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ON THE DAMPENING-OF-COMPETITION EFFECT OF EXCLUSIVE DEALING*

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The authors compare and contrast the profit and welfare effects of exclusive dealing, sales through a common retailer, and vertical integration. As did Lin [1990], the authors find that imperfectly competitive manufacturers prefer to impose exclusive dealing on their retailers. Unlike Lin, the authors find that welfare is higher under exclusive dealing than when products are sold through a common retailer. This finding suggests a new interpretation of the *Standard Stations v. United States* 1949 antitrust case.

I. INTRODUCTION

IN A recent issue of this Journal, Lin [1990] argues that imperfectly competitive manufacturers may impose exclusive dealing on their retailers in order to relax competition among themselves. He compares a situation in which an upstream duopoly distributes through a common retailer with one in which each upstream firm has its own retailer. The latter is referred to as exclusive dealing (ED) and the former as non-exclusive dealing (ND).

His main insight is that "the perceived demands of the manufacturers are rendered more inelastic under exclusive dealing, much as if the products had been made more differentiated." This tends to reduce competition and yields higher profits for the upstream firms. Assuming linear demand, Lin demonstrates these points for both uniform wholesale pricing and two-part tariffs.

This note shows that Lin's analysis is only partially correct; if we assume retailer rationality, his proposed equilibrium under two-part tariffs can easily be broken. We derive the unique subgame perfect equilibrium and find that, although it is still true that exclusive dealing is preferred by the manufacturers, some of his policy conclusions need to be revised.

II. LIN'S MODEL AND NOTATION

Lin considers two manufacturers who each supply a single, differentiated product for resale. The downstream industry may consist of a single retailer who sells both goods, or two independent retailers, each selling one good. In either case, the final demands for the products are given by

$$(1) \qquad q_i(p_i, p_j) = 1 - p_i + ap_j \quad i, j \in \{1, 2\}, i \neq j$$

*The views expressed herein are not purported to represent those of the US Department of Justice. We thank Gregory Werden, Lawrence J. White, and two anonymous referees for helpful comments.

where p_i and p_j are the retail prices of goods i and j, and $0 < a < 1$. For simplicity, all production and distribution costs are assumed to be zero.

The game has three stages. In stage one, the manufacturers simultaneously choose whether to impose exclusive dealing.[1] In stage two, the manufacturers choose wholesale prices (w_1, w_2) and fixed fees (F_1, F_2). These are taken as parametric by the retailer or retailers and are common knowledge to all. In stage three, the retailer or retailers choose prices (p_1, p_2).[2] The game is solved backwards using subgame perfection as the equilibrium concept.

Consider first the exclusive dealing subgames. On the assumption that retailers 1 and 2 agree to pay F_1 and F_2 respectively, the third stage Nash equilibrium prices solve

$$\max_{p_i}(p_i - w_i)(1 - p_i + ap_j) - F_i \quad i, j \in \{1, 2\}, i \neq j \tag{2}$$

Let p_1^* and p_2^* be the Nash prices. In stage two, each manufacturer chooses a wholesale price and fixed fee to maximize

$$w_i(1 - p_i^* + ap_j^*) + F_i \quad \text{subject to} \quad (p_i^* - w_i)(1 - p_i^* + ap_j^*) - F_i \geq 0 \tag{3}$$

where the constraint serves to ensure that each retailer earns non-negative profit. Lin demonstrates that the solution yields a wholesale price for each retailer of

$$w(ED, F) = \frac{a^2}{4 - 2a - a^2}$$

Substituting this into the third stage equilibrium retail prices gives

$$p(ED, F) = \frac{2}{(4 - 2a - a^2)}$$

Finally, each manufacturer's profit is found to be

$$\pi_m(ED, F) = \frac{(4 - 2a^2)}{(4 - 2a - a^2)^2}$$

Notice that the wholesale price exceeds production marginal cost. By committing one's own retailer to a high marginal cost, each manufacturer induces its rival's retailer to charge a higher price. This has a first-order effect on the profits of the retailers whose surpluses are then extracted by the upstream firms.[3] If each manufacturer/retailer pair were vertically integrated

[1] The two possible outcomes are a single retailer selling both goods, or two independent retailers each selling a single good. The former arises only if both manufacturers choose non-exclusive dealing.

[2] It is assumed that the retailers cannot observe each others' contract at the time they pay their fixed fee. However, contracts do become observable before any retail prices are chosen. Although Lin does not make this assumption, it is necessary for an equilibrium to exist in the exclusive dealing subgames.

[3] See Bonanno and Vickers [1988] for a careful derivation.

(*VIN*), their internal transfer price would be zero. Thus, vertical separation is more profitable than vertical integration. For comparison purposes, Lin shows that

$$w(ED,F) > w(VIN) = 0$$

$$p(ED,F) > p(VIN) = \frac{1}{2-a}$$

$$\pi_m(ED,F) > \pi_m(VIN) = \frac{1}{(2-a)^2}$$

Our point of contention with Lin occurs in the subgame in which both manufacturers have chosen to distribute through a common retailer, i.e. the non-exclusive dealing subgame. On the assumption that the retailer agrees to pay F_1 and F_2 respectively, the third stage prices solve

$$\max_{p_1,p_2} (p_1-w_1)(1-p_1+ap_2)+(p_2-w_2)(1-p_2+ap_1)-F_1-F_2 \tag{4}$$

Let $\bar{p}_1$ and $\bar{p}_2$ be the profit maximizing prices. In the second stage, Lin assumes that both manufacturers will choose their fixed fees to extract fully their "own-brand downstream profits." More precisely, from appendix B in his paper, it is clear that he means

$$F_i = (\bar{p}_i-w_i)(1-\bar{p}_i+a\bar{p}_j) \tag{5}$$

Lin argues that this is a natural assumption. However, we now show that it is inconsistent with retailer profit maximization.

In Lin's game the retailer can always choose to sell zero units of good i by setting p_i equal to infinity. Thus, manufacturer i must ensure that F_i is chosen such that the retailer will sell its product. Let $q_2(\infty,p_2)$ denote the demand for product 2 when product 1 is not sold. Define similar notation for the demand for product 1 when product 2 is not sold. Then, for a given pair of two-part tariffs, the retailer will sell both goods if and only if

$$\begin{aligned}&(\bar{p}_1-w_1)(1-\bar{p}_1+a\bar{p}_2)+(\bar{p}_2-w_2)(1-\bar{p}_2+a\bar{p}_1)-F_1-F_2 \geqslant \\ &\max\left\{\max_{p_1}(p_1-w_1)q_1(p_1,\infty)-F_1,\ \max_{p_2}(p_2-w_2)q_2(\infty,p_2)-F_2,0\right\}\end{aligned} \tag{6}$$

Given Lin's assumption that manufacturers extract their own-brand downstream profits (equation (5)), the left-hand side of (6) is zero. The retailer is constrained to earn zero profit. However, the right-hand side of (6) is not zero. To see this note that

$$\begin{aligned}\max_{p1}(p_1-w_1)q_1(p_1,\infty)-F_1 &\geqslant (\bar{p}_1-w_1)q_1(\bar{p}_1,\infty)-F_1 \\ &= (\bar{p}_1-w_1)(q_1(\bar{p}_1,\infty)-q_1(\bar{p}_1,\bar{p}_2)) \\ &> 0\end{aligned}$$

where we have substituted (5) for F_1 and used the fact that goods 1 and 2 are substitutes. This means that the retailer can increase his profit by dropping one of the products, i.e. by setting one price equal to infinity. Lin's equilibrium is broken. Mathematically, his error was to ignore corner solutions to the retailer's optimization. Intuitively, total sales when both products are sold will be less than the sum of the sales if each good is sold alone. The most that F_i can extract is good i's marginal contribution to the retailer's profit.[4]

III. EQUILIBRIUM WITH A COMMON RETAILER

One difficulty with (5) was that it assumed the retailer would necessarily sell both products. Instead, we have shown that the retailer can make positive profit by pitting one product against another and threatening to drop one of them.[5] In Lin's example, the demand for good j when good i is not sold can be found by setting $p_i = 1 + ap_j$ and substituting into $q_j(p_i, p_j)$. This yields

$$q_j(\infty, p_j) = (1+a)(1-(1-a)p_j) \tag{7}$$

Let the retailer's maximized profit when only good j is sold be given by

$$\Pi_r^j = \max_{p_j} (p_j - w_j)(1+a)(1-(1-a)p_j) - F_j \tag{8}$$

Since the most that F_i can extract is good i's marginal contribution to the retailer's profit, we know that in any equilibrium in which both goods are sold,

$$F_i = (\bar{p}_1 - w_1)(1 - \bar{p}_1 + a\bar{p}_2) + (\bar{p}_2 - w_2)(1 - \bar{p}_2 + a\bar{p}_1) - F_j - \Pi_r^j \tag{9}$$

Manufacturer i's objective function then becomes

$$\max_{w_i} \bar{p}_i(1 - \bar{p}_i + a\bar{p}_j) + (\bar{p}_j - w_j)(1 - \bar{p}_j + a\bar{p}_i) - F_j - \Pi_r^j \tag{10}$$

Using the retailer's first order condition and the fact that Π_r^j is independent of w_i, the first order condition to (10) is given by

[4] This result holds for general demands and is proven formally in Shaffer [1991].

[5] In the context of Lin's model, this threat is credible because a rejected manufacturer is unable to sell to an independent retailer once the common retailer has been agreed upon in stage one. Alternatively, one can imagine a setting in which a rejected manufacturer can costlessly establish a relationship with a new buyer. This is similar to Bernheim and Whinston [1985] in which "rejected firms in effect take their marketing decisions with them: perhaps they hire another agent or make decisions independently." Not surprisingly, the upstream firms are able to extract all of the surplus in their model. In our view, establishing a relationship with a new buyer takes time, even when there are potential retailers that a manufacturer can turn to if rejected. It is not always prohibitively costly, as in Lin, but it is not costless either. Exploring the dynamics of seller-buyer relationships is a fruitful area for future research. We conjecture that the qualitative result that some surplus will necessarily be earned by the common retailer will prove robust.

$$-w_i \frac{\partial \bar{p}_i}{\partial w_i} + w_i a \frac{\partial \bar{p}_j}{\partial w_i} = 0$$

This is satisfied only at $w_i = 0$. Intuitively, manufacturer i is interested in maximizing bilateral joint profit minus a fixed amount Π_r^j. This is done by transferring the good to the retailer at marginal cost. In equilibrium, both wholesale prices are set at

$$w(ND, F) = 0$$

Substituting this into the third stage retail prices gives[6]

$$p(ND, F) = \frac{1}{2(1-a)}$$

Upstream profits are equal to the fixed fees, which can be found using (9). Straightforward calculations yield

$$\pi_m(ND, F) = \frac{1}{4}$$

Comparing the exclusive dealing and non-exclusive dealing subgames, along with vertical integration of each manufacturer/retailer pair, it is easy to verify that

$$w(ED, F) > w(ND, F) = w(VIN)$$

$$p(ND, F) > p(ED, F) > p(VIN)$$

$$\pi_m(ED, F) > \pi_m(VIN) > \pi_m(ND, F)$$

By contrast, Lin erroneously found that

$$w(ED, F) > w(VIN) > w(ND, F)$$

$$p(ED, F) > p(ND, F) = p(VIN)$$

$$\pi_m(ED, F) > \pi_m(ND, F) = \pi_m(VIN)$$

IV. POLICY IMPLICATIONS

Lin uses his results to evaluate the US Supreme Court's decision in *Standard Stations v. United States* [1949] and its aftermath and to give overall welfare prescriptions. We shall now describe how some of the policy conclusions emanating from his analysis should be altered.

In the Standard Stations case, the Court ruled that the exclusive dealing arrangements used by seven leading oil companies to distribute gasoline were

[6] The third stage retail prices as functions of the wholesale prices are found in Lin [1990] at the top of page 222, and are not rederived here.

illegal. By banning the arrangements, the Court hoped that firms would turn to "split-pump stations," i.e. to non-exclusive dealing. Instead there was a wave of vertical integration in the industry, as more retail outlets became owned by individual oil companies. Several states responded to the integration trend by prohibiting oil companies from owning gasoline retail stations.

Why did Standard Stations and its major competitors choose franchised exclusive dealing rather than vertical integration or non-exclusive dealing? Lin's answer was that exclusive dealing was more profitable because it dampened competition among the oil companies. He incorrectly found that selling to a common retailer induced such intense competition among the manufacturers that wholesale prices were set below marginal cost. By contrast our analysis highlights a different intuition. Selling to a common retailer has two effects on upstream profits. First, the common retailer internalizes any pricing externality between goods 1 and 2. This means that joint profits can be maximized. However, in exchange for this favor, the retailer, through its credible threat of exclusion, is able to extract positive surplus from the manufacturers. Since the latter effect dominates in a linear demand framework, both manufacturers prefer to sell through independent retailers. The reason that exclusive dealing (vertical separation) is preferred to vertical integration in the model is precisely the same reason given in Bonanno and Vickers [1988]. That is, selling to an independent agent when contracts are observable affords strategic commitment to higher retail prices.

Our analysis demonstrates that vertical integration yields strictly higher profits for the manufacturers than non-exclusive dealing. This is consistent with the stylized fact that a wave of vertical integration occurred after exclusive dealing was banned. By contrast, Lin found that vertical integration and non-exclusive dealing gave manufacturers the same profits. He explained the integration trend by appealing to factors outside the reach of his model.

Can the Court's decision to ban exclusive dealing be given a normative justification? Assuming a welfare objective equal to the sum of consumer surplus and profits, our analysis implies that prohibiting exclusive dealing may have been desirable only in those jurisdictions where vertical integration was allowed and subsequently occurred. This conflicts with Lin's conclusion that banning exclusive dealing was desirable regardless of whether vertical integration occurred.

Finally, if vertical integration is not viable, and assuming that intra-brand competition and economies of scope are absent, Lin gives a rule of thumb concerning the legal treatment of exclusive dealing. With uniform pricing of the intermediate good, he finds that welfare is higher under exclusive dealing than non-exclusive dealing. His rule of thumb, therefore, is that "without franchise extraction, exclusive dealing is more efficient than non-exclusive dealing and should be allowed. Exactly the opposite can be stated if there is full franchise extraction." Once the analysis incorporates retailer rationality,

however, we find that exclusive dealing can be welfare enhancing whether or not there is franchise extraction. This lends support to the growing view that exclusive dealing can have desirable welfare properties.[7]

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[7] Exclusive dealing has also been posited to raise barriers to upstream entry and/or raise rivals' costs. See Comanor and Frech [1985] and the comments by Mathewson and Winter [1987] and Schwartz [1987]. These considerations lie outside the scope of this model.