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Abstract

This paper examines the effects of exclusive dealing contracts offered by an incumbent distributor. The effectiveness of exclusive dealing contracts offered by distributors is quite different from those offered by incumbent manufacturers. The traditional literature has focused solely on exclusive dealing contracts made by incumbent manufacturers and has derived multiple equilibria within homogeneous price competition models. In contrast, this paper asserts that exclusive dealing contracts made by a distributor generate a unique equilibrium and that an efficient entrant must be excluded under the equilibrium as long as distributors have sufficient bargaining power.

Key words: Exclusive Dealing, Large Distributor, Antitrust Policy

JEL Classification: L11, L13, L14, L42, K21

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I Introduction

The market power of the distribution sector on vertical restraints has recently become a growing concern. The European Commission is working for a revision of the Vertical Restraints Block Exemption Regulation and the related guidelines on supply and distribution agreements concerning the increased buyer power of large retailers.[1] According to the revised regulation, "the Commission proposes that for a vertical agreement to benefit from the block exemption, not only the supplier's market share (as is currently the case) but also the buyer's market share should not exceed 30%" (European Commission Press Release, July 28, 2009). The European Commission is now concerned that large distributors could soften competition by restricting suppliers' deal backed with their buying power.[2] Will the mechanism of the anti-competitive effect of vertical restraints be changed when such restraints are attempted by distributors and not by suppliers?

This paper tries to answer this question. We will demonstrate that the structure of the game between distributors and suppliers is largely changed in the case of restraint offered by distributors. More specifically, this paper shows that exclusive dealing contracts made by an incumbent distributor are more effective than those made by an incumbent seller or manufacturer.

In the literature, regulations regarding exclusive dealing contracts have mainly focused on suppliers' contract offers. Rasumsen et al. (1991) and Segal and Whinston (2000) revealed that exclusive dealing contracts made by an incumbent manufacturer (seller) may deter efficient entries. They have shown that buyers may not reject the exclusive dealing offer of an incumbent manufacturer when an entrant has to pay a fixed entry cost. The reason for this is that the sales amount for a rejected buyer (or free buyer) is insufficient for the entrant and cannot cover the fixed entry cost. Hence, there is a possibility that all buyers will accept the exclusive dealing contract.

Recently, Fumagalli and Motta (2006) and Simpson and Wickelgren (2007) extended this issue to cases in which a manufacturer offers exclusive dealing contracts to downstream distributors.[3] As Fumagalli and Motta (2006) have stressed, if buyers are distributors, this insufficient sales amount problem does not exist. The main reason for this is that, if buyers are distributors, the sales to a rejected buyer are sufficient to cover the fixed entry cost because the distributor can

[1] The new rules becomes effective in June 2010 with a one-year transitional phase.

[2] In France, we can find a similar reform of competition rules. In 2005, an act regarding slotting allowances and hidden rebates was reformed. This reform provoked a debate regarding the fact that industrial profits are concentrated in large retailers through two-part tariff contracts (see also Miklos-Thal et al., forthcoming).

[3] Wright (2009) corrects some of analysis in Fumagalli and Motta (2006)

sell a sufficient amount of the product to consumers. On the other hand, if we consider such manufacturer-distributor relationships, we face another problem, which is that there are multiple equilibria. There exists both an equilibrium in which an entrant is excluded (hereafter "exclusion equilibrium") and an equilibrium in which an entrant is not excluded (hereafter "non-exclusion equilibrium" or "entry equilibrium").

The main reason for this is that an incumbent manufacturer only faces the wholesale market. If a distributor rejects an exclusive dealing offer, the incumbent does not have to care about the retail price competition or its wholesale price offer to the contracted distributor. The incumbent competes with the entrant by making the wholesale price offer to the free distributor (non-captured by the exclusive contract) as low as possible and the wholesale price offer to the contracted distributor can be indeterminate (i.e., it becomes irrelevant to the profit function of the incumbent). However, the wholesale price offer of the incumbent to the contracted distributor crucially affects the result of retail price competition and the profit of the free distributor. Thus, there are multiple equilibria. If the incumbent offers a low (high) wholesale price to the contracted distributor, the free distributor obtains high (low) profit as the result of retail price competition. If the profit of the free distributor is high, the necessary compensation for the exclusive dealing contract becomes too high and a non-exclusion equilibrium must be realized. On the other hand, if the profit is low, it becomes possible to offer a sufficient amount of compensation and an exclusion equilibrium is realized.

In contrast to the aforementioned concept, this paper shows that there exists a unique equilibrium in which an incumbent distributor successfully prevents the entry of an efficient distributor by offering exclusive dealing contracts to manufacturers. The crucial point is that the incumbent distributor engages in retail price competition. Even when a manufacturer has rejected an exclusive dealing contract offer, the incumbent distributor and the entrant distributor seriously compete in the retail market. Thus, in our model, even the incumbent has no incentive to purchase from the free manufacturer at a high wholesale price. Hence, the profit of the free manufacturer must be unique and the realized equilibrium must also be unique. Furthermore, if we assume large distributors, those are distributors who have high bargaining power, the profit of the free manufacturer becomes very low. Thus, in such situations, the unique equilibrium is the exclusion equilibrium.

Evidently, even in the literature, the previous papers have derived uniqueness by modifying their settings. Simpson and Wickelgren (2007) and Abito and Wright (2008) have assumed a

(slightly) differentiated goods market and have shown that a unique exclusion equilibrium exists. On the other hand, we will show in this paper that as long as we consider an exclusive dealing offer from an incumbent distributor, a unique exclusion equilibrium exists even in a homogeneous goods market. Moreover, Fumagalli and Motta (2006) eliminated multiplicity by assuming a small fixed operation cost for distributors. They showed that if distributors cover this fixed cost to operate (i.e. to compete in the retail market), non-exclusion is the unique equilibrium. Because only a free distributor can cover the fixed cost and all others will exit the retail market, a free distributor can capture a monopoly profit that the incumbent manufacturer cannot compensate for with more than two distributors. In contrast, we prove that even without a small fixed cost for distributors, our result remains robust; that is, exclusion occurs as a unique equilibrium.

We can find real-world evidence that large distributors have obtained high bargaining power in recent years. According to Miklos-Thal et al. (forthcoming), "large supermarket chains often account for a high share of a manufacturer's production: in the UK, even large manufacturers typically rely on their main buyer for more than 30 percent of domestic sales. Inderst and Wey (2006) state that some countries in the European Union are dominated by a small number of large retailers. Furthermore, in the US, so-called mega distributors such as Wal-Mart exist and have established a presence. Many articles have examined the strategies of Wal-Mart's demanding orders for suppliers (e.g., Moore, 1993; Norek, 1997).

Even in the economic literature, some papers have focused on such situations and have developed "large distributor models." O'Brien and Shaffer (1997) and Bernheim and Whinston (1998) examined cases in which retailers take the initiative of wholesale contracting, e.g., retailers offer wholesale prices to suppliers. Inderst (2005) examined slotting allowances in a situation where several manufacturers supplied a large monopolist retailer. Marx and Shaffer (2007) extended the common agency model in a situation where two competing large distributors have bargaining power over a supplier. Those papers, however, did not focus on exclusive dealing offers from larger distributors, which is the subject of this paper. In that sense, this paper makes a contribution to the literature by demonstrating the important implications of exclusive dealing offers made by distributors.

This paper is organized as follows. Section 2 presents the large distributor model. We show that there exists an equilibrium of entry deterrence. Section 3 concludes the paper and presents some policy implications.

II The Model

We present a simple manufacturer-distributor model in which two manufacturers (M) produce homogeneous goods and have the same technology with a constant marginal cost c. There is no fixed cost for production. There is one incumbent distributor (I) who faces a potential entrant distributor (E). The marginal distribution cost of the incumbent distributor is d_I and that of the entrant distributor is d_E. We assume that $d_I > d_E$; that is, the entrant is more efficient than the incumbent. Although there is no fixed cost for distribution, we assume that the entrant has to pay an entry cost F to enter the downstream market. The two distributors face a demand function, $X = X(p)$ where p is the market retail price, and we assume that the demand function satisfies the standard assumptions, which ensures that $dX(p)/dp < 0$.

The game runs as follows. At t = 0, the incumbent offers exclusive contracts to manufacturers and they decide whether or not to accept. $S(= 0, 1, 2)$ denotes the number of signed manufacturers. An exclusive dealing contract stipulates that a signer supplies only for the incumbent and instead gets x as a compensation. As assumed in the related literature, this contract cannot be breached and any commitments regarding wholesale prices or distribution margins are not included in the contract. Moreover, the standard tie-break rule is assumed; that is, if manufacturers are indifferent about whether to sign or reject the contract, they must sign it. We only focus on simultaneous and nondiscriminatory offers of exclusive dealing contracts. At t = 1, having observed S, the efficient entrant distributor decides whether to enter or not. The entrant enters the market when it can obtain non-negative profit, that is, if it can cover the entry cost F.

At t = 2, we have three stages. First, each active distributor offers wholesale prices to manufacturers. In order to capture situations in which distributors have strong bargaining power, we assume that these are take-it-or-leave-it offers.[4] Let w_I denote a wholesale price offer from $i = I, E$.[5] Second, manufacturers decide either to accept the wholesale price offers or not. Manufacturers can accept two offers, because we do not assume any capacity constraints. Finally, distributors engage in retail price competition a la Bertrand. Here we adopt the tie-break rule as in the literature, that is, the most efficient firm wins the price competition if more than two offers are the same. We look for the subgame perfect Nash equilibrium of this game and examine

[4] This assumption makes analysis very simple. Even if we consider more general situations, our qualitative results do not change. We discuss this point in later sections.

[5] Here we do not exclude the situation in which an offer from a distributor to one manufacturer is different from an offer to another manufacturer. As will be explained below, a distributor has no incentive to make two different offers.

the effect of efficient entry at the downstream level.

In order to characterize the equilibrium at t = 2, we first consider the case in which $S = 2$. In this case, all manufacturers have signed exclusive contracts and the entrant manufacturer cannot enter the market. The incumbent is only one (active) distributor, and the profit function of the monopolist becomes:

$$\pi(p, C) = (p - C)X(p),$$

where C is the marginal cost (i.e., marginal distribution cost plus marginal wholesale payment) of the distributor. This monopolist can obtain the monopoly profit (denoted by $\pi^m(C)$) by offering the monopoly retail price (denoted by $p^m(C)$). $\pi^m(C)$ and $p^m(C)$ are specified as follows:

$$\begin{aligned} \pi^m(C) &= \max_p (p - C)X(p), \\ p^m(C) &= \arg\max_p (p - C)X(p). \end{aligned}$$

The equilibrium wholesale offers from the incumbent are rather obvious. Because the wholesale offers are take-it-or-leave-it offers, each manufacturer accepts the offer as long as $w_I \geq c$. It is optimal for the incumbent distributor to offer $w_I = c$ and for all manufacturers to accept the offer. Hence, the equilibrium retail price becomes $p^m(c + d_I)$ and the incumbent's payoff becomes $\pi^m(c + d_I)$.

Next, we consider the case of $S = 1$. In this case, the entrant distributor enters the market and there are two active distributors. Under the tie-break rule, a distributor i's profit, $\Pi_i(p_i, p_j; C_i, C_j)$, becomes as follows:

$$\Pi_i(p_i, p_j; C_i, C_j) = \begin{cases} \pi(p_i, C_i) & \text{if} \quad p_i < p_j \text{ or, } p_i = p_j \text{ and } C_i < C_j \\ \pi(p_i, C_i)/2 & \text{if} \quad p_i = p_j \text{ and } C_i = C_j \\ 0 & \text{if} \quad p_i > p_j \text{ or, } p_i = p_j \text{ and } C_i > C_j \end{cases} , i = I, E, \ j \neq i,$$

where p_i is i's retail price and C_i is i's marginal cost. From the profit maximization of a distributor, the reaction function of distributor i, $p_i(p_j; C_i, C_j)$, $i = I, E$, $j \neq i$) becomes as follows:

$$p_i(p_j; C_i, C_j) = \begin{cases} p^m(C_i) & \text{if} \quad p_j > p^m(C_i) \\ p_j & \text{if} \quad p^m(C_i) \geq p_j > C_i, \ C_i < C_j \\ p_j - \varepsilon & \text{if} \quad p^m(C_i) \geq p_j > C_i, \ C_i \geq C_j \\ C_i & \text{if} \quad C_i \geq p_j \end{cases} , i = I, E, \ j \neq i.$$

Hence, the equilibrium price of player i, $p_i^*(C_i, C_j)$, becomes:

$$p_i^*(C_i, C_j) = \begin{cases} p^m(C_i) & \text{if} \quad C_j > p^m(C_i) \\ C_j & \text{if} \quad p^m(C_i) \geq C_j > C_i \\ C_i & \text{if} \quad C_i \geq C_j \end{cases} , i = I, E, \ j \neq i,$$

and player i's equilibrium profit, $\Pi_i^*(C_i, C_j)$, becomes:

$$\Pi_i^*(C_i, C_j) = \begin{cases} \pi^m(C_i) & \text{if} \quad C_j > p^m(C_i) \\ \pi(C_j, C_i) & \text{if} \quad p^m(C_i) \geq C_j > C_i \\ 0 & \text{if} \quad C_i \geq C_j \end{cases} , i = I, E, \ j \neq i.$$

This is a standard profit function under homogeneous Bertrand competition.

We now examine the optimal wholesale price offer. Even in the case of $S = 1$, each manufacturer accepts offers from distributors as long as $w_i \geq c$. It is possible for the incumbent distributor to make offers to both manufactures, but there is no reason to offer a wholesale price that is strictly higher than c. Hence, the incumbent offers $w_I = c$ to all manufacturers. On the other hand, the entrant distributor can make an offer only to the manufacturer who did not sign the exclusive dealing contract (the "free manufacturer"), and the optimal wholesale price offer becomes $w_E = c$. Obviously, the manufacturers accept all offers. In summary, the incumbent's optimal marginal cost is $C_I = c + d_I$, and the entrant's optimal marginal cost is $C_E = c + d_E$. Because $d_I > d_E$, the outcome of retail price competition becomes:

$$\Pi_E^*(c + d_E, c + d_I) = \begin{cases} \pi^m(c + d_E) & \text{if} \quad c + d_I > p^m(c + d_E) \\ \pi(c + d_I, c + d_E) & \\ = (d_I - d_E)X(c + d_I) & \text{if} \quad c + d_I \leq p^m(c + d_E), \end{cases}$$

and $\Pi_I^* = 0$. Thus, the entrant distributor will enter the market at t=1 as long as $\Pi_E^* \geq F$.

Even when $S = 0$, the outcome is the same as when $S = 1$. Because the two manufacturers are free manufacturers, $w_I = w_E = c$, the incumbent's cost is $c + d_I$, and the entrant's cost is $c + d_E$. Hence, the outcome of the retail competition is the same as when $S = 1$.

Using these results, we examine the equilibrium decisions at t = 0. We can see that even if a manufacturer rejects an exclusive dealing contract, it cannot obtain any positive profit under the equilibrium wholesale offer. Hence, manufacturers have no incentive to reject the exclusive contract even if the compensation level is zero, $x^* = 0$. This means that the exclusive contract can exclude the entrant. Formally, we obtain the following result.

Proposition 1 *If a downstream incumbent firm intends to exclude an efficient rival by making exclusive dealing contracts, there exists a unique equilibrium, in which the entrant must be excluded for any level of F.*

Proof. First, we examine the optimal decisions at t = 2. Because the marginal cost of a manufacturer, c, is a common knowledge, the optimal wholesale price offer from an entrant distributor to a free distributor is $w_E = c$. Moreover, the incumbent distributor only has an incentive to offer $w_I = c$ to the free distributor. This means that a manufacturer cannot get any positive profit by rejecting the exclusive dealing contract. On the other hand, by accepting the exclusive dealing contract, each captured manufacturer gets zero profit, because the equilibrium wholesale price offer from the incumbent distributor is $w_I = c$. Hence, it is indifferent for a manufacturer to accept the exclusive dealing contract or not, even if $x^* = 0$, and all manufacturers sign the exclusive contracts. As a result, the entrant manufacturer cannot enter the market for any level of F. ■

The intuition of this result is as follows. In the large distributor model, rejecting the exclusive dealing contract is not attractive for a manufacturer since it cannot sell its product at a high price. None of distributors have incentive to offer a higher wholesale price than c even for the free manufacturer because the distributors have strong bargaining power[6]. Hence all manufacturers sign the exclusive contract even if the compensation level is zero, and the entrant cannot enter the market for any any level of F.

This result is much different from the traditional one. The crucial difference between our argument and the traditional one is whether or not the incumbent directly engages in retail price competition. In the traditional literature which examined the exclusive dealing offer from an incumbent manufacturer (e.g., Fumagalli and Motta, 2006; Simpson and Wickelgren; 2007, and Abito and Wright, 2008), the incumbent does not engage in retail price competition. Hence, the wholesale price competition between the incumbent and the entrant is important and the wholesale price offer of the incumbent to the free distributor is crucial to the profit function of the incumbent. This implies the optimal wholesale price offer of the incumbent to the contracted distributor can be indeterminate. However, the profit function of the free distributor depends upon the wholesale price offer of the incumbent manufacturer to the contracted distributor. Hence, the profit of the free distributor (and the necessary compensation level) becomes indeterminate and

[6] Armstrong (2006) has used the same assumption in the two sided market context; stating that distributors (or platforms) can offer both a wholesale price to upstream firms and a retail price to final consumers.

there are multiple equilibria; entry equilibria and exclusion equilibria. On the other hand, in our setting, the incumbent distributor engages in the retail price competition. It is optimal for the incumbent to minimize the total cost and to offer competitive retail price, which becomes the treat price to the entrant distributor. Thus, the equilibrium wholesale price and the equilibrium profit of the free manufacturer are uniquely determined. Furthermore, we have assumed that distributors have strong bargaining power. Thus, even the free manufacturer cannot make any profit. For those reasons, manufacturers must agree with the exclusive dealing contract even if the compensation level is zero and the entrant cannot enter the market at the equilibrium.

III General bargaining

Evidently, the situation in which a distributor has very strong bargaining power and can make a take-it-or-leave-it offer is an extreme one. Even if we relax this assumption, however, we can have a unique equilibrium, and the entrant can be excluded under some parameters. In order to explore this point, we assume that when $S = 1$, a free manufacturer has some appertaining power and determines the wholesale price as follows:

$$w_E = c + \theta(d_I - d_E),$$

where θ represents the bargaining power of the manufacturer and we assume that $0 \leq \theta \leq 1$. This means that the entrant distributor's cost becomes $C_E = w_E + d_E = c + d_I - (1 - \theta)(d_I - d_E)$. Clearly, C_E and w_E are uniquely determined by the bargaining process given θ.

On the other hand, the signed manufacturer has no chance to trade with the entrant distributor. Thus, the incumbent distributor makes a take-it-or-leave-it offer, $w_I = c$, to the signed manufacturer, which accepts the offer. In the case of $S = 1$, it is possible for the incumbent distributor to offer a wholesale price even to the free distributor. However, this wholesale price must be equal to c because the incumbent can purchase any amount of the product from the signed manufacturer at the price c. As long as the wholesale price offer of the incumbent to the free distributor is c, the profit of the free distributor does not change through the trade with the incumbent distributor.

We should note here that the incumbent distributor cannot block the trade between the entrant and the free manufacturer by offering a high wholesale price to the free manufacturer. Since the manufacturer does not face any capacity constraints, it is optimal for it to trade with the entrant even if the wholesale price offer of the entrant is lower than that of the incumbent as long as the

offer of the entrant is not lower than the unit cost c. Thus, in the case of $S = 1$, the wholesale offer by the incumbent is c and C_I is uniquely determined as $C_I = c + d_I$. From those offers, the equilibrium profit of the entrant distributor in the case of $S = 1$, denoted by Π_E^{**}, becomes as follows:

$$\Pi_E^{**} = \begin{cases} \pi^m(c + d_I - (1-\theta)(d_I - d_E)) & \text{if} \quad c + d_I > \\ & p^m(c + d_I - (1-\theta)(d_I - d_E)) \\ \pi(c + d_I, c + d_I - (1-\theta)(d_I - d_E)) & \text{if} \quad c + d_I \leq \\ = (1-\theta)(d_I - d_E)X(c + d_I) & p^m(c + d_I - (1-\theta)(d_I - d_E)), \end{cases}$$

and the incumbent distributor gets zero because it loses the retail price competition. The entrant distributor will enter the market at t=1 as long as $\Pi_E^{**} \geq F$. On the other hand, the profit of the free manufacturer Π_f^{**} becomes,

$$\Pi_f^{**} = \begin{cases} \theta(d_I - d_E)X(p^m(c + d_I - (1-\theta)(d_I - d_E))) & \text{if} \quad c + d_I > \\ & p^m(c + d_I - (1-\theta)(d_I - d_E)) \\ \theta(d_I - d_E)X(c + d_I) & \text{if} \quad c + d_I \leq \\ & p^m(c + d_I - (1-\theta)(d_I - d_E)). \end{cases} \tag{1}$$

If $S = 2$, the signed manufacturers make zero profit because they have no bargaining power against the incumbent and the incumbent distributor offers $w_I = c$. This means that the incumbent distributor has to offer $x^* \geq \Pi_f^{**}$ to realize $S = 2$. In summary, as long as $\pi^m(c + d_I) \geq 2\Pi_f^{**}$ or $\Pi_E^{**} < F$ is satisfied, the entrant cannot enter the market and the exclusion becomes a unique equilibrium. If $\pi^m(c + d_I) < 2\Pi_f^{**}$ and $\Pi_E^{**} \geq F$, two manufacturers do not sign the exclusive contracts and the entrant enters the market. Even in this case, there is a unique equilibrium. As explained in the previous section, $w_I = w_E = c$ and the incumbent's (the entrant's) cost is $c + d_I$ ($c + d_E$) when $S = 0$ because the two manufacturers are free. Thus, the outcome of the retail price competition is unique.

Next, we should check the robustness of the necessary compensation level, $2\Pi_f^{**}$. In this model, if one manufacturer rejects the exclusive dealing offer, the incumbent distributor and the signed manufacturer get zero profit. Hence, it is necessary to block the unilateral deviation (i.e., the rejection of the exclusive dealing offer) incentive of both manufacturers, that is, it is necessary to give the compensation Π_f^{**} to each manufacturer. This also implies that the sequential offer of exclusive dealing contract does not change the total necessary compensation

level, $2\Pi_f^{**}$. Moreover, even if we consider the situations in which the agreement of exclusive dealing contracts becomes ineffective with some probabilities, the result does not change at all. Consider an exclusive dealing contract in which all contracted manufacturers can be free and the incumbent does not pay the compensation, x, with probability $q > 0$. In such situations, the incumbent can reduce the required compensation level to $2(1-q)\Pi_f^{**}$. The reason is as follows. With probability q, a contracted manufacturer becomes free and becomes a competitor to the manufacturer rejected the original exclusive dealing contract, and thus the manufacturer rejected the original contract loses the profit Π_f^{**}. However, the incumbent distributor gets zero profit when the contracted manufacturer becomes free, that is, the expected profit of the incumbent under $S = 2$ becomes $(1-q)\pi^m(c+d_I)$. Hence, this type of contract cannot change the necessary condition for exclusion[7]. In summary, we obtain the following result.

Proposition 2 *In the general bargaining situation, this economy realizes a unique equilibrium. As long as the following condition is satisfied, the exclusion is realized under the unique equilibrium even if* $F = 0$.

$$\pi^m(c+d_I) \geq 2\theta(d_I - d_E)X(p^m(c+d_I-(1-\theta)(d_I-d_E))) \quad \text{if} \quad c+d_I > p^m(c+d_I-(1-\theta)(d_I-d_E))$$

$$\pi^m(c+d_I) \geq 2\theta(d_I - d_E)X(c+d_I) \quad \text{if} \quad c+d_I \leq p^m(c+d_I-(1-\theta)(d_I-d_E))$$

Linear demand example To understand the condition of Proposition 2 clearly, let us consider a linear demand example where the demand function is $X(p) = 1-p$. When $S = 2$, the incumbent distributor monopolizes the retail market with cost $C_I = c + d_I$ and gets:

$$\Pi_I = \pi^m(c+d_I) = \frac{(1-c-d_I)^2}{4}.$$

When $S = 1$, $C_E = c+d_I-(1-\theta)(d_I-d_E)$ and the monopoly price for the entrant distributor becomes:

$$p^m(c+d_I-(1-\theta)(d_I-d_E)) = \frac{1+c+d_I-(1-\theta)(d_I-d_E)}{2}.$$

[7] If we allow more sophisticated contracts, however, the necessary condition could be changed as explored by Simpson and Wickelgren (2007). For example, if the exclusive contract can be ineffective only when $S = 1$, the free distributor cannot get any profit and the necessary compensation level can be zero. That is, we can get the exclusion equilibrium.

This monopoly price is lower than $c+d_I$ if and only if $\{(d_I-d_E)-(1-c-d_I)\}/(d_I-d_E)>\theta$. Thus, the free manufacturer's profit (1) becomes as follows:

$$\Pi_f^{**}=\begin{cases}\theta(d_I-d_E)(\frac{(1-\theta)(d_I-d_E)-c-d_I}{2}) & \text{if} \quad \frac{\{(d_I-d_E)-(1-c-d_I)\}}{d_I-d_E}>\theta \\ \theta(d_I-d_E)(1-c-d_I) & \text{if} \quad \frac{\{(d_I-d_E)-(1-c-d_I)\}}{d_I-d_E}\leq\theta.\end{cases} \tag{2}$$

It is optimal for the incumbent to offer $x^{**}=\Pi_f^{**}$. Exclusive dealing contracts are feasible to offer for the incumbent if $\Pi_I\geq 2x^{**}$. Thus the above condition in the Proposition 2 becomes,

$$\begin{array}{ll}\frac{(1-c-d_I)^2}{4}\geq 2\theta(d_I-d_E)(\frac{(1-\theta)(d_I-d_E)-c-d_I}{2}) & \text{if} \quad \theta<\frac{\{(d_I-d_E)-(1-c-d_I)\}}{d_I-d_E} \\ \frac{(1-c-d_I)^2}{4}\geq 2\theta(d_I-d_E)(1-c-d_I) & \text{if} \quad \theta\geq\frac{\{(d_I-d_E)-(1-c-d_I)\}}{d_I-d_E}.\end{array} \tag{3}$$

By simple calculation, we can see that

$$\begin{aligned}\frac{(1-c-d_I)^2}{4} &\geq 2\theta(d_I-d_E)(\frac{(1-\theta)(d_I-d_E)-c-d_I}{2}) \\ &\Leftrightarrow \quad \theta\leq\theta^{**}\equiv\frac{2(d_I-d_E)(1-c-d_I)-(1-c-d_I)\sqrt{(d_I-d_E)(4(d_I-d_E)-1)}}{2(d_I-d_E)}.\end{aligned}$$

Since $\theta^{**}<\frac{\{(d_I-d_E)-(1-c-d_I)\}}{d_I-d_E}$, $\theta\leq\theta^{**}<\frac{\{(d_I-d_E)-(1-c-d_I)\}}{d_I-d_E}$. Thus, the exclusion is a unique equilibrium if $\theta\leq\theta^{**}$.

Furthermore, we have that

$$\frac{(1-c-d_I)^2}{4}\geq 2\theta(d_I-d_E)(1-c-d_I)\Leftrightarrow\theta\leq\frac{1-c-d_I}{8(d_I-d_E)}, \tag{4}$$

and

$$\frac{1-c-d_I}{8(d_I-d_E)}\geq\frac{\{(d_I-d_E)-(1-c-d_I)\}}{d_I-d_E}, \tag{5}$$

as long as $d_I-d_E\leq\frac{9(1-c-d_I)}{8}$. Hence, even when $\frac{\{(d_I-d_E)-(1-c-d_I)\}}{d_I-d_E}\leq\theta\leq\frac{1-c-d_I}{8(d_I-d_E)}$, the exclusion becomes a unique equilibrium as long as $d_I-d_E\leq\frac{9(1-c-d_I)}{8}$.

On the other hand, if the conditions above are not satisfied, the entrant always enters and the case of $S=0$ must be realized.

IV Concluding Remarks

In this paper, we introduced a large distributor model in the context of exclusive dealing contracts. A large distributor offers exclusive dealing contracts to manufacturers in order to exclude the efficient entrant distributor. Our main result is that even in the homogeneous goods market, there exists only a unique exclusion equilibrium. The uniqueness of the equilibrium in our large

distributor model stems from the simple fact that distributors engage in retail market competition. They have incentives to minimize their total costs and make wholesale price offers as low as possible. Therefore, the unique equilibrium can be realized. Moreover, if distributors have strong bargaining power, their wholesale price offers must be low even for the only one free manufacturer. Hence a manufacturer cannot expect a sufficient amount of profit if it rejects the exclusive dealing contract. This implies that the necessary compensation level can be reduced. As a result, the incumbent distributor can capture all manufactures and the efficient entrant distributor cannot enter the market. Exclusion must be realized at the equilibrium.

As implications of anti-trust issues, we assure that the anti-trust authority should take care of the exclusive dealing contract offered by distributors in addition to by manufacturers. Our result supports the European Commission's revision of regulations on vertical restraint, and also encourages efforts by authorities in other countries concerning large distributors' intention to exclude entrants by promoting vertical restraints with manufacturers, which have relatively lower bargaining power against large distributors.

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