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Exclusive dealing contract and inefficient entry threat.

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Abstract

This paper examines the effects of exclusive dealing contracts offered by an incumbent distributor to an incumbent manufacturer with entrants in both manufacturing and distribution sectors. It is well-known that a potential entry threat is welfare increasing under homogenous price competition, even though the potential entrant is less productive. This paper reexamines this intuition. We show that the entry threat of a less-productive manufacturer is welfare decreasing when there is an exclusive dealing contract between the incumbent manufacturer and distributor.

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1 Introduction

The effects of exclusive dealing contracts have been a controversial subject among economists for more than 20 years.[1] In this paper, we will show that weak entrants have a crucial role for understanding the effects of exclusive dealing contracts on social welfare. Those entrants may become the main reason for the exclusive dealing contract to decrease social welfare. In other words, we will present the possibility that an entry threat may create a harmful mechanism for social welfare when there is an exclusive contract.

It is well-known that a potential entry threat is welfare increasing (more rigorously, not welfare decreasing) under price competition with a homogenous product, even though the potential entrant is weak (less productive). In this paper, however, we will show that this result is not applicable when there is an exclusive dealing contract. An entrant can decrease social welfare when incumbents sign exclusive dealing contracts. In order to consider this point clearly, we focus on large and strong distributors who possess strong bargaining power over manufacturers.[2] How can we obtain such a counter-intuitive result? The exclusive dealing contract offered by the incumbent distributor is a key element. As explored by Aghion and Bolton (1987), an exclusive dealing contract functions not only as an entry-deterrence device but also as a rent-extraction device by setting an appropriate level of liquidated damage. Hence, in our model, without an entrant in the manufacturing sector, an efficient transaction (incumbent manufacturer trades with the entrant distributor) is realized even under the exclusive dealing contract, and the incumbent distributor obtains the liquidated damage. With the possibility of entry into the manufacturing sector, however, this mechanism does not function properly. If the exact cost of the new manufacturer is uncertain, the incumbent distributor cannot set an appropriate level of liquidated damage to extract all rents realized by the efficient players. Thus, there is a possibility that the inefficient entrant in the manufacturing sector replaces the efficient incumbent and trades with the new efficient distributor. This trade decreases total welfare.

In recent times, Simpson and Wickelgren (2007) treated the cases of manufacturer-distributor relationships in the context of exclusive dealing contracts.[3] However, those papers examined the exclusive dealing incentive of an incumbent manufacturer. In this paper, we focus on the exclusive behaviors of an incumbent distributor. We explore a new aspect of exclusive dealing contracts.

The paper is organized as follows: Section 2 explains the basic model with one manufacturer. Section 3 provides the optimal contracts when an inefficient entrant manufacturer exists. Finally, Section 4 provides some concluding remarks.

[1] Rey and Tirole (2007) provide a concise survey on this topic.

[2] The market power of the distribution sector on vertical restraints has recently become a growing concern. The European Commission has revised the Vertical Restraints Block Exemption Regulation and the related guidelines on supply and distribution agreements: 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) See also Miklos-Thal et al. (forthcoming) for recent research on this topic.

[3] See also Fumagalli and Motta (2006) and Wright (2009) for a model with homogenous products. Abito and Wright (2008) develop a model with differentiated products in a similar context.

2 Basic Model

We consider a model with a simple vertical structure. Players are manufacturers (sellers), distributors (buyers), and consumers. In this section, we analyze the case with one incumbent manufacturer (IM) with constant marginal cost c_I. In the next section, we introduce another manufacturer which tries to enter the market. At the downstream, there is a incumbent distributor (ID) with constant marginal cost d_I and an entrant distributor (ED) with constant marginal cost $d_E(< d_I)$, that is, ED is more efficient than ID.[4] There is no entry cost, and fixed costs are zero for all players. In this setting, ID has an incentive to exclude ED by using exclusive dealing contracts. In this paper, we consider exclusive dealing contacts with liquidated damage.[5] The contract is consisted with the compensation x and liquidated damage h. The liquidated damage level h is the damage the signer must pay if he breaches the contract and trades with the entrant distributor. We assume that if the incumbent manufacturer is indifferent between breaching and not breaching, it trades with the entrant distributor. Any commitments on wholesale prices or distribution margins are not included in the contract. Since there is no entry cost and no uncertainty about the entry, the difference between the incumbent and the entrant distributor is the possibility of offering an exclusive dealing contract. Only the incumbent distributor has an opportunity to offer exclusive dealing contracts.

All consumers have the same preference, and the reservation price for the product is v. Each consumer buys at most only one unit of the product, and we set the number of consumers as 1 for simplicity. In order to avoid unnecessary complications, we assume that v is sufficiently high, and all possible transactions are profitable for consumers, that is, $v > d_I + c_I$. We assume that all players are risk neutral. Under these assumptions, the transaction between IM and ED is efficient and socially optimal.

This game runs as follows. At t = 0, the incumbent distributor offers an exclusive dealing contract to the incumbent manufacturer and the manufacturer decides whether to accept or reject this contract.[6] At t = 1, the entrant distributor decides to enter the market. Since we assume no entry cost, an entrant surely enters if it can find the partner to deal with. At t=2, each distributor offers a wholesale price to an upstream firm in a "take-it-or-leave-it" manner. We assume that distributors have strong bargaining power over manufacturers. This assumption can be interpreted as a simplified model with multiple identical manufacturers.[7] The manufacturer can accept both of the offers since we do not assume any capacity constraint for the manufacturer. Then, active distributors compete a la Bertrand in the retail market. ID and ED simultaneously offer their retail prices to consumers. P^i is the retail price offered by distributor i $(= ID, ED)$. Finally, consumers determine whether to buy the product.[8]

[4] In this sense, we can see that our model is an extension of Comanor and Rey's (2000) model with efficient downstream entrants and weak upstream entrants. Comanor and Rey (2000), however, exclude the possibility of trade between entrants, i.e., between EM and ED, by assumption.

[5] We have examined other types of exclusive contracts in two papers, Oki and Yanagawa (2009, 2010).

[6] We assume that if the manufacturer is indifferent about whether to sign the exclusive contract, then it signs it in order to avoid additional notation.

[7] Armstrong (2006) also assume that the platform (corresponding to distributors in our model) can offer wholesale prices to producers.

[8] We assume the following tie-break rules for simplicity. If two prices are the same, the more efficient trans-

Here we will show that there is no inefficiency in this case even if an exclusive dealing contract is agreed between the incumbents. Suppose that the incumbent manufacturer has signed the exclusive contract with a liquidated damage level, h, at t=0. This implies that the entrant distributor has to pay h additionally to buy from the incumbent manufacturer. Hence, the wholesale price offers by the incumbent and entrant distributors at the equilibrium becomes $w_{IM}^{ID} = c_I$ and $w_{IM}^{ED} = c_I + h$, respectively where w_{IM}^{i} is a wholesale price offer from distributor i $(= ID, ED)$ to IM. Then, the minimum total cost of distributor i (denoted by TC^i) including a wholesale price and unit distribution cost becomes $TC^{ID} = c_I + d_I$, and $TC^{ED} = c_I + h + d_E$.

Note that even if $d_I - d_E < h$, i.e., $TC^{ID} < TC^{ED}$, the incumbent distributor will not compete with the entrant at the retail market competition. If it competes, the equilibrium retail price becomes $P^* = TC^{ED} = c_I + h + d_E$, and ID's profit (denoted by π^{ID}) becomes $\pi^{ID} = h - d_I + d_E < h$. Hence, the incumbent distributor always avoids price competition even if it has cost advantage and obtains the liquidated damage h by offering $P^{ID} > P^{ED}$. All combinations such that P^{ID} which is higher than P^{ED} are Nash equilibria, but all equilibria attain the same optimal liquidated damage level. Hence, throughout this paper, we simply assume that a Nash equilibrium that maximizes the profit of ED is chosen without loss of generality. That is, the incumbent always offers $P^{ID} \geq v$. With signed exclusive dealing contract and given h, the signer (IM) always breaches the contract and trades with the entrant by paying h. Then the outcome with each players profit (π_{ID}, π_{ED} and π_{IM}) at the end of t=2 is as follows: $\pi_{ID} = h$, $\pi_{ED} = v - (c_I + h + d_E)$,and $\pi_{IM} = x$.

The profit maximization problem for the incumbent distributor at t = 0 is:

$$\begin{aligned} & \max_{h} \quad h \\ s.t. \ 0 \ \leq \ & h \leq v - c_I - d_E. \end{aligned}$$

Let h^* and x^* denote the equilibrium level of liquidated damage and compensation, respectively. Obviously, $h^* = v - c_I - d_E$. The compensation $x^* = 0$ is sufficient for the incumbent manufacturer to sign because it can obtain only zero even by rejecting the exclusive contract. ID obtains all surplus by the liquidated damage. Each player's payoff becomes as follows: $\pi^{ID} = v - c_I - d_E$, $\pi^{ED} = 0$, and $\pi^{IM} = 0$.

At the equilibrium, the efficient entry occurs and there is no welfare loss. The liquidated damage as a rent extraction device, h, enables the incumbent distributor to absorb the entire surplus that the efficient entrant brings to the market. We have the following proposition.

Proposition 1 *When no potential entrant exists in the manufacturing sector, the optimal exclusive dealing contract with liquidated damage does not deter an efficient entry, and there is no welfare loss.*

3 The Optimal Contract with an Entrant Manufacturer

In this section, we introduce another entrant; an entrant manufacturer (EM), that decides to enter or not at t=1. Both the entrant and the incumbent manufacturer produce homogenous

action is chosen by consumers. If two transactions have the same efficiency level, the entrants' transaction is chosen.

goods. EM's constant marginal cost, c_E, is uncertain when an exclusive dealing contract is offered. All players only know that c_E is uniformly distributed in $[\underline{c}_E, \bar{c}_E]$. Hereafter, we will focus on an inefficient upstream entrant case by assuming that EM's cost is uniformly distributed in $[c_I, \bar{c}_E]$, and we define $C \equiv \bar{c}_E - c_I$.[9] At t=1, all players can observe the realization of c_E, before the entry decision.[10] In order to avoid unnecessary complications, we assume that v is sufficiently high, and all possible transactions are profitable for consumers, that is, $v > d_I + \bar{c}_E$. We assume that all players are risk neutral. Under these assumptions, the transaction between the incumbent manufacturer and the entrant distributor is efficient and socially optimal. Since we continue to assume that there is no entry costs for both entrants, the difference between the incumbents and the entrants is the possibility of signing an exclusive dealing contract. Only the incumbents have an opportunity to write exclusive dealing contracts.

This game runs as follows. At t= 0, the incumbent distributor offers the incumbent manufacturer an exclusive dealing contract and IM decides whether to accept or reject this contract. At t = 1, The entrant manufacturer's cost, c_E, realizes. Then, EM and ED decide to enter the markets. At t=2, competition occurs. Competition structures are the same as in the previous section. There are four stages; First, each distributor offers manufacturers wholesale prices, w_j^i, $i = ID$ or ED and $j = IM$ or EM, simultaneously in the take-it-or-leave-it manner. Second, active manufacturers determine whether to accept each offer or not. For the same reasons described in the previous section, a manufacturer can accept both offers. Third, active distributors simultaneously offer their retail price to consumers. Let P^i denote the retail price offered by distributor i (= ID or ED). Finally, consumers determine whether to buy the product and choose a distributor that offers the lowest retail price.[11] In this setting, we have the following proposition.

Proposition 2 *When there is a potential weak entrant in the manufacturing sector, an exclusive dealing contract offered by an incumbent distributor induces inefficiency as follows. Case (i) $C/2 \leq d_I - d_E$. When $C/2 \leq c_E - c_I$, there is no inefficiency. When $c_E - c_I < C/2$, the efficient incumbent manufacturer cannot supply the product.*
Case (ii) $C/2 > d_I - d_E$. When $c_E - c_I \geq C - (d_I - d_E)$, there is no inefficiency. When $d_I - d_E < c_E - c_I < C - (d_I - d_E)$, the efficient entrant distributor is excluded. When $c_E - c_I \leq d_I - d_E$, the efficient incumbent manufacturer cannot supply the product.

Proof. By the assumption of c_E, $c_E - c_I$ is also uniformly distributed on $[0, C]$ where $C \equiv \bar{c}_E - c_I$. We consider the following two situations separately; (a) $h \leq d_I - d_E$ and (b) $h \geq d_I - d_E$.

(a) $h \leq d_I - d_E$. In this case, if $h \leq c_E - c_I$, $TC^{ED} = c_I + h + d_E$ and $TC^{ID} = c_I + d_I$. It is better for the incumbent distributor to set its price very high and obtain the penalty h

[9] We assume that an upstream entrant (EM) is inefficient for simplicity. Even if we assume that EM can be more efficient than IM with some probabilities, the qualitative results of this paper are not affected.

[10] Here we assume that the realization of c_E is observable at t=1, but we may be able to assume that c_E is private information which is unknown for other players throughout two periods. Even if we assume that c_E is private information, qualitative results of this paper are not affected and become more robust since exclusive contracts become renegotiation-proof. See Yanagawa and Oki (2008) for further discussion.

[11] We assume that the same tie-break rule in the previous section is applied.

avoiding price competition since

$$c_I + h + d_E - (c_I + d_I) = h + (d_E - d_I) < h.$$

On the other hand, if $h > c_E - c_I$, $TC^{ED} = c_E + d_E$ and $TC^{ID} = c_I + d_I$. Since $c_E + d_E - (c_I + d_I) \leq c_E - c_I - h < 0$, the incumbent cannot win the retail price competition and has zero profit. Thus, in Case (a), the incumbent distributor can get positive profit h with probability $(C - h)/C$, which is the probability that $h \leq c_E - c_I$. The expected payoff of the incumbent distributor becomes as follows:

$$E[\pi^{ID}(h)] = \frac{(C - h)h}{C}.$$

(b) $h \geq d_I - d_E$. If $h \leq c_E - c_I$, the incumbent distributor obtains h as in Case (a). If $h > c_E - c_I$, the incumbent distributor has a chance to win the retail price competition. We have $TC^{ED} = c_E + d_E$ and $TC^{ID} = c_I + d_I$. When $c_E - c_I \geq d_I - d_E$, then $TC^{ED} \geq TC^{ID}$. The incumbent distributor earns $c_E + d_E - c_I - d_I \geq 0$. When $d_I - d_E > c_E - c_I$, on the other hand, the incumbent distributor cannot win the retail price competition and earns zero profit. Hence, in Case (b), the expected payoff of the incumbent distributor becomes:

$$E[\pi^{ID}(h)] = \frac{(C - h)h}{C} + \frac{(h - d_I + d_E)^2}{2C}.$$

By using these results, we can derive the optimal h by solving the following problem:

$$\max_h E[\pi^{ID}(h)] = \begin{cases} \frac{(C-h)h}{C} & \text{if} \quad h \leq d_I - d_E \\ \frac{(C-h)h}{C} + \frac{(h-d_I+d_E)^2}{2C} & \text{if} \quad h \geq d_I - d_E. \end{cases}$$

We should note that the incumbent manufacturer accepts this optimal exclusive dealing offer because its profit is zero whether it accepts or rejects the offer.

We can derive that:

$$\begin{aligned} \frac{C}{2} &= \arg\max_h \frac{(C - h)h}{C}, \\ C - (d_I - d_E) &= \arg\max_h \frac{(C - h)h}{C} + \frac{(h - d_I + d_E)^2}{2C}, \end{aligned}$$

and we classify this problem into the following two cases: (i) $C/2 \leq d_I - d_E$, (ii) $C/2 > d_I - d_E$.

(i) If $C/2 \leq d_I - d_E$, then $C - (d_I - d_E) \leq d_I - d_E$ and $(C - h)h/C + (h - d_I + d_E)^2/2C$ is maximized at $d_I - d_E$ within the range of $h \geq d_I - d_E$. Thus, the optimal liquidated damage level is $h = C/2 (= \arg\max\ (C - h)h/C)$. Hence, the entrant distributor trades with the incumbent manufacturer and the incumbent manufacturer obtains $h = C/2$ and there is no inefficiency when $C/2 \leq c_E - c_I$. When $C/2 > c_E - c_I$, however, the entrant distributor chooses to trade with the entrant manufacturer and the incumbent manufacturer, that is more efficient than the entrant, cannot supply the product.

(ii) If $C/2 > d_I - d_E$, $(C - h)h/C$ is maximized at $d_I - d_E$ within the range of $h \leq d_I - d_E$. It implies that the optimal liquidated damage level is $h = C - (d_I - d_E) (= \arg\max\ \frac{(C-h)h}{C} +$

$\frac{(h-d_I+d_E)^2}{2C}$). Hence, when $c_E - c_I \geq C - (d_I - d_E)$, the entrant distributor trades with the incumbent manufacturer and there is no welfare loss. When $d_I - d_E < c_E - c_I < C - (d_I - d_E)(= h)$, we have $h + c_I + d_E > c_E + d_E > c_I + d_I$ and the entrant distributor is excluded since h and c_E are too high for the entrant distributor to win the retail price competition. When $c_E - c_I \leq d_I - d_E (< C - (d_I - d_E) = h)$, we have $c_E + d_E \leq c_I + d_I$ and $c_E + d_E < h + c_I + d_E$, then the entrant distributor minimizes its total cost by trading with the entrant manufacturer, and it can win the retail price competition. Thus, the efficient incumbent manufacturer cannot supply the product. ■

This result implies that the exclusive dealing contract decreases social welfare. Although IM-ED combination is the socially optimal, we have shown that there is a possibility that the inefficient vertical structure EM-ED or IM-ID wins the retail price competition.

An intuitive reason of this result is as follows. The incumbent distributor uses the exclusive dealing contract to absorb the rent which the entrant distributor derives. If the penalty level h can be set appropriately, the incumbent distributor does not hesitate to induce the efficient transaction since it is the best way to absorb the rent through the penalty as much as possible. However, the appropriate level must be perfectly contingent upon the realized cost level of the entrant manufacturer (c_E). Because c_E is uncertain, the incumbent distributor cannot set the level appropriately. In order to maximize its expected profit, the penalty becomes too high and the inefficient transactions will be realized.

4 Conclusion

From Proposition 1 and 2, we have an interesting implication. The entrant manufacturer is crucial for the result that the exclusive dealing contract generates inefficiency. Without the entrant manufacturer, the incumbent distributor can set the level of liquidated damage appropriately and can absorb the rent completely. Hence, even with the exclusive dealing contract, it does not decrease total welfare in this simple setting. In other words, the existence of the entrant in the manufacturing sector and the uncertainty about the cost level of the entrant are crucial for the inefficiency. Our result implies that an entry threat does not increase the welfare automatically even though the competition is homogenous and there is no entry cost. This point is quite in contrast with the results of the contestable markets theory. We can state that the effect of entry threats on social welfare is more complex than we expected when there are exclusive dealing contracts.

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