retail Druggists' forcing RPM on unwilling manufacturer of Pepsodent toothpaste. *See* Palamountain (1955, pp. 235-239) for more detail.

criticism. Steiner (1997) points out that the economic models on RPM employ a “single-stage” framework, in which the retail market is assumed to be either perfectly competitive, or monopolized. When perfectly competitive retail market is assumed,[12] any differences in retailers’ prices have to be explained as attributable to cost differences that are due to differences in services. Such models necessarily lead to some sort of free-riding explanations for adopting RPM.[13]

Consequently, retailers are modeled as taking a rather passive role without much bargaining power vis-à-vis manufacturers. However, clearly distinctive retailer identities, appearance of large chain stores, and substantial surge in the number of new products introduced each year cast doubts on validity of portraying retailers as having a merely passive role without much bargaining power. Hammonds and Radtke (1990) report that a typical supermarket has room for fewer than 25,000 products, whereas the number of products available is around 100,000, and that between 10,000 and 25,000 items are introduced each year. This observation suggests that not all products find their way onto the shelf of retailers, and that it can be quite a competitive process to obtain shelf space for less established/recognized manufacturer products. The appearance of “slotting allowances” and “renewal allowances” in mid-1980’s maybe the indicator of shift in relative bargaining power from manufacturers to retailers.

In addition, few studies of RPM address the effects of interbrand competition explicitly, although casual observation suggests the existence of many close substitutes in a product category. Formal models using assumptions of products without close substitutes and abundance of competitive retailers may have given some misleading conclusions when applied to vertical restraint.

In reality, both the manufacturing and retail sector are neither monopolized nor perfectly competitive. Typically, the manufacturing

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[12] With the assumption of retail monopoly, the concern for a manufacturer is to reduce the double marginalization of successive monopoly mark-ups, which leads to the issue of price-ceiling.

[13] He states (p. 408), “As seen through a single-stage lens, manufacturers’ and consumers’ interests are always, instead of usually, identical. The logic goes like this: the manufacturer that embraces vertical restraints thereby raises its brand’s retail price. Thus, the firm must have had a pro-competitive output-increasing motive, such as curing a free-rider problem. Otherwise, the higher retail price produced by the restraints causes the brand’s sales to fall.”

sector is monopolistically competitive through product differentiation and there are a handful of retailers distributing the manufacturer products within the relevant market range. The retailers are also differentiated and have some steady customer base such that even if a retail store has a lower price for a product than others, it cannot take away all the sales of the product from other retailers. Also, a change in a product's price by one retailer generally will not have the same effect as the same price change of the product by another retailer. The steady customer base a retail store has, combined with degree of substitutability of a manufacturer's product, will determine relative bargaining power of the retailer dealing with the individual manufacturer. A strong retailer with a large market share may exercise its clout to maneuver a manufacturer to his benefit. Examples of such behaviors are abundant. In *Business Electronics Corp. v. Sharp Electronics Corp.*[14], Hartwell, a Sharp dealer, issued an ultimatum to Sharp, threatening to drop the Sharp products unless its lower-priced rival dealer, Business Electronics, stops undercutting of the price. The ultimatum apparently led Sharp to terminate its relationship with Business Electronics.[15]

The demand of a manufacturer product facing a retailer that carries it is dependent not only on its own price and other prices of the products the retailer carries, but also on those of rival retailers and on relative position (e.g., reputation, physical location, nicety of display, etc.) of all retailers. In other words, the demand for a brand[16] is a function of the vigor of interbrand competition with rival brands, the intensity of intrabrand competition among the brand's retailers, relative market power (or market share) of the retailers, and the manufacturer's bargaining power with these retailers.

[14] 485 U.S. 717.

[15] Marvel (1994, p. 86) cites another example that clearly shows the retailer power: R.H. Macy department store chain, upon hearing the plan of Kids "R" Us, the Toys "R" Us's new clothing chain, to expand their lines to children's swimwear, informed the manufacturers that if they sold to Kids "R" Us, Macy could well reduce or eliminate entirely its business with these firms. The threat of Macy resulted in each of the swimwear manufacturers deciding to deal with Macy's and to drop Kids "R" Us.

[16] We will use the terms product and brand interchangeably.

1.3. Direction of Alternative Modeling

The main focus of this paper is to examine whether and how the adoption of RPM is attributable to the difference in market position of retailers and manufacturers. To examine the incentive to impose RPM and its effects in such an environment, therefore, we need to depart from monopoly or perfectly competitive market setting and single product retailer model.

This study is an attempt to present a model that incorporates all forces of market interaction - interbrand and intrabrand competition, and manufacturers' and retailers' relative market position. To capture all the market forces, the model should allow for differentiated manufacturer products[17] and their interrelated demands, for possible different consequences of retailer actions due to their differentiation, and for differing operating costs of retailers other than (in addition to) the usual costs of wholesale product prices of manufacturers.

Attempting to model such an environment in a direct fashion can be a quite a formidable task and analytically difficult. Instead, in order to avoid messy specification of environments and losing manageability, we take an indirect route and present a model which has a modified role for retailers from their usual role of acting purely as channel distributors of manufacturers' products to consumers. In the model, retailers are portrayed as the producers of differentiated composite goods taking manufacturer products as factors of production. The specification of production technology parameters for retailers' composite goods thereby is meant to capture the consumers' differential preference over the differentiated manufacturer products (and also differential treatment of the same manufacturer product purchased from different retailers). Retailer's pricing decision of each manufacturer's product and its overall effect (and the changes of) on the retailer's status is mirrored in the pricing and sales of the composite goods.

With this approach, we find that a retailer can use resale price maintenance as a strategic tool for limiting rival retailer's choice: A

[17] This is one of essential aspects of RPM model since RPM can only be imposed for branded products where a product is physically distinguishable from rival products.

manufacturer of less popular brand with relatively high manufacturer price can be subject to a threat of a retailer with large market share, and involuntarily impose RPM. The possibility of RPM being used for such strategic purpose disappears as the retailers' market share disparity gets smaller.

Section 2 presents the basic assumptions of the model and outlines the equilibrium conditions of manufacture and retail sectors. Section 3 interprets the model and translates the equilibrium conditions into the usual market setting of retailers acting as distributors of manufacturers' products, and investigates the effects of RPM. Section 4 concludes.

II. THE MODEL

2.1. Assumptions and Notations

There are n manufacturers each producing a differentiated product i, $i = 1, 2, \ldots. n.$ Each product has an associated attribute β. Two retailers, A and B, purchase some of the manufacturer products and use them as factors of production for their composite goods, Y^A and Y^B, respectively. I will use superscripts for denoting retailers and subscripts for denoting manufacturers. The productions of Y^A and Y^B observe constant elasticity of substitution (CES) technology as follows.

$$Y^A = f^A(\mathbf{x}) = \left(\sum_{i \in I^A} \beta_i x_i^{-\rho}\right)^{-\frac{1}{\rho}} \text{ and}$$

$$Y^B = f^B(\mathbf{x}) = \alpha\left(\sum_{i \in I^B} \beta_i x_i^{-\rho}\right)^{-\frac{1}{\rho}},$$

$$\text{where } 0 < \alpha < 1, \; 0 < \beta_i < 1, \text{ and } -1 < \rho < 0.$$

I^r $(r = A, B)$ is the set of input factors (i.e., manufacturer products) that retailer r uses for production. I^A and I^B are not necessarily the same and there is an upper limit on the number of input variety each retailer can employ. That is, the cardinality of set $|I^r| < n^r (< n)$ for $r = A$, B.[18] The

[18] With the CES production function, the more the variety of inputs used in production, the lower the unit production cost. Both retailers prefer to use as many input variety as possible but are constrained by this limit n^r. In equilibrium, each retailer r will employ the maximum variety of

parameter ρ specifies the degree of substitution and α is the retailer B 's relative production efficiency parameter. This allows for any possible differences in the way a retail business is organized and operated. The unit price of input i (equivalently, the wholesale price of manufacturer i's product to retailer) is denoted by w_i, and is assumed to be the same for both retailers (manufacturers cannot price discriminate retailers).

A representative consumer (reflecting the preference of whole market constituents) has a separable utility function $U(m, Y^A, Y^B) = m + u(Y^A, Y^B)$ where m represents all other goods with price equal to one. Assume $u(\cdot)$ is continuous and twice differentiable concave function. Maximizing the utility subject to a budget constraint gives the demand functions for the composite goods Y^A and Y^B as function of both prices, $Y^A(P^A, P^B)$ and $Y^B(P^A, P^B)$.

2.2. The Retail Sector

Each retailer r maximizes his profit by choosing the optimal level of output Y^r, taking Y^z as given.

$$\max_{Y^r} \prod^r (Y^r, Y^z) = P^r(Y^r, Y^z)Y^r - C(Y^r)$$
$$= P^r(f^r(\mathbf{x}^r), f^z(\mathbf{x}^z))f^r(\mathbf{x}^r) - \mathbf{w}^r \cdot \mathbf{x}^r \tag{1}$$
$$(r \neq z \text{ and } r, z = A, B)$$

where $\mathbf{x}^r$ is a vector of factor demands, and $\mathbf{w}^r$ is a vector of factor prices for all factors $i \in I^r$.[19] We defer the problem of retailer determining the input set to a later section. Taking the set of inputs as given for now, this problem is the same as determining the optimal levels

inputs n^r. This assumption reflects the scarcity of shelf space that retailers use to display products. We also want to allow for the possibility that there may exists some impediments that prevent the weaker retailer from obtaining the dealership of some products despite his wishes. This assumption is consistent with the result of Marvel and McCafferty (1984) that some manufacturer may refuse the dealership of his product to discount retailers in fear of the deterioration of the product's reputation.

[19] By the Implicit Function Theorem, the demand function $Y^r(P^r, P^z)$ and $Y^z(P^r, P^z)$ are invertible to $P^r(Y^r, Y^z)$ and $P^z(Y^r, Y^z)$, provided that $Y^r(P^r, P^z)$ is continuous, possesses continuous first partial derivatives and the Jacobian is nonsingular.

of factor demands x_i 's.[20]

The first-order conditions for retailer $r\left(r = A, B\right)$ are

$$(P^r + \frac{\partial P^r}{\partial Y^r} \cdot Y^r)\frac{\partial f^r(\mathbf{x}^r)}{\partial x_i} - w_i = 0 \text{ for all input } i \in I^r. \tag{2}$$

For any two factors i and j, the marginal rate of technical substitution (MRTS) of factor i for factor j is given by the ratio of marginal products:

$$\frac{\frac{\partial f^A}{\partial x_i}}{\frac{\partial f^A}{\partial x_j}} = \frac{\beta_i}{\beta_j}(\frac{x_j}{x_i})^{1+\rho} = \frac{\frac{\partial f^B}{\partial x_i}}{\frac{\partial f^B}{\partial x_j}} \text{ for } i, j \in I^A, I^B. \tag{MRTS}$$

Thus, for any two factors used in the production for both retailers, the ratio of factor intensity is the same for both retailers. Note that the MRTS does not depend on the level of output. From the first-order condition (2), the MRTS is equated to the ratio of factor prices at optimum,

$$\frac{\beta_i}{\beta_j}(\frac{x_j}{x_i})^{1+\rho} = \frac{w_i}{w_j} \text{ for } i, j \in I^A, I^B. \tag{3}$$

The elasticity of substitution (σ_{ij}) is defined as the proportional change in the factor intensity associated with a unit proportional change in the MRTS, holding output constant,

$$\sigma_{ij} = \frac{\partial \log(x_i / x_j)}{\partial \log(\frac{\partial f}{\partial x_i} / \frac{\partial f}{\partial x_j})} = \frac{1}{1+\rho} \equiv \sigma.^{21}$$

[20] This factor demand is the equilibrium sales of each manufacturer product *i* by retailer *r*.

[21] When $\rho = -1(\sigma = \infty)$, this is the case of perfect factor substitution and the isoquant is linear. When $\rho = 0(\sigma = 1)$, the CES function becomes Cobb-Douglas function. When $\rho = \infty(\sigma = 0)$, it becomes Leontief function with a right angle isoquant and the factor substitution is impossible.

Note that the elasticity is constant for all pairs of factors.

Since the CES production function is homogeneous of degree one, by Euler's theorem[22] and the first-order condition (2), the following holds.

$$Y^r = f^r(\mathbf{x}) = \sum_{i \in I^r} x_i \cdot \frac{\partial f^r}{\partial x_i} = \sum x_i \cdot \left(\frac{w_i}{P^r + \frac{\partial P^r}{\partial Y^r} Y^r}\right) for\ r = A, B\ .$$

Because the $\sum_{i \in I^r} x_i w_i$ is the total costs for producing Y^r, by multiplying both sides by $P^r + \frac{\partial P^r}{\partial Y^r} Y^r$, it can be written as

$$C(Y^r) = \sum_{i \in I^r} x_i w_i = \lambda^{\mathrm{r}} \cdot Y^r \tag{4}$$

where $\lambda^r \equiv P^r + \frac{\partial P^r}{\partial Y^r} Y^r$. The equation (4) tells us that the cost functions for both retailers exhibit constant returns to scale. Thus, the marginal cost and average variable cost are constant and given by λ^r.

The expression for marginal cost for retailer *A* is

$$\lambda^A = \left(\sum_{i \in I^A} \beta_i^{\sigma} \cdot w_i^{1-\sigma} \right)^{\frac{1}{1-\sigma}} \tag{5}$$

and for retailer *B* is

$$\lambda^B = \left(\frac{1}{\alpha} \right) \left(\sum_{i \in I^B} \beta_i^{\sigma} \cdot w_i^{1-\sigma} \right)^{\frac{1}{1-\sigma}} \tag{6}$$

Here we confine our analysis to the interval $-1 < \rho \leq 0$.

[22] The function $f(\mathrm{x}) = \alpha(\sum \beta_i x_i)^{-1/\rho}$ is homogeneous of degree one since

$$f(\mathbf{tx}) = \alpha[\sum \beta_i (tx_i)^{-\rho}]^{-1/\rho} = \alpha[t^{-\rho} \sum \beta_i x_i^{-\rho}]^{-1/\rho} = t \cdot \alpha(\sum \beta_i x_i^{-\rho})^{-1/\rho} = t \cdot f(\mathbf{x}) \cdot$$

For a function of homogenous of degree one, Euler's theorem tells us that if each input is paid its marginal product, the total product is exhausted such that $f(\mathrm{x}) = \sum_i x_i \frac{\partial f}{\partial x_i} \cdot$

Now, we can write conditions for the equilibrium outputs and factor demands. Since $\lambda^r = \dfrac{w_i}{\dfrac{\partial f^r(\mathbf{x}^r)}{\partial x_i}}$ from (2), the equilibrium outputs $(\hat{Y}^A, \hat{Y}^B)$ satisfy the following conditions.

$$P^A(\hat{Y}^A, \hat{Y}^B) + \frac{\partial P^A(\hat{Y}^A, \hat{Y}^B)}{\partial Y^A}\hat{Y}^A = \lambda^A \quad \text{and}$$
$$P^B(\hat{Y}^A, \hat{Y}^B) + \frac{\partial P^B(\hat{Y}^A, \hat{Y}^B)}{\partial Y^B}\hat{Y}^B = \lambda^B. \tag{7}$$

The equilibrium factor demands $\hat{\mathbf{x}}^A$ and $\hat{\mathbf{x}}^B$ are given in terms of factor prices and the outputs. By Shephard's Lemma,

$$\hat{x}_i^A(\mathbf{w}, \hat{Y}^A) = (\beta_i)^\sigma w_i^{-\sigma} \left(\sum_{i \in I^A} \beta_i^\sigma \cdot w_i^{1-\sigma} \right)^{\frac{\sigma}{1-\sigma}} \hat{Y}^A = (\beta_i)^\sigma \left(\frac{\lambda^A}{w_i} \right)^\sigma \hat{Y}^A \tag{8}$$

for all $i \in I^A$ and

$$\hat{x}_i^B(\mathbf{w}, \hat{Y}^B) = (\frac{\beta_i}{\alpha^\rho})^\sigma w_i^{-\sigma} \left(\sum_{i \in I^B} \beta_i^\sigma \cdot w_i^{1-\sigma} \right)^{\frac{\sigma}{1-\sigma}} \hat{Y}^B = \left(\frac{\beta_i}{\alpha^\rho} \right)^\sigma \left(\frac{\lambda^B}{w_i} \right)^\sigma \hat{Y}^B \tag{9}$$

for all $i \in I^B$.

Note that the factor share of input x_i for both retailers, $\dfrac{w_i x_i}{\lambda Y} = \left(\dfrac{\beta_i}{\alpha^\rho} \right)^\sigma \left(\dfrac{\lambda}{w_i} \right)^{\sigma - 1}$ (substitute $\alpha = 1$ for retailer *A*), is independent of the output level, which is the trait of the homothetic property of CES function.

2.3. The Manufacturers' Problem

The manufacturer *i* sets his factor price w_i to maximize his profit

$$\max_{w_i} \ \Pi_i(\mathbf{w}) = \left[x_i^A(\mathbf{w}, Y^A) + x_i^B(\mathbf{w}, Y^B) \right] (w_i - c_i)$$

where $x_i^r(\cdot)$ is the factor demand by retailer r, and c_i is the constant marginal cost of producing product i. The necessary condition for the maximal profit is

$$\left[x_i^A(\mathbf{w},Y^A)+x_i^B(\mathbf{w},Y^B)\right]+\left[\frac{dx_i^A(\mathbf{w},Y^A)}{dw_i}+\frac{dx_i^B(\mathbf{w},Y^B)}{dw_i}\right](w_i-c_i)=0, \quad (10)$$

taking all other factor prices as given.

If we write the equilibrium outputs (7) as a function of the marginal costs,

$$Y^A = g(\lambda^A,\lambda^B) \text{ and } Y^B = h(\lambda^A,\lambda^B),$$

the changes in factor demands, x_i^A and x_i^B, with respect to its price w_i are

$$dx_i^A = -\left\{\frac{\sigma x_i^A}{w_i}-\left(\frac{x_i^A}{Y^A}\right)^2\left[\frac{\partial g}{\partial\lambda^A}+\frac{\partial g}{\partial\lambda^B}\alpha^{\sigma-1}\left(\frac{\lambda^B}{\lambda^A}\right)^{\sigma}+\frac{\sigma Y^A}{Y^A}\right]\right\}dw_i$$

and

$$dx_i^B = -\left\{\frac{\sigma x_i^B}{w_i}-\left(\frac{x_i^B}{Y^B}\right)^2\left[\frac{\partial h}{\partial\lambda^B}+\frac{\partial h}{\partial\lambda^A}\alpha^{-(\sigma-1)}\left(\frac{\lambda^B}{\lambda^A}\right)^{-\sigma}+\frac{\sigma Y^B}{Y^B}\right]\right\}dw_i .$$

Thus,

$$\frac{dx_i(\cdot)}{dw_i}=\frac{dx_i^A(\cdot)}{dw_i}+\frac{dx_i^B(\cdot)}{dw_i}=-\frac{\sigma(x_i^A+x_i^B)}{w_i} + \delta \quad (11)$$

$$\text{Where } \delta \equiv \left(\frac{x_i^A}{Y^A}\right)^2\left[\frac{\partial g}{\partial\lambda^A}+\frac{\partial g}{\partial\lambda^B}\alpha^{\sigma-1}\left(\frac{\lambda^B}{\lambda^A}\right)^{\sigma}+\frac{\sigma Y^A}{\lambda^A}\right]+$$

$$\left(\frac{x_i^B}{Y^B}\right)^2\left[\frac{\partial h}{\partial\lambda^B}+\frac{\partial h}{\partial\lambda^A}\alpha^{-(\sigma-1)}\left(\frac{\lambda^B}{\lambda^A}\right)^{-\sigma}+\frac{\sigma Y^B}{\lambda^B}\right].$$

We can see that the effects on the total factor demands x_i of a change in w_i alone have direct and indirect effects. The first term on the right-hand side in (11) gives the direct effect of a change of w_i on x_i, due to substitution with other factors in production. The second term δ gives the indirect effects, through changes in outputs that are caused by changes in marginal costs.[23] When there are n varieties of factors involved in production, the change on marginal cost λ^r $(r = A, B)$ due to a change in w_i is of the order (1/n). This change of marginal cost on output is further mitigated by the opposite signs of $\frac{\partial Y^r}{\partial \lambda^r}$ and $\frac{\partial Y^r}{\partial \lambda^z}$ $(r, z = A, B)$. We shall assume that n is reasonably large. Then the effect of a change in w_i on the marginal costs is very small, and accordingly, we can neglect this indirect effects δ. This enables us to write the necessary condition for profit maximum for each manufacturer as

$$\frac{\hat{w}_i - c_i}{\hat{w}_i} \cong \frac{1}{\sigma}. \tag{12}$$

This is similar to the familiar form of monopoly pricing rule that the price markup is inverse of the elasticity of demand. Since retailers' production technology exhibits constant elasticity of substitution, the elasticity of the demand facing each manufacturer's product is approximated to the elasticity of substitution.[24] Thus, from (12) each manufacturer's equilibrium price is

$$\hat{w}_i = \frac{c_i}{-\rho}. \tag{13}$$

[23] That is, the indirect effects (δ) are

$$\frac{\partial x_i^A}{\partial Y^A}\left(\frac{\partial Y^A}{\partial \lambda^A}\frac{\partial \lambda^A}{\partial w_i} + \frac{\partial Y^A}{\partial \lambda^B}\frac{\partial \lambda^B}{\partial w_i}\right) + \frac{\partial x_i^B}{\partial Y^B}\left(\frac{\partial Y^B}{\partial \lambda^B}\frac{\partial \lambda^B}{\partial w_i} + \frac{\partial Y^B}{\partial \lambda^A}\frac{\partial \lambda^A}{\partial w_i}\right).$$

[24] Since we ignore the indirect effects, the change in factor demand due to a change in factor price is given by the $\frac{\partial x_i}{\partial w_i} = -\sigma \frac{x_i}{w_i}$ and thus, the elasticity of the factor demand is $\frac{\partial x_i}{\partial w_i}\frac{w_i}{x_i} = -\sigma$. In Dixit and Stiglitz (1977), they use a CES utility function to determine optimal variety of goods. They refer to the elasticity of substitution as the elasticity of the demand for each monopolistic competitior (the *dd* curve in Chamberlinian terminology).

Note that the manufacturer's price is only dependent on the marginal cost of production and the substitution parameter.

III. INTERPRETATION AND IMPLICATIONS

We now translate above model into that of more familiar market scenario in which retailers serve as channel distributors of manufacturer products. Products are differentiated by the attribute β. This attribute can be interpreted as the degree of the product popularity (brand recognition) or perceived product quality. Given the number of product variety, carrying more popular products attract more customers. This is captured in the model that using factors with higher β's reduces the marginal cost and thus increases profits, other things being equal. Carrying wide selection of products also brings in more customers, thus results in higher profits. Again, this is reflected in the lower marginal cost (higher profit) when more input variety is employed.

The degree of interbrand competition present in the market is quantified by σ, the elasticity of substitution. When products are closer substitutes, the competition between products is more severe because consumers will substitute away more from a product in response to a small increase in its price. With the way our model is set up, it is through the retailers' production function where this interbrand competition shows up, since they produce composite goods. The form of this composite good production function is a reflection of consumers' taste over the products. The marginal rate of technical substitution, given a level of output, can be regarded as the marginal rate of substitution, holding utility level constant. Thus, the higher the σ, the more substitutable each input is with other input, and hence the more intense the interbrand competition is. The manufacturer's price markup reflects this relationship and is inversely related to the elasticity of substitution as seen in (12).

According to the production function of retailers, a unit of composite good can be produced by infinite number of differently weighted combinations of manufacturer products. A unit of composite goods thus produced by any two different input combinations corresponds to two different points on the same utility indifference curve to our representative consumer, indicating different product displays a retailer may choose to present. There is a single representative consumer in the economy and his demand is, therefore, the aggregate demands of the whole economy. The demand schedule of this consumer is an amalgam of demand schedule facing individual manufacturer product.

The retailers are not concerned about the particular mix of manufacturer products in itself, but instead care about it because of the differences in profit each mix brings in. They will choose the combination of manufacturer's products in such a way that will maximize profit given the consumer preference. In a standard model, a retailer sets each product's price and make sales according to the consumer demand. Or, we can think of the retailer taking the market clearing prices after presenting certain numbers of different products to consumers. In our model, the latter story applies.[25]

The equilibrium output of retailer's composite good Y^r can be disintegrated into the sales of each manufacturer's product as we will see below. The equilibrium factor demands by a retailer are the retailer's choice of number of products, given the manufacturers' wholesale prices, consumer preference and the rival retailer's choice.

The production function can also reflect the difference in costs with the way in which a retailer's business is operated via the efficiency parameter α . Not all retailers perform their business in the same way. For example, some display all stocks in the shelf, and others choose to bring out products from storage room after consumers fill out an order form, displaying only sample products on the store floor. Or, in chain retail store case, the way delivery of products to each store location can make a difference in the overhead cost. Thus, cost of selling a unit of product is not the same across the retailers even though they are faced with the same wholesale price for the product. The difference in retail price then cannot always be traced to the difference in service or store amenities provided, although they certainly play an important part in cost difference. One of the reasons for invoking production function to model the retail activity is to reflect the idea that the cost of retailing is constrained by the way retailer's *modus operandi* is organized.

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[25] Since raising rival's cost is beneficial both in Cournot and Bertrand type retail competition, the result would be qualitatively the same in the case where retailers choose to compete over price.

3.1. Identifying the Implicit Retail Price

The profit of a retailer in the standard model is the sum of quantity sold times the price margin of each product,

$$\Pi = \sum_{i \in I} x_i (\pi_i - w_i) \tag{14}$$

where π_i is the retail price of ith product and I is the set of products the retailer carries. In our modified model, the retail price is somewhat obscure since the retailers are producing composite goods and there are only the prices of the composite goods that are visible. To examine the effect of RPM, we need to identify the retail price of each product that is implicit in the model. We achieve this by utilizing the property of the linear homogeneity of CES function. The total output of composite good Y produced with a CES production function can be decomposed into the sum of number of inputs multiplied by each input's marginal product. Thus, the profit of a retailer in our model can be written as

$$\Pi = P \cdot Y - \sum_{i \in I} x_i w_i = P \cdot \left\{ \sum_{i \in I} x_i \frac{\partial f}{\partial x_i} \right\} - \sum_{i \in I} x_i w_i = \sum_{i \in I} x_i \cdot \left(P \frac{\partial f}{\partial x_i} - w_i\right).$$

P is the price for the composite good (as a function of his own and the rival's outputs), and x_i is the factor demands. Comparing this expression with (14), we can consider the term $P \frac{\partial f}{\partial x_i}$ the implicit retail price charged for each unit of input i that

$$\pi_i \equiv P \frac{\partial f}{\partial x_i}$$

and hence, $P \frac{\partial f}{\partial x_i} - w_i \; (\equiv \pi_i - w_i)$ as the retail margin for the product

i.[26] From the first order condition (2), the retail margin at equilibrium is

$$(\pi_i - w_i) = -\frac{\partial P}{\partial Y} \cdot Y \cdot \frac{\partial f}{\partial x_i} \quad \text{for all } i \in I,$$

and the total profit is

$$\Pi = \sum_{i \in I} x_i (\pi_i - w_i) = -\frac{\partial P}{\partial Y} \cdot Y \cdot \sum_{i \in I} x_i \frac{\partial f}{\partial x_i} = -\frac{\partial P}{\partial Y} \cdot Y^2 \tag{15}$$

since $\sum_{i \in I} x_i \frac{\partial f}{\partial x_i} = Y$.

3.2. Retailers' Product choice: Determination of inputs

Since the number of available products exceeds the shelf space limitation of retailers, each retailer has to decide which products to carry. A retailer with a shelf space for *k* products (that is, the cardinality of input set is *k*) would choose to carry *k* most profitable products. In our model, this decision is equivalent to choosing the set of inputs given the cardinality *k*. To do that, the retailer first has to rank the values of all inputs in terms of its contribution to his profit (equivalently, its contribution to the reduction of the marginal cost).

Whereas employing (abandoning) an additional input variety always lowers (raises) the level of marginal cost, the magnitude of the change in marginal cost depends on the elasticity of substitution σ. The higher the σ, the smaller the change of marginal cost is. In other words, the absolute value of dealing additional product depends on the intensity of interbrand competition for which σ is used as a proxy. An additional product item on shelf space brings in more sales, but also takes away the sales of other products the retailer carries.

The value of an additional input can be calculated as its contribution to the reduction in the marginal cost λ. In Feenstra and Markusen (1992, p. 417), the change in marginal cost from a change of the input variety is established as

[26] In the previous section, the optimal input demand $x_i(\cdot)$ is derived via cost minimization approach, whereas here is written in profit maximization approach. Due to duality, the same result is derived.

$$\frac{\lambda(\mathbf{w},I')}{\lambda(\mathbf{w},I)}=\left(\frac{\sum_{i\in I'}w_ix_i}{\sum_{i\in I}w_ix_i}\right)^{\frac{1}{1-\sigma}} \tag{16}$$

where I is the set of inputs before change and I' is the changed set of inputs. Suppose that an input is taken out from the set I. Inside the parenthesis measures 1 minus the abandoned input's expenditure share. The expenditure share of an input is dependent on its own and other input prices and attributes. Given all input prices and attributes, its impact (introduction to or deletion from the production) on marginal cost becomes smaller as σ gets larger. If σ is high that $\left(\frac{1}{\sigma-1}\right)$ close to zero, then the term in the right hand side will be close to one. This means that, as the interbrand competition gets fiercer, the change in marginal costs from abandoning a particular input gets smaller. This is accordant with intuition because as σ becomes large, each input becomes closer substitute of one another, and thus introducing a new input or discarding one has less effect on the marginal cost change.

The relative value of inputs can be measured by its contribution to the reduction of marginal cost. From (16), for any pair of inputs i and j, i is more valuable than j if $w_i \cdot x_i^* > w_j \cdot x_j^*$, where x_i^* and x_j^* are optimal input demands of i and j. That is, the magnitude of the increase in marginal cost resulting from discarding an input is greater for input i than that of j if

$$\frac{\beta_i}{\beta_j}>\left(\frac{w_i}{w_j}\right)^{-\rho}=\left(\frac{c_i}{c_j}\right)^{-\rho}.$$

The equality follows from (15). From this, we can rank all inputs according to their position in (β,w) space (equivalently in (β,c) space). A pair of inputs, i and j, are equally valuable if (β_i,w_i) and (β_j,w_j) are on a curve

$$w(\beta) = (\frac{1}{v}) \cdot \beta^{-\frac{1}{\rho}}$$

for some constant v. In Figure 1, this curve is drawn for different value of v. We will refer to the curves as "iso-value" curves. Along each curve, all inputs are equally valuable. A curve to the right has higher value than a curve to the left. An input i is, then, more valuable than j if it is located on a higher curve than j.

We can hence define v_i as the rank of ith input value such that

$$v_i \equiv \frac{\beta_i^{-\frac{1}{\rho}}}{w_i}.$$

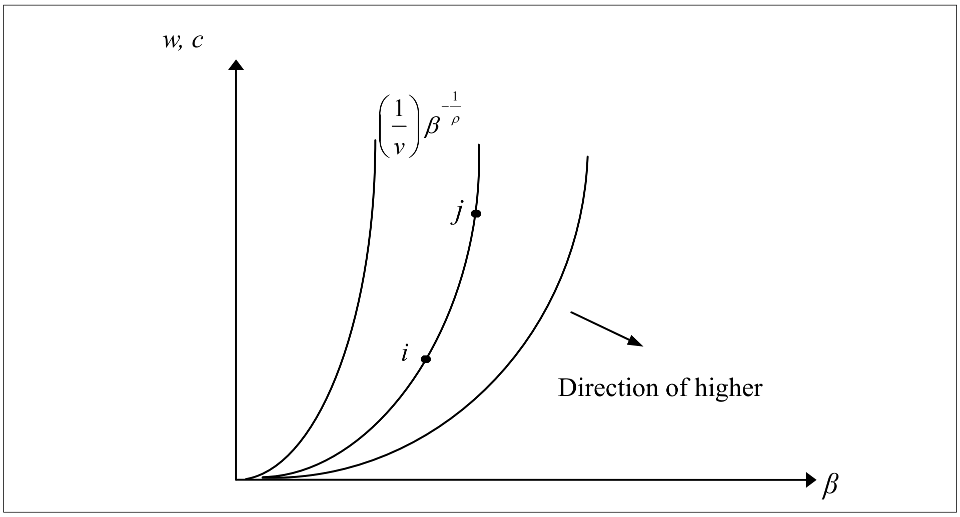
With v_i defined in this way, $v_i > v_j$ implies that the input i is more valuable to a retailer than the input j, since the discarding the input i leads to a larger increases in the marginal cost than discarding input j. If $v_i = v_j$, the inputs i and j are equally valuable and they lie on the same "iso-value" curve. Thus, the input with least v, or the input located on the left-most "iso-value" curve is identified as the least valuable input. This implies that a retailer with k available shelf space will choose to carry products with k highest v_i.[27]

The shape of "iso-value" depends on the magnitude of ρ. As ρ approaches –1 ($\sigma \to \infty$), its shape becomes more like a straight line. Thus, two inputs equally valuable for a given level of σ (that they are on the same "iso-value" curve) will no longer be of the same value under a different level of σ. For instance, the input i and j in Figure 1 are equally valuable to the retailer since they are on the same iso-value curve (for a given level of ρ). However, under a lower value of ρ (σ larger), the input i will be on higher iso-value than j because the iso-value curves are less convex with lower ρ (higher σ). Thus, the n th most valuable input depends on the elasticity of substitution σ. We cannot make a precise statement about the characteristic of the most (or least) valuable input a

[27] In case the kth most profitable product is not unique such that a retailer is indifferent between several products, we assume that the retailer chooses one at random.

priori, because it depends on the distribution of inputs on (β, w) space. But we can make general prediction that the input with low β tends to be the least valuable input when σ is low and the price differentials are not substantial. Given some price differentials between inputs, the differentials among inputs' attribute β are relatively more important when σ is low because inputs are less close substitutes. The relative importance of high β inputs' position weakens if σ is large because inputs are more easily substitutable.

[Figure 1] Factor Iso-Value Curves



To simplify the analysis that follows, suppose that the demand curves facing each retailer are given as[28]

[28] If the representative consumer's utility function (representing preference of the whole market constituents) is given as

$$U(m, Y^A, Y^B) = m + \left\{ A_o Y^A + B_o Y^B - \frac{b}{2}\left\{(Y^A)^2 + (Y^B)^2\right\} - d(Y^A Y^B) \right\},$$

maximizing the utility subject to budget constraint $I \geq m + P^A Y^A + P^B Y^B$ gives the inverse demand functions for retailers A and B. Introducing more complex demand functions would not change the nature of the following result as long as the profit functions of retailers are concave in one's own output.

$$\begin{aligned} P^A(Y^A, Y^B) &= A_o - bY^A - dY^B \\ P^B(Y^A, Y^B) &= B_o - bY^B - dY^A \end{aligned} \tag{17}$$

where A_o, $B_o > 0$ and $b > d > 0$. A_o and B_o indicate the strength of the positions of retailer *A* and *B* in the market, respectively. If the two retailers are identical in all aspects(that their production function and the input varieties are the same) except A_o and B_o such that $A_o > B_o$, the retailer *A* can command a higher price for the same output level. The difference of market position strengths may be due to the elements such as the location, established reputation, etc. We will refer to the difference in the magnitude of A_o and B_o as the differences in customer base, or market share. Solving for equilibrium outputs and prices in terms of marginal costs λ^A and λ^B results in the following.

$$Y^A(\lambda^A, \lambda^B) = (\frac{1}{4b^2 - d^2})\left\{ 2b(A_o - \lambda^A) - d(B_o - \lambda^B)\right\}$$

$$Y^B(\lambda^A, \lambda^B) = (\frac{1}{4b^2 - d^2})\left\{ 2b(B_o - \lambda^B) - d(A_o - \lambda^A)\right\}$$

and

$$P^A = (\frac{1}{4b^2 - d^2})\left\{ 2A_o b^2 - B_o bd + (2b^2 - d^2)\lambda^A + bd\lambda^B \right\}$$

$$P^B = (\frac{1}{4b^2 - d^2})\left\{ 2B_o b^2 - A_o bd + (2b^2 - d^2)\lambda^B + bd\lambda^a \right\}$$

where the marginal costs are given by (5) and (6) above.

3.3. The Effects of RPM

We can treat the imposition of RPM (a price-floor) on product *i* effectively as equivalent to a constraint on the production such that

$$\pi_i = P\frac{\partial f}{\partial x_i} \geq \Gamma \quad \text{where } \Gamma \text{ is the price-floor.}$$

Proposition 1 Let Γ_i be the RPM imposed on factor *i*. If the RPM binds for some retailer r such that $\pi_i^r < \Gamma_i$, then $\frac{\partial C(Y^r)}{\partial Y^r} > \lambda^r$ and $\frac{\partial^2 C(Y^r)}{\partial Y^{r2}} > 0$ for $Y^r > Y_o^r$, where Y_o^r satisfies $P^r(Y_o^r, Y^z(Y_o^r))\frac{\partial f^r(\mathrm{x}_o)}{\partial x_i}$ $= \pi_i^r(Y_o^r) = \Gamma$.

The proposition states that a RPM raises the marginal cost beyond a certain level of output for the RPM-binding retailer, and the marginal cost curve displays a convex shape with respect to output. The proof is in the Appendix. Here, a sketch of the argument is presented. Suppose that manufacturer i adopts a RPM (a price-floor) and it is binding only for one retailer, say retailer B, such that $\pi_i^A \geq \Gamma > \pi_i^B$, where $\pi_i^A (= P^A \frac{\partial f^A}{\partial x_i})$ and $\pi_i^B (= P^B \frac{\partial f^B}{\partial x_i})$ are the implicit retail prices of product i in each retail store A and B. To comply to RPM and continue to use product i as an input of production, retailer B has to either lower the output so that the price of the composite good is raised, or lower the input amount x_i so that the marginal product of input i is raised, or both. Define Y_o^B to be the output level that satisfies RPM constraint without any adjustment of the optimal factor ratio. Then Y_o^B is smaller than the equilibrium output level before the RPM. To increase the output beyond Y_o^B and comply to the RPM, the marginal factor demand of i has to decrease, while the efficiency condition dictates that it be constant for all output level. Thus, as a result of RPM, a distortion has to be introduced in the factor intensity. This necessarily increases the cost of producing additional unit of output beyond Y_o^B. Moreover, the distortion that needs to be introduced in factor demand to comply to the RPM increases progressively as the output increases. This implies the marginal cost of Y^B is increasing. Therefore, the shape of the marginal cost of output is initially constant up to Y_o^B, and exhibits an upward-sloping curve from Y_o^B.

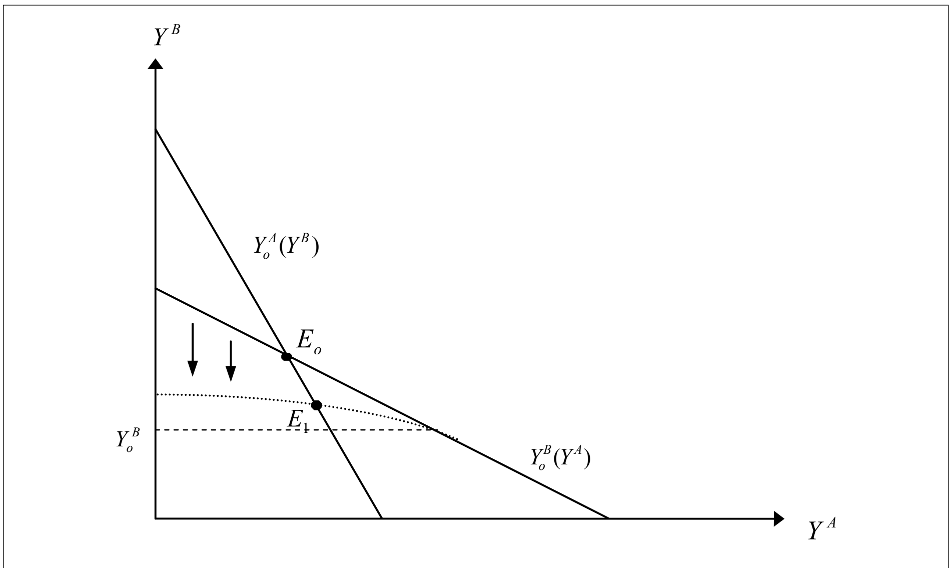
As a result of such change in a part of marginal cost schedule, the reaction function of retailer B's output in terms of A's output will change. The reaction function for B before the RPM constraint is

$$Y^B(Y^A) = \frac{1}{2b}(B_o - \lambda^B - d \cdot Y^A).$$

With RPM, the λ^B is replaced by $\dfrac{\partial C(Y^B)}{\partial Y^B}$ for $Y^B \geq Y_o^B$, where $\dfrac{\partial C(Y^B)}{\partial Y^B} > \lambda^B$. Consequently, it is bowed towards the axis from Y_o^B as shown in Figure 2.

The original unconstrained equilibrium is the point E_o and the new equilibrium occurs at E_1. The new equilibrium output for *B* is less and for *A* greater than before the RPM constraint. The magnitude of reduction in *B*'s output is larger than that of the increase in *A*'s output. Even though *A*'s output has increased, hence the factor demand of product *i* by *A*, the total factor demand of *i* has decreased as the greater amount of the decrease in *i* th factor demand by retailer *B* supersedes the increase in *i* th factor demand by *A*. Therefore, it is not incentive compatible for manufacturer *i* to adopt RPM voluntarily.

[Figure 2] Response Functions



If the RPM constraint is binding for both retailers, the new equilibrium outputs for both retailers will decrease as their marginal cost curves will rise in the relevant region. The total factor demand of i will be reduced because of the reduced outputs and through the change in factor intensity which the RPM requires for the new equilibrium outputs. Therefore, the manufacturer has even less incentive to impose RPM that binds both retailers.

3.4. RPM as a Result of Retailer Coercion?

As we have seen in Proposition 1, the manufacturers do not have any incentive to adopt RPM because doing so would only reduce their profits. The retailer whose price was not constrained by the RPM, however, clearly benefits from its adoption because it raises rival's cost. If a retailer has a higher price for a product, he has a good incentive to coerce a manufacturer to adopt RPM if possible. Can a retailer coerce an unwilling manufacturer to adopt RPM? We will now investigate the conditions under which such coercion is possible.

Suppose both retailers use input i for production such that $i \in I^A$ and I^B, and the retailer A's price of i is higher than that of B. That is,

$$\pi_i^A = P^A \frac{\partial f^A}{\partial x_i} > \pi_{\mathrm{i}}^{\mathrm{B}} = P^B \frac{\partial f^B}{\partial x_i} \ .$$ [29]

The retailer A can coerce manufacturer i to adopt RPM at π_i^A by threatening to drop input (product) i otherwise, when the factor demand of retailer A is larger than that of B, $x_i^A > x_i^B$. From the optimal factor demands (8) and (9), this is equivalent to the condition (18).

$$\frac{Y^A}{Y^B} > \alpha^{-\rho\sigma} \left(\frac{\lambda^B}{\lambda^A}\right)^{\sigma} \tag{18}$$

Proposition 2 Suppose that for a product i retailer A has a higher price than his rival retailer B. If an input k such that $v_k = v_i$ and $v_k \notin I^A$ exists

[29] Thich is equivalent to $\frac{P^A}{P^B} > \frac{\lambda^A}{\lambda^B} \Leftrightarrow \frac{P^A}{P^B} < \frac{Y^A}{Y^B}$.

and condition (18) holds, then RPM can be adopted out of retailer *A*'s coercion.

(Proof) The RPM will be adopted out of a retailer's coercion if the threat to drop the product by retailer *A* is credible and adopting RPM is incentive compatible for the manufacturer *i*. If pulling off the product from retail shelf reduces his profit, the retailer has no reason to carry out the threat. Such threat becomes credible, however, if carrying out the threat does not have any detrimental effects on the part of retailer, which is the case when there exists an equally good substitute *k* for input *i*.

As for the incentive compatibility of the manufacturer, if submission to the coercion makes him worse off than noncompliance, the manufacturer would not adopt RPM. On the other hand, if he adopts the RPM, retailer *B*'s reaction would be either to comply to the RPM or switch to the next best product.[30] In either case, the sales would be reduced for the manufacture *i*, and therefore, the manufacturer has to weigh this loss against the possible reduction of all sales to retailer *A* when he doesn't adopt RPM. A sufficient condition for the incentive compatibility for manufacturer *i* is if the factor demand by retailer *A* is larger than that of *B*, which is the condition (18). □

Proposition 3 If $\lambda^A = \lambda^B$ and $I^A < I^B$, then the retailer *r* can coerce a manufacturer into adopting RPM when $A_o > B_o$.

(Proof) Suppose that two retailers are equally efficient, and two retailer's marginal cost is the same. Then the retailer who has a larger market share carrying relatively small number of popular brands can coerce a manufacturer into adopting RPM. Retailers can have the same marginal cost even if their input sets are not identical. For instance, retailer *A* with a smaller set of high β inputs and *B* with a larger set comprised of relatively low β inputs. That is, *A* is an established high

[30] When there is also a close substitute for product *i* for retailer *B*, that is, when there exists an input *l* such that and $v_l = v_i$ and $v_l \notin I^B$, retailer *B* will react to the RPM by dropping the product *i* and switching to the product *l*. In this case, since $v_l = v_i$, there are no changes in the marginal costs and the profits of both retailers. Consequently, retailer *A* would not have coerced the manufacturer to adopt the RPM in the first place.

priced retail store specializing in small number of products, and *B* is a discount store carrying a large number of products. If *A* has a larger customer base than *B* does, retailer *A* can coerce a manufacturer to adopt a RPM by threatening to cease dealing the manufacturer's product. The product that becomes the target of such threat tends to be the least popular product retailer *A* carries. Thus, the retail shelf space limitation is a crucial element in determining the target product of such coercion for RPM.

The conditions that retailer *A*'s price for *i* is higher than that of *B*'s and that A's demand for *i* is larger than that of B's, give us the following two implicit functions in terms of market parameters (A_o, B_o, α, ρ, b, d) and marginal costs(λ^A, λ^B) :

$$(2A_o b^2 - B_o bd + bd\lambda^B)\lambda^B > (2B_o b^2 - A_o bd + bd\lambda^A)\lambda^A \quad \text{and}$$
$$(2b(A_o - \lambda^A) - d(B_o - \lambda^B))(\lambda^A)^\sigma > \alpha^{-\rho\sigma}(2b(B_o - \lambda^B)$$
$$-d(A_o - \lambda^A))(\lambda^B)^\sigma$$

When $\lambda^A = \lambda^B$, then these conditions are met when *A*'s customer base has to be larger than *B*'s ($A_o > B_o$). □

For given levels of relative efficiency and the marginal costs, as the disparity of customer bases $(A_o - B_o)$ gets bigger, the conditions are more likely to be satisfied. The possibility of RPM as a result of retailer coercion critically depends on the disparity of retailer customer bases (equivalently, market share) and the degree of interbrand competition.

If two retailers have the same customer base $(A_o = B_o)$, then the retailer *A*'s marginal cost should be lower than *B*'s $(\lambda^A < \lambda^B)$ if the retailer *A*'s price for *i* is to be higher than *B*'s. But when $(\lambda^A < \lambda^B)$, the condition (18) is not satisfied unless α is very small and/or σ is close to one. Hence when the sizes of customer bases are similar, it is difficult for a retailer with high product prices to coerce the manufacturer to adopt RPM since his demand magnitude for a manufacturer's product tends to be smaller than rival retailer's. Such coercion is possible only if his rival carries a large number of products and is very inefficient in retail operation.

3.5. Can RPM Correct for Service Externalities?

Let us briefly examine Telser's service free-riding argument for RPM in terms of our model. We can think of retailer's product specific service s_i as increasing the product attribute β_i that

$$\frac{\partial \beta_i}{\partial s_i} > 0.$$

Assume that the β_i that is enhanced by dealer service is not directly associated with the retailer, but with the product. This assumption is in line with the dealer service free-riding story that although dealer service is demand enhancing, consumers do not care where they purchase the product. Thus, when β_i is increased by a retailer's investment in service, this also benefits his rival. Any service provided by retailer *r* is the result of acting on his own profit opportunity after taking into account the positive externality to his rival such that

$$s_i^r = \arg \max_{S_i} \prod{}^r (x^r, x^z)$$

where x^r is the optimal input demands. Because of this externality, the level of service provided by a retailer will fall short of the optimal level. Any service level lower than the other retailer's is redundant and hence a waste of resource because of the externality. In equilibrium, only a retailer end up providing the service and it is the retailer, to whom the product is relatively more valuable, who will provide the service. The imposition of RPM on input (product) *i* will limit the extent of free-riding by constraining the level of output and input *i*, and enable the service-providing retailer to increase the level of service. However, even though benefit from service free-riding will be limited by RPM, it will not be taken out completely by the RPM. Therefore, RPM can correct the problem of inadequate service only partially, not entirely.

In a perfectly competitive retail environment and single product retailers, when a discount retailer has to raise his price because of RPM, he will lose all his sales unless he matches the service level of his rival.

When we move away from perfectly competitive retail market assumption and allow multi-product retailers, we do not arrive at the conclusion that a discount retailer will provide matching service level. Since service externality is present, the retailer can instead respond by lowering other products he carries or provide service that is specific to his own store. In any case, duplicating the free-rideable service that his rival provides is not an optimal response.

If the purpose of RPM is to enhance service by limiting the extent of benefits from free-riding, other measures could serve equally good or better for that purpose. Establishing exclusive dealers or simply refusing to deal with retailers without adequate service can completely eliminate such externalities.

IV. CONCLUSION

Typically, the costs of retail, the channeling of manufacturers' products to consumers, include other costs than just the transfer (wholesale) prices that they pay the manufacturers to obtain the products. A significant part of these other costs are affected by how the distribution is organized, and there are usually some sunk costs involved in the organization of distribution method. Therefore, there arises a real possibility that a new entrant to a retail market is more efficiently organized, having "late-mover" advantages of benefiting from development in the distribution system expertise, and has lower costs in supplying the same products than other retailers. Also, there can be "first-mover" advantage for early comers who have positioned in lucrative locations and built strong customer bases. Different retailers may have different target customers and thus, differentiate themselves via service and amenity differences. In the model presented, the cost differences arising from modus operandi are incorporated into the composite goods production functions. Any service or amenity differences are implicitly incorporated in the demand for the composite goods.

Most economic models of RPM are presented in perfectly competitive retail environment. Consequently, this practice has led us to ignore the retailer differentiation and to examine the rationale behind the adoption of resale price maintenance only in terms of aspects such as retail service.

Some models that do allow retailer differentiation assume single product retail dealer. This can be also misleading by ignoring the presence of interbrand competitive effects, because there are many substitutes for a product.

This paper presented an implicit model of retail market. We have taken an approach in order to avoid the need to messy specification of interrelated demands of all available products and other relevant environments. Specifically, this approach enabled us to consider non-symmetrically differentiated products explicitly. By relaxing the assumptions of perfectly competitive retail market and single product retailer, another possibility behind the adoption of RPM arises: RPM being used as a strategic tool by a stronger retailer to introduce some distortions in the rival retailer's optimal choice. This possibility is affected by many variables, such as current market position of retailers, efficiency of operation, degree of interbrand competition, other products that retailers carry, and shelf space limitation. As the disparity of market position gets smaller, the possibility of RPM used for such strategic purpose disappears.

Appendix

< Proof of the Proposition 1 >

- **RPM raises marginal cost**

Suppose that i th manufacturer imposes a RPM at level Γ that is binding only for one retailer, say B.

$$\Gamma \geq \tilde{\pi}_i^B = P^B(\tilde{Y}^A, \tilde{Y}^B)\frac{\partial f^B(\mathbf{x})}{\partial x_i}$$

where the $\tilde{\pi}_i^B$ denotes retailer B's implicit retail price of manufacturer i's product in unconstrained case (before RPM compliance). Upon the imposition of RPM, the $\tilde{\pi}_i^B$ has to be increased in order to continue using product i as an input of production.

Define Y_o^B to be the output level that satisfies the constraint without any adjustment of the optimal factor ratio, and $\mathbf{x}_o$ be the vector of corresponding factor demands such that

$$P^B(Y^A(Y_o^B), Y_o^B)\frac{\partial f^B(\mathbf{x}_o)}{\partial x_i} = \pi_i^B(Y_o^B) = \Gamma$$

Then, $Y_o^B < \tilde{Y}^B$.[31]

Consider increasing output from Y_o^B while satisfying the RPM constraint. This means the implicit price for factor i should not change as Y changes,

[31] From (3), we know that the optimal factor ratio does not depend on the level of output. Thus, if we hold the factor ratio the same, $P^B(Y^A(Y^B), Y^B)$ increases as Y^B decreases, since

$$\frac{dP^B}{dY^B} = \frac{\partial P^B}{\partial Y^B} + \frac{\partial P^B}{\partial Y^A}\frac{\partial Y^A}{\partial Y^B} = \frac{-2b^2 + d^2}{2b} < 0,$$

while $\frac{\partial f^B(\mathrm{x})}{\partial x_i} = \left(\frac{\beta_i}{\alpha^\rho}\right)^{1-\sigma}\left(\frac{\lambda^B}{w_i}\right)^{-\sigma}$ does not change. Thus, Y^B has to decrease in order to increase $P^B(Y^A, Y^B)\frac{\partial f^B(\mathrm{x})}{\partial x_i}$.

$$\frac{d\pi_i}{dY^B}=\frac{\partial f^B(\mathbf{x}_o)}{\partial x_i}\frac{dP^B}{dY^B}+P^B(Y^A(Y_o^B),Y_o^B)\frac{d(\frac{\partial f^B(\mathbf{x}_o)}{\partial x_i})}{dY^B}=0. \tag{19}$$

Since $\frac{dP^B}{dY^B}$ term in (19) is constant and has negative sign, $\frac{d(\frac{\partial f^B(\mathbf{x}_o)}{\partial x_i})}{dY^B}$ term has to be positive and equals to

$$-\frac{1}{P^B(Y^A(Y_o^B),Y_o^B)}\frac{\partial f^B(\mathbf{x}_o)}{\partial x_i}\frac{dP^B}{dY^B}. \tag{20}$$

By totally differentiating the marginal product of factor *i*, we have

$$d(\frac{\partial f^B(\mathbf{x}_o)}{\partial x_i})=\frac{1+\rho}{Y_o^B}\frac{\partial f^B(\mathbf{x}_o)}{\partial x_i}dY^B-\frac{1+\rho}{x_{io}}\frac{\partial f^B(\mathbf{x}_o)}{\partial x_i}dx_i. \tag{21}$$

Solving the (20) and (21) together, the following should hold.

$$\frac{dx_i}{dY^B}=\frac{x_{io}}{Y_o^B}-\frac{\left(-\frac{dP^B(\cdot)}{dY^B}\right)\cdot x_{io}}{(1+\rho)P^B(\cdot)}. \tag{22}$$

Since the second term in RHS of (22) has a positive sign, we have

$$\frac{dx_i}{dY^B}<\frac{x_{io}}{Y_o^B}. \tag{23}$$

Thus, in unconstrained case, the factor to output ratio is constant for all output level and equal to $\frac{x_{io}}{Y_o^B}$. With RPM constraint, the equation (23) tells that this ratio has to decrease as output expands above Y_o. Retailer B can no longer employ the factors in the efficient ratio, and hence it is more costly to produce additional output beyond Y_o^B. Thus,

$$\frac{\partial C(Y^B)}{\partial Y^B} > \lambda^B \text{ for } Y^B > Y^o.$$

• **The marginal cost is increasing beyond Y^o.**

If the distortion in the factor ratio stays constant, then the marginal cost will be constant beyond Y_o^B, albeit at a higher level than λ^B. However, if it has to increases (decreases) as output increases in order to meet RPM condition, the marginal cost will be increasing (decreasing). To examine the level of distortion required to meet RPM condition, differentiate (22) to obtain

$$\frac{d^2 x_i}{(dY^B)^2} = \frac{\left(-\frac{dP^B(\cdot)}{dY^B}\right) x_i \left(Y^B \frac{dP^B(\cdot)}{dY^B} - \frac{1}{P^B(\cdot)}\right)}{(1+\rho)\left\{P^B(\cdot)\right\}^2 Y^B} < 0,$$

Thus, we can see that the factor to output ratio for factor *i* has to decrease progressively as output increases (beyond Y_o^B). This implies that the distortion from the efficient factor allocation has to increase for each additional output. Since the distortion increases more than proportionally with output, the marginal cost for any additional output above Y_o^B increases.

The RPM constraint (22) prescribes the incremental amount of $x_i^B(Y^B)$ that can be used for each additional level of output beyond Y_o^B. The marginal cost of output at Y^B then can be derived as the cost of producing one unit of output when x_i is exogenously fixed at $\bar{x}_i\,(= x_i^B(Y^B))$. The shape of the marginal cost curve can be seen by examining the change on the unit cost when $\bar{x}_i$ is reduced. Denote the marginal cost as $\lambda(\bar{x}_i)$. Then,

$$\lambda(\bar{x}_i) = \arg \min_{x_j (j \neq i)} \qquad w_i \bar{x}_i + \sum_{j \neq i} w_j x_j$$

$$s.t. \qquad Y = \ 1 = \alpha\,(\beta_i \overline{x}_i^{-\rho} + \sum_{j \neq i} \beta_j x_j^{-\rho})^{-\frac{1}{\rho}}.$$

Solving this minimization problem gives the following factor demands.

$$x_j(\mathbf{w}, \overline{x}_i) = \left(\frac{\beta_i}{\alpha^\rho} \right)^\sigma \left(\frac{\phi(\overline{x}_i)}{w_i} \right)^\sigma \qquad \text{for all } \ j \neq i \tag{24}$$

where

$$\phi(\overline{x}_i) = \left(\frac{\sum_{j \neq i} \beta_j^\sigma w_j^{1-\sigma}}{1 - (\frac{\beta_i}{\alpha^\rho}) \overline{x}_i^{-\rho}} \right)^{\frac{1}{1-\sigma}}.$$

The factor demand (24) is the same form as the unconstrained factor demand (9) for $Y^B = 1$, except that λ^B is now replaced by $\phi(\overline{x}_i)$. The constrained optimization reveals that the factor intensity ratios among all other inputs do not change from those of unconstrained case. The marginal cost is

$$\begin{aligned} \lambda(\overline{x}_i) &= w_i \overline{x}_i + \phi(\overline{x}_i) \left(1 - (\frac{\beta_i}{\alpha^\rho}) \overline{x}_i^{-\rho} \right) \\ &= w_i \overline{x}_i + \left(\sum_{j \neq i} \beta_j^\sigma w_j^{1-\sigma} \right)^{\frac{1}{1-\sigma}} \left(1 - (\frac{\beta_i}{\alpha^\rho}) \overline{x}_i^{-\rho} \right)^{-\frac{1}{\rho}}. \end{aligned}$$

Note that $\left(\sum_{j \neq i} \beta_j^\sigma w_j^{1-\sigma} \right)^{\frac{1}{1-\sigma}}$ is the unconstrained marginal cost when the retailer's input set does not include the input i. By differentiating $\lambda(\overline{x}_i)$ with respect to $\overline{x}_i$ gives

$$\frac{\partial \lambda(\overline{x}_i)}{\partial \overline{x}_i} = w_i - \phi(\overline{x}_i)(\frac{\beta_i}{\alpha^\rho}) x_i^{-\rho}.$$

Thus, $\lambda(\overline{x}_i)$ achieves a minimum when $\overline{x}_i$ satisfies $w_i = \phi(\overline{x}_i)\dfrac{\partial f(\mathbf{x})}{\partial x_i}$ and becomes identical to the unconstrained marginal cost λ^B in (6).

$$\frac{\partial^2 \lambda(\overline{x}_i)}{\partial \overline{x}_i^{\,2}} = \phi(\overline{x}_i)(1+\rho)\left(\frac{\partial f(\mathbf{x})}{\partial x_i}\right)^2 \left(1-(\frac{\beta_i}{\alpha^\rho})\overline{x}_i^{\,-\rho}\right)^{-1} - \phi(\overline{x}_i)\frac{\partial^2 f(\mathbf{x})}{\partial x_i^2} > 0$$

since $\dfrac{\partial^2 f(\mathbf{x})}{\partial x_i^{\,2}} = \left(\dfrac{1+\rho}{f(\mathbf{x})}\right)\dfrac{\partial f(\mathbf{x})}{\partial x_i}\left(\dfrac{\dfrac{\partial f(\mathbf{x})}{\partial x_i}\cdot x_i - f(\mathbf{x})}{x_i}\right) < 0.$

Therefore, the unconstrained marginal cost $\lambda(\overline{x}_i)$ decreases initially and reaches a minimum and then rises again as $\overline{x}_i$ increases. Since the RPM constraints progressively limits the amount of x_i as output increases, we can conclude that the marginal cost of producing additional output beyond Y_o^B increases from Y_o^B.

To sum up, the imposition of RPM has an effect of raising the marginal cost of retailer B for any output above Y_o^B, while has no effect on the marginal cost for output below Y_o^B. Moreover, the marginal cost is increasing for $Y^B > Y_o^B$. That is,

$$\frac{\partial C(Y^B)}{\partial Y^B} > \lambda^B \text{ and } \frac{\partial^2 C(Y^B)}{(\partial Y^B)^2} > 0 \quad \text{for } Y^B > Y_o^B.$$

- **RPM decreases the output and profit of affected retailer**

The reaction functions with the linear demands (17) without the RPM constraint are

$$Y^A(Y^B) = \frac{1}{2b}(A_o - \lambda^A - d\cdot Y^B) \quad \text{and}$$
$$Y^B(Y^A) = \frac{1}{2b}(B_o - \lambda^B - d\cdot Y^A).$$

With the RPM constraint, the λ^B is replaced by $\dfrac{\partial C(Y^B)}{\partial Y^B}$ for $Y^B \geq Y_o^B$, where $\dfrac{\partial C(Y^B)}{\partial Y^B} > \lambda^B$. Consequently, it is bowed towards the axis from Y_o^B as shown in Figure 2. Retailer *B*'s new equilibrium output will be set at a level between Y_o^B and the previous output level that was determined before the RPM, because of the higher marginal cost. Retailer *A*'s output will increase by a factor of $\left(\dfrac{d}{2b}\right)$ of *B*'s output reduction. From the expression of profit in (15), we know that *B*'s profit is lowered by RPM since the equilibrium output is reduced.

- **Manufacturer has no incentive to adopt RPM voluntarily**

For the RPM to be profitable for manufacturer *i*, total change in factor demand of *i* has to increase. That is,

$$
\begin{aligned}
&\left(\frac{\partial x_i^A}{\partial Y^A}\frac{\partial Y^A}{\partial Y^B} + \frac{\partial x_i^B}{\partial Y^B}\right)dY^B \\
&= \left(\left(\frac{-d}{2b}\right)\frac{\partial x_i^A}{\partial Y^A} + \frac{\partial x_i^B}{\partial Y^B}\right)dY^B > dx_i^A + dx_i^B > 0
\end{aligned}
$$

$\dfrac{\partial x_i^r}{\partial Y^r}$ denotes the (optimal) marginal factor demand of x_i to increase a unit of output Y^r without the constraint of RPM. The first inequality reflects the fact that when output of retailer *B* is changed by dY^B, the amount of factor demand x_i^B has to decrease more than the (optimal) marginal factor demand in the unconstrained case. Since the equilibrium output of *B* is decreased $(dY^B < 0)$ with RPM, there is corresponding decrease in the factor demand of x_i from retailer *B*. This is the term $\dfrac{\partial x_i^B}{\partial Y^B}dY^B < 0$. In addition to this reduction, there is further reduction of x_i^B from the factor demand distortion effects of RPM. There is a small offsetting increase in the factor demand from retailer *A*, but this is secondary indirect effect compared to the reduction of demand by retailer

B. The necessary condition for the manufacturer's profit to increase is

$$(\frac{-d}{2b})(\beta_i)^{\sigma}\left(\frac{\lambda^A}{w_i}\right)^{\sigma}+\left(\frac{\beta_i}{\alpha^{\rho}}\right)^{\sigma}\left(\frac{\lambda^B}{w_i}\right)^{\sigma}<0$$

$$\Leftrightarrow \lambda^A > (\frac{2b}{d})^{\frac{1}{\sigma}}\alpha^{-\rho}\lambda^{B}.$$

In the reasonable range of the parameter values for $b, d(b > d)$ and α, this condition cannot be satisfied. This implies that the adoption of RPM reduces the total demands for the manufacturer's product, and therefore, the manufacturer has no incentive to impose the RPM voluntarily. □

References

Deneckere, Raymond, Howard P. Marvel and James Peck (1996), "Demand Uncertainty, Inventories, and Resale Price Maintenance," *Quarterly Journal of Economics*, Vol. 111, No. 3, pp. 885-914.

Deneckere, Raymond, Howard P. Marvel and James Peck (1997), "Demand Uncertainty and Price Maintenance: Markdowns as Destructive Competition," *American Economic Review*, Vol. 87, No. 4, pp. 619-641.

Dixit, Avinash K. and Joseph Stiglitz (1977), "Monopolistic Competition and Optimum Product Diversity," *American Economic Review*, Vol. 67, No. 3, pp. 297-308.

Feenstra, Robert C., James R. Markusen and William Zeile (1992), "Accounting for Growth with New Inputs: Theory and Evidence," *American Economic Review*, Vol. 82, No. 2, pp. 415-421.

Hammonds, T. and H. Radtke (1990), "Two Views on Slotting Allowances," *Progressive Grocer*, Vol. 69, pp. 46-48.

Grimes, Warren S. (1995), "Brand Marketing, Intrabrand Competition, and the Multibrand Retailer: the Antitrust Law of Vertical Restraints," *Antitrust Law Journal*, Vol. 64, No. 1, pp. 83-136.

Ippolito, Pauline M. (1988), *Resale Price Maintenance: Economic Evidence from Litigation*, Federal Trade Commission.

Ippolito, Pauline M. (1991), "Resale Price Maintenance: Empirical Evidence from Litigation," *Journal of Law and Economics*, Vol. 34, pp. 264-294.

Jullien, Bruno and Patrick Rey (2007), "Resale Price Maintenance and Collusion," RAND *Journal of Economics*, Vol. 38, No. 4, pp. 983-1001.

Klein, Benjamin and Kevin M. Murphy (1988), "Vertical Restraints as Contract Enforcement Mechanism," *Journal of Law and Economics*, Vol. 31, No. 2, pp. 265-297.

Kleit, Andrew (1993), "Efficiencies without Economists: The Early Years of Resale Price Maintenance," *Southern Economic Journal*, Vol. 59(4), pp. 597-619.

Marvel, Howard P. and Stephen McCafferty (1984), "Resale Price Maintenance and Quality Certification," *RAND Journal of Economics*, Vol. 15, No. 3, pp. 346-359.

Marvel, Howard P. (1994), "The Resale Price Maintenance Controversy: Beyond the Conventional Wisdom," *Antitrust Law Journal*, Vol. 63, No. 1, pp. 59-92.

Overstreet, Thomas R., Jr. (1983), "Resale Price Maintenance: Economic Theories and Empirical Evidence," Bureau of Economics Staff Report to the Federal

Trade Commission, Washington, D.C., November (1983).

Overstreet, Thomas R. and Alan A. Fisher (1985), "Resale Price Maintenance and Distributional Efficiency: Some Lessons from the Past," *Contemporary Policy Issues*, Vol. 3, pp. 43-56.

Palamountain, Joseph C., Jr. (1955), *The Politics of Distribution*, (Cambridge, Mass: Harvard University Press).

Perry, Martin K. and David Besanko (1991), "Resale Price Maintenance and Manufacturer Competition for Exclusive Dealership," *The Journal of Industrial Economics*, Vol. 39, No. 5, pp. 517-544.

Pickering, J. F. (1969), *Resale Price Maintenance in Practice*, (New York: Augustus M. Kelley Publishers).

Salop, Steven (1979), "Monopolistic Competition with Outside Goods," *Bell Journal of Economics*, Vol. 10, pp. 141-156.

Scherer, Frederic M. (1983), "The Economics of Vertical Restraints," *Antitrust Law Journal*, Vol. 52, No. 3, pp. 687-718.

Scherer, Frederic M. and David Ross (1990), *Industrial Market Structure and Economic Performances*, (3rd ed., Boston: Houghlin Mifflin Company).

Shaffer, Greg (1991), "Slotting Allowances and Resale Price Maintenance: A Comparison of Facilitating Practices," *RAND Journal of Economics*, Vol. 22, No. 1, pp. 120-135.

Shaffer, Greg (1995), "Rendering Alternative Offerings Less Profitable with Resale Price Maintenance," *Journal of Economics and Management Strategy*, Vol. 3, No. 4, pp. 639-662.

Steiner, Robert L. (1997), "How Manufacturers Deal with the Price-Cutting Retailer: When Are the Vertical Restraints Efficient?" *Antitrust Law Journal*, Vol. 65, No. 2, pp. 407-48.

Spengler, Joseph J. (1950), "Vertical Integration and Antitrust Policy," *Journal of Political Economy*, Vol. 58, pp. 347-352.

Taussig, F. W. (1916), "Price Maintenance," *American Economic Review*, Vol. 6 (Supplement), pp. 170-184.

Telser, Lester G. (1960), "Why Should Manufacturers Want Fair Trade?" *Journal of Law and Economics*, Vol. 3, pp. 86-105.

Tirole, Jean (1988), *The Theory of Industrial Organization*, (Cambridge, Mass: M.I.T. Press).

Waldman, Don E. (1986), *The Economics of Antitrust: Cases and Analysis*, (Boston: Little, Brown and Company).

Yamey, B. S. (1966), *Resale Price Maintenance*, (Chicago: Aldine Publishing Company).