Exclusive Dealing and Entry, when Buyers Compete

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For a long time, economists have been skeptical about the possibility that exclusive contracts could deter entry of a more efficient seller. This view is well summarized by the influential works of Richard A. Posner (1976) and Robert Bork (1978). They argue that, in order to induce a buyer to sign an exclusive deal, the incumbent should fully compensate it for the loss it suffers from not buying from a more efficient entrant. If buyers are final consumers, this loss amounts to the difference between the consumer surplus under entry and the consumer surplus under monopoly, an area which equals the monopoly profit plus the monopoly deadweight loss. Hence, the loss suffered by a buyer is higher than the profit the incumbent would make if entry were deterred. It follows that the incumbent would not find it profitable to foreclose entry, and that efficiency considerations, rather than anticompetitive motives, would explain the use of exclusive contracts.

Since the early 1980s a number of game theoretic models have been developed to study the rationale for anticompetitive exclusive contracts. Philippe Aghion and Patrick Bolton (1987) illustrate how an incumbent and a buyer might agree on a contract that enables the incumbent to extract some of the surplus the more efficient producer brings to the market in case of entry. Exclusion does not always occur, but when it does it is inefficient. In Eric B. Rasmusen et al. (1991), subsequently refined by Ilya R. Segal and Michael D. Whinston (1996, 2000), the entrant needs to supply a minimum number of buyers (higher than one) to cover its fixed costs. This creates the scope for entry deterrence: by signing the exclusive contract, a buyer makes it more difficult for the entrant to achieve its minimum viable scale, thereby imposing a *negative externality* on the other buyers. By exploiting this externality, the incumbent is able to deter efficient entry. In B. Douglas Bernheim and Whinston (1998), in addition to an existing market, a second market will develop over time. If entry is viable only by serving both markets, an exclusive deal with the buyer in the existing market might preempt entry in the second market.

A common feature of these papers is that the exclusive contract between the incumbent and a buyer exerts some type of externality on (one or more) third parties. Indeed, Bernheim and Whinston (1998) shows in a general way that it is the existence of externalities that makes an exclusive deal profitable.

These papers assume that buyers are final consumers. Exclusive agreements, however, typically do not involve final consumers, but firms.[1] Our paper, thus, considers buyers that

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[1] Among early prominent decisions related to exclusive dealing arrangements, see *Standard Oil Co. of California v. United States*, 337 U.S. 293 (1949), which involved Standard Oil and its independently owned stations, and *United Shoe Machinery Corporation v. United States*, 347 U.S. 521 (1954), where buyers were shoe manufacturers. Recent cases dealt with exclusive agreements between ice-cream producers and retailers (e.g., *Schöller v. Commission,* European Court Case T-9/95), Microsoft and personal computer original equipment manufacturers (OEMs) (*United*

use the input bought either from the potential entrant or from the incumbent to (transform it and) resell it in a final market.

When buyers are final consumers (or sell in independent markets), the demand and the payoff of a buyer depend exclusively on the price paid for the good (input). When, instead, buyers compete in a downstream market, the market share of a buyer, its input demand, and its profits depend on the input price, but also on the price paid by the rival buyer(s). This introduces an additional externality which will affect the scope for entry deterrence.

In Section I, we explore the role of downstream competition in the framework of the models by Rasmusen et al. (1991) and Segal and Whinston (1996, 2000), where exclusive dealing is extremely powerful in deterring entry. We show that intense downstream competition exerts two effects. First, by making the demand of a single buyer large enough to attract entry, it removes the negative externality that a buyer exerts on the others by accepting the exclusive agreement. Second, it can boost the profitability of being more efficient than rivals. As a result, intense downstream competition can eliminate the incumbent's incentives to exclude. To gain insight, suppose that buyers sell a homogenous good in the downstream market and compete in prices. Suppose also that all buyers but one sign the exclusive deal. If entry occurs, the free buyer will acquire a cheaper input from the more efficient entrant, thereby obtaining a very strong competitive advantage vis-à-vis rivals: it will have a lower marginal cost and will be able to capture the entire downstream market. This has two important implications. First, it makes the free buyer's input demand large enough for the entrant to cover its fixed costs. Hence, the incumbent should secure *all* buyers to exclude. Second, it can make the free buyer earn large profits. When this is the case, the incumbent should pay a very high compensation to each buyer to elicit acceptance, and will not find it profitable to exclude. At the other extreme, suppose that downstream sellers produce goods so differentiated that their markets are independent. In this case, obtaining the input at a lower price than other buyers does not allow it to steal any of their business. Therefore, being the only buyer to address the entrant would not generate a large enough input demand so as to make entry profitable. This case is therefore equivalent to the model analyzed by Rasmusen et al. (1991) and Segal and Whinston (1996, 2000), where buyers are final consumers.

Our central result is, therefore, that the potential for using exclusive contracts in an anticompetitive way crucially depends on the intensity of competition in the downstream markets.[2]

Section I analyzes the case where upstream firms set linear tariffs and focuses on the extreme case of Bertrand competition in the downstream market. Section II shows that fierce downstream competition eliminates the entry deterrence effects of exclusive dealing also under two-part tariffs. Section III assesses the robustness of the results. Section IV concludes the paper.

I. The Model

An incumbent firm (I) produces a good at a constant marginal cost c_I. The good is used by two buyers as an input to produce a final good sold in a downstream market. (We assume for simplicity that there is a one-to-one relationship between the input bought by the buyer and the output sold in the final market, and that the cost of transformation or resale is zero.) In order to facilitate the exposition, we assume that the demand for the final product is given by a simple linear function $Q = 1 - p$. Two extreme cases can be considered with this demand function. First is the case where downstream firms are independent monopolists, each facing half of the market demand: $Q_i = (1 - p_i)/2$. Second

States v. Microsoft (1995 Consent Decree)), and Bacardi-Martini and on-trade retailers (UK *Competition Appeals Tribunal Decision, case no. 1017/2/1/03, 10 June 2004*). We are not aware of any case where exclusive deals involved final consumers.

[2] Christodoulos Stefanadis (1998) and John Simpson and Abraham Wickelgren (2001) find that downstream competition *facilitates* exclusion. Crucial for their result is that the exclusive contract includes a commitment to provide the input at a certain price. Moreover, they rely on very specific assumptions. In Stefanadis (1998), the demand of a single buyer is never sufficient to trigger entry (thereby not considering the effect we highlight in this paper). Simpson and Wickelgren (2001) assume that, in the period when it enters the market, the entrant's production *must* be very small.

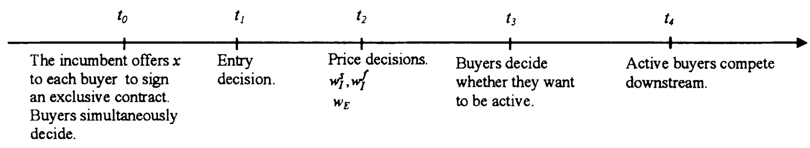

FIGURE 1. TIME LINE

is the case where they compete à la Bertrand (i.e., they choose prices and sell homogenous products) facing market demand $Q = 1 - p$.

A potential rival (E), which has lower marginal cost than the incumbent ($c_E = 0 < c_I < ½$),[3] is willing to enter the upstream market. To do so, it will have to pay the fixed sunk cost F. Throughout the paper we assume that F is too large for entry to be profitable if the entrant can serve only one buyer when downstream firms are independent monopolists, and that F is small enough for entry to be profitable if E serves both customers. In this section, where we follow Segal and Whinston (1996, 2000) in considering linear price offers to buyers, the restrictions above on fixed costs are satisfied by assuming

$$\text{(A1)} \qquad \frac{c_I(1 - c_I)}{4} \leq F < \frac{c_I(1 - c_I)}{2}.$$

The timing of the game is as follows (see also Figure 1). At time t_0, the incumbent offers buyers exclusive contracts (i.e., contracts that commit buyers to purchase only from it), and buyers decide whether to accept or not. S denotes the number of buyers that accept the exclusive contract. To sign the contract, each buyer is offered a compensation x. Following Segal and Whinston (1996, 2000), we shall analyze three different specifications of the game at t_0: (a) the case of simultaneous and nondiscriminatory offers to buyers, (b) the case of simultaneous and discriminatory offers, and (c) the case of sequential offers. Further, as in Rasmusen et al. (1991) and in Segal and Whinston (1996, 2000), exclusive contracts do not include any commitment on prices,[4] and they cannot be breached.[5, 6] At time t_1, after having observed S, the entrant decides on entry. At time t_2, active firms simultaneously name input prices. The incumbent is able to discriminate between those buyers that have signed the exclusive contract, which are offered a unit price w_I^s, and those that have not (free buyers), which are offered a price w_I^f. The potential entrant, if it has entered, can make offers only to free buyers. It offers a price w_E. The equilibrium price for free buyer(s) will be identified adopting the tie-break rule that at equal prices it is the lower-cost firm that takes all the market. Further, we shall disregard equilibria in weakly dominated strategies. At time t_3, buyers decide whether they want to be active in the downstream market (we allow buyers to use mixed strategies), which would entail

[3] The assumption $c_I < ½$ implies that the entrant's monopoly price is higher than c_I. Entry equilibria will *a fortiori* exist when the difference between the incumbent's and the entrant's costs is larger.

[4] Price commitments are unlikely if the nature of the product is not well specified at the time of the offer, or if agreements span a long time horizon in which unforeseen contingencies might occur. If exclusive contracts did include price commitments (i.e., if they took the form (w_I, x)), then downstream competition would never prevent the incumbent from excluding. The incumbent commits to a "low" price and uses negative compensations to extract the buyers' surplus. When downstream markets are independent, however, the incumbent commits to the price c_I that maximizes the joint surplus of the incumbent and the buyers, whereas under fierce competition the incumbent has to commit to a lower price in order to deter entry. Details of this analysis can be found in Appendix B (www.e-aer.org/data/june06_app_20030697.pdf).

[5] This assumption is crucial for exclusion. Suppose for instance that—in case of breach of contract by a buyer—the buyer will have to pay *expectation damages* (that is, damages that give the incumbent exactly the same profits as if the transaction had occurred). Then it can be shown (see Appendix C on line) that equilibria with entry exist both under independent markets and under fierce downstream competition. The reason the possibility of breaching prevents entry deterrence is that a buyer's gain from breach is larger than the incumbent's lost profit, if the entrant is more efficient than the incumbent. Hence, entry is profitable even though all buyers signed the exclusive contract, because breach will follow.

[6] As in Segal and Whinston (1996, 2000), we assume that the incumbent's offers are observable and are not contingent on other buyers' behavior.

payment of a small but positive fixed cost $\varepsilon > 0$ (Section III discusses the case where the buyers' fixed cost is exactly zero).[7] At time t_4, active buyers order the input and compete in the final market.

We look for the subgame perfect Nash equilibria of this game and explore the role of downstream competition. When buyers are independent monopolists, the results obtained by Rasmusen et al. (1991) and Segal and Whinston (1996, 2000) are replicated, and exclusive contracts prevent efficient entry.[8] By contrast, we show that when downstream firms are Bertrand competitors, there exist only equilibria with entry.

A. *Simultaneous and Nondiscriminatory Offers*

When downstream firms are independent monopolists and the incumbent simultaneously offers uniform contracts to buyers, there exist both "exclusion equilibria"—where both buyers sign the exclusive deal and entry is prevented—and "entry equilibria"—where both buyers reject the contract and buy from the entrant.

The intuition for this result is that, when offers are restricted to be uniform, efficient entry may be prevented because the incumbent exploits the buyers' *coordination failure.* Why do buyers sign exclusive contracts if they end up having the incumbent as the only seller in the industry and pay a higher price for the good than if entry occurred? The reason is that the entrant needs both orders to cover its entry costs. Hence, if both buyers sign the exclusive contract, no one has an incentive to deviate. By refusing to sign, a single buyer would not trigger entry and would have to buy the good from the incumbent anyway, at the monopoly price. The deviation is not profitable and both buyers signing the exclusive contract is an equilibrium.

There are also equilibria, however, where both buyers reject exclusivity and entry follows. These are equilibria because the incumbent has no incentive to deviate and make an offer such that both buyers sign. Since it cannot discriminate among the compensations, it should offer a rich compensation to both buyers, which it could not afford.

Proposition 1 below shows that tough downstream competition breaks the "exclusion equilibria." The deviation of a *single* buyer would now be profitable because it would trigger entry. By obtaining a cheaper input than its rival, the deviant buyer would capture the entire downstream market. This would make its input demand large enough for the entrant to cover its fixed costs. This also implies that each buyer would require a very high compensation to sign the exclusive deal and makes it too costly for the incumbent to block unilateral deviations. Proposition 1 also shows that "entry equilibria" exist. The incumbent cannot profitably deviate and make an offer such that both buyers accept. Since individual demand triggers entry, it would have to compensate both buyers, and this is too costly. Note that under fierce downstream competition, it is the fact that each buyer is pivotal for exclusion—and not that offers are restricted to be uniform—that makes the incumbent's deviation unprofitable.

B. *Simultaneous and Discriminatory Offers*

When downstream markets are independent and the incumbent can discriminate among the compensations, only exclusion equilibria exist.

Offering discriminatory compensations gives the incumbent an additional instrument to exploit the negative externality that a buyer exerts on the other by accepting the exclusive contract. As a result, equilibria with entry do not exist, and the incumbent does not need to rely on coordination failures to exclude. To gain insight, imagine both buyers reject the exclusive deal and entry follows. Discrimination allows the incumbent to offer a rich compensation to *one* buyer, so that its dominant strategy is to accept the contract. Given that this buyer is locked in by the incumbent, the remaining buyer anticipates that its demand does not attract entry and cannot do better than accepting the exclusive contract, even for free. Hence, it is

[7] It can be shown that by inverting t_2 and t_3, results would not change.

[8] For the sake of brevity, we shall omit the formal proof that Segal and Whinston's (1996, 2000) results (obtained under the assumption that buyers are final consumers) extend to the case where buyers are independent monopolists. The interested reader can find the proof in Appendix D on line.

now profitable for the incumbent to deviate and make an offer such that both buyers sign.

Tough downstream competition makes individual demand large enough to trigger entry. Hence, the possibility to discriminate among the offers does not facilitate entry deterrence, as *both* buyers should be secured and sufficiently compensated (and this is too costly). As Proposition 1 shows, only entry equilibria exist.

C. *Sequential Offers*

When downstream firms do not compete, sequential offers represent the most effective instrument for the incumbent to play the buyers off against each other. Hence, there exists a unique equilibrium where the incumbent excludes at no cost.

The explanation is that, for the incumbent, it is profitable to bribe the second buyer and make it sign, should the first buyer reject the contract. Since individual demand does not attract entry, the first buyer anticipates that, whatever it does, entry will be prevented. Hence, it signs for free, inducing the second buyer to do the same. The incumbent ends up monopolizing the market without offering any compensation.

Proposition 1 shows that tough downstream competition breaks this mechanism because it makes individual demand large enough to trigger entry. Thus, the fact that a buyer signs the contract does not force the other buyer to sign for free. Indeed, it exerts a positive externality on the other buyer. By rejecting, the latter will obtain a cheaper input and will monopolize the entire downstream market. Hence, for the incumbent it is too costly to bribe this buyer and exclusion is not profitable.

PROPOSITION 1: *If downstream firms are Bertrand competitors, and the incumbent makes* (a) *simultaneous and nondiscriminatory offers;* (b) *simultaneous and discriminatory offers; or* (c) *sequential offers, there exist only entry equilibria.*

PROOF:

(a) *Simultaneous and nondiscriminatory offers.* First, let us show that exclusion equilibria do not exist. Let us suppose $S = 2$ and let us solve for the incumbent's optimal wholesale price focusing on the symmetric equilibrium in mixed strategies of the buyers' game at t_3.[9] Appendix A identifies the optimal wholesale price and shows that the incumbent's profits (gross of the compensations) $\Pi_{I|S=2}$ are decreasing in ε and tend to $(1 - c_I)^2/4$ as ε tends to 0, which correspond to the vertically integrated monopoly profits.[10] Appendix A also proves that in the equilibrium following $S = 2$, buyers earn $\pi_{B|S=2} = 0 + x$. (With the symbol π we indicate profits net of either fixed costs or compensations; with the symbol Π we indicate profits gross of the compensations.) We now show that the deviation of a single buyer attracts entry and is therefore profitable. If $S = 1$, and firm E enters, the free buyer will buy the input from the entrant at the price c_I and will monopolize the market (the signer would not be offered a price below c_I from the incumbent, and will thus choose to be inactive). The free buyer's profits are $\pi^f_{B|S=1} = (1 - c_I)^2/4 - \varepsilon$, and the entrant's profits are $\pi_{E|S=1} = c_I(1 - c_I)/2 - F > 0$ by assumption A1: entry is triggered by the deviant buyer because it will serve the entire market (it will sell $(1 - c_I)/2$ units). The incumbent cannot profitably block unilateral deviations. It would have to offer at least $\pi^f_{B|S=1} - 0 = (1 - c_I)^2/4 - \varepsilon$ to *each* buyer, while the maximum profits it could realize from exclusion would tend to $(1 - c_I)^2/4$.

Second, let us check that both buyers rejecting the exclusive contract ($S = 0$) followed by entry is an equilibrium. The entrant's optimal wholesale price is $w_{E|S=0} = c_I$, its profits $\pi_{E|S=0}$ tend to $c_I(1 - c_I) - F > 0$ as $\varepsilon \to 0$, and the buyers earn $\pi_{B|S=0} = 0$. The incumbent has no incentive to deviate and make an offer such that both buyers accept. It would have to offer at least $(1 - c_I)^2/4 - \varepsilon$ to *each* buyer, but this deviation is not profitable. There exists also an asymmetric "entry equilibrium" where the

[9] Considering pure strategy equilibria where one buyer remains inactive and the other monopolizes the market would reinforce our results: because of double marginalization, the incumbent would earn less from exclusion and would find it more difficult to compensate buyers for accepting the exclusive deal.

[10] Note that we are considering small fixed costs to operate downstream. Since the incumbent's gross profits are decreasing in ε, considering larger values of the fixed costs would make it more difficult for the incumbent to compensate the buyers, and would again reinforce our results that exclusion cannot arise at equilibrium.

incumbent offers $x = 0$; one buyer accepts and the other rejects. The free buyer monopolizes the downstream market, while the signer, which remains inactive, does not receive any compensation and gets zero profits. It is willing to accept because, in case of rejection, it would compete fiercely on the downstream market with the rival buyer and would end up with zero profits anyway.

(b) *Simultaneous and discriminatory offers.* Since each buyer is pivotal for exclusion, for the same mechanism as in (a), exclusion equilibria do not exist, while $S = 0$ is an equilibrium. There also exist asymmetric entry equilibria where the incumbent offers $x_i = 0$ to buyer i which accepts and $x_j \leq \pi^f_{B|S=1}$ to buyer j which rejects the exclusive deal.

(c) *Sequential offers.* Let us analyze the second buyer's decision.

Case 1: the first buyer signs the contract. If the second buyer signs as well, its (gross) payoff is 0. If it rejects, entry occurs and it monopolizes the entire downstream market. Hence, it requires at least $x_2 = \pi^f_{B|S=1} = (1 - c_I)^2/4 - \varepsilon$ to accept. Appendix A shows that the incumbent cannot profitably induce this buyer to sign: the (gross) payoff $\Pi_{I|S=2}$ that it attains from exclusion is always lower than $\pi^f_{B|S=1}$ (with $\Pi_{I|S=2}$ which tends to $\pi^f_{B|S=1}$ as ε goes to 0). Hence, if the first buyer signs, the second buyer rejects.

Case 2: the first buyer rejects the contract. The second one requires $x_2 = 0$ to sign because its (gross) payoff will be zero no matter if it signs or rejects. Since entry occurs anyway, the incumbent's payoff is 0 in both cases, and it does not offer any compensation to the second buyer. Hence, if the first buyer rejects, the second buyer is indifferent between accepting and rejecting.

Let us analyze the decision of the first buyer for each continuation equilibrium.

Case I: if the first buyer rejects, the second buyer also rejects. Anticipating that the second buyer always rejects, the first one requires $x_1 = 0$ to sign. Since entry occurs anyway, the incumbent is not willing to offer any compensation and the first buyer is indifferent between accepting and rejecting. There exists a symmetric entry equilibrium where both buyers reject the contract and asymmetric entry equilibria where the first buyer signs and the second rejects.

Case II: if the first buyer rejects, the second buyer signs. The first buyer anticipates that its (gross) payoff will be 0 if it signs, whereas it will monopolize the entire downstream market if it rejects. It requires at least $\pi^f_{B|S=1} = (1 - c_I)^2/4 - \varepsilon$ to sign, but the incumbent cannot profitably compensate this buyer. In the asymmetric entry equilibria, the first buyer rejects and the second signs.

II. Two-Part Tariffs

In this section we show that tough competition prevents exclusion also when upstream firms adopt two-part tariffs at time t_2. (We indicate with w the unit price and with ϕ the fixed fee.) For brevity, Proposition 2 will explicitly analyze only the case where the incumbent makes sequential offers, as it is the one where exclusion is easier.[11] (Since Segal and Whinston, 1996, 2000, do not analyze the case of two-part tariffs, we also include a proof for the independent monopolists case.)

The assumption on fixed costs is now the following:

$$\text{(A2)} \quad \frac{1}{8} - \frac{(1 - c_I)^2}{8} \leq F < \frac{1}{4} - \frac{(1 - c_I)^2}{4}.$$

Note that the adoption of two-part tariffs avoids double marginalization. Hence, firm E extracts more surplus from each buyer with respect to the case of linear tariffs, and the threshold levels of F (such that entry occurs when $S = 0$ and does not when $S = 1$) are larger.

PROPOSITION 2: *When upstream firms adopt two-part tariffs and the incumbent makes sequential offers:*

(a) *If downstream firms are independent monopolists, there exists a unique exclusion equilibrium where the incumbent excludes at no cost.*
(b) *If downstream firms compete à la Bertrand, there exist only entry equilibria.*

[11] *A fortiori,* under simultaneous offers, exclusion equilibria do not exist.

PROOF:

(a) *Independent monopolists.* Let us analyze the second buyer's decision.

Case 1: the first buyer rejects the exclusive deal. If the second buyer also rejects, entry occurs. The entrant and the incumbent compete for the free buyers. The incumbent's best offer leaves each buyer with the vertically integrated monopoly profits (for marginal costs c_I): $w_{I|S=0} = c_I$, $\phi_{I|S=0} = 0$. The entrant captures the free buyers offering $w_{E|S=0} = c_E = 0$ and choosing the fee that makes them indifferent between its offer and the incumbent's: $\phi_{E|S=0} = 1/8 - (1 - c_I)^2/8$. Hence, firm E appropriates the additional profits generated by a more efficient (vertically integrated) monopolist on each independent market: $\pi_{E|S=0} = 1/4 - (1 - c_I)^2/4 - F > 0$ by assumption A2. Buyers earn $\pi_{B|S=0} = (1 - c_I)^2/8 - \varepsilon$. Instead, if the second buyer signs, by assumption A2, entry does not occur. The incumbent monopolizes the market, offers contracts where $w_I = c_I$ and $\phi_I = (1 - c_I)^2/8 - \varepsilon$, and realizes the same gross profit as under vertical integration: $\Pi_{I|S=1} = \Pi_{I|S=2} = 2[(1 - c_I)^2/8 - \varepsilon]$. In this case the buyers' gross payoff is 0. Thus, the second buyer requires $x^* = (1 - c_I)^2/8 - \varepsilon$ to sign. Since the payoff that the incumbent realizes from exclusion is larger than x^*, for the incumbent it is profitable to have the second buyer sign behind the payment of x^*.

Case 2: the first buyer signs the deal. By assumption A2, entry will not occur, both if the second buyer signs and if it rejects. Hence, the second buyer signs even if $x_2 = 0$. The first buyer, anticipating that the second one always accepts, accepts even if $x_1 = 0$. In equilibrium, $x_1 = x_2 = 0$ and $S = 2$.

(b) *Bertrand competitors.*

Case 1: the first buyer signed the deal. If the second buyer also signs, entry does not occur and the incumbent offers both buyers a contract where $\phi_{I|S=2} = 0$ (and $w_{I|S=2}$ tends to $(1 + c_I)/2$ as $\varepsilon \to 0$). Buyers earn $\pi_{B|S=2} = 0 + x_i$ while the incumbent's profits $\pi_{I|S=2}$ tend to $(1 - c_I)^2/4 - x_1 - x_2$. If the second buyer rejects, entry occurs. The entrant anticipates that time t_2 offers will be as follows: the incumbent offers the contract $w^s_{I|S=1} > c_I$, $\phi^s_{I|S=1} = 0$ to the signer and the contract $w^f_{I|S=1} = c_I$, $\phi^f_{I|S=1} = 0$ to the free buyer. If it accepted the incumbent's offer, the free buyer would capture the entire downstream market, thus obtaining the monopoly profits $(1 - c_I)^2/4 - \varepsilon$. The entrant captures the free buyer offering $w^f_{E|S=1} = 0$ and a franchise fee that leaves the free buyer with the same payoff as if it accepted the incumbent's offer $\phi^f_{E|S=1} = 1/4 - (1 - c_I)^2/4$.[12] The signer decides to be inactive and its payoff is $\pi^s_{B|S=1} = 0 + x_i$, whereas the free buyer earns $\pi^f_{B|S=1} = (1 - c_I)^2/4 - \varepsilon$. Hence, $\pi_{E|S=1} = 1/4 - (1 - c_I)^2/4 - F > 0$ by A2: entry supported by a single buyer is profitable as the entrant extracts from the free buyer the additional profits generated by a more efficient monopolist on the *entire* downstream market. Thus, the second buyer requires a compensation $x_2 = (1 - c_I)^2/4 - \varepsilon$ to sign. The incumbent cannot profitably induce it to sign. (Appendix A proves that $\Pi_{I|S=2} < \pi^f_{B|S=1}$ with $\Pi_{I|S=2} - \pi^f_{B|S=1} \to 0$ as $\varepsilon \to 0$.)

Case 2: the first buyer rejected the exclusive deal. If the second buyer also rejects, entry occurs and upstream firms compete for the buyers. In equilibrium the incumbent and the entrant offer, respectively, $(w_{I|S=0} = c_I, \phi_{I|S=0} = 0)$ and $(w_{E|S=0} = 0, \phi_{E|S=0} = 1/4 - (1 - c_I)^2/4)$.[13] One buyer decides to be inactive and earns 0. The other buyer decides to be active and patronizes the entrant. It earns $[(1 - c_I)^2/4] - \varepsilon > 0$. The entrant gets $\pi_{E|S=0} = 1/4 - (1 - c_I)^2/4 - F > 0$ by assumption A2. If the second buyer signs, entry occurs and the second buyer's payoff is $0 + x_2$. Thus, the compensation that the second buyer requires to sign the contract depends on whether it will be active in the subgame after $S = 0$. If it is active it requires $x_2 \geq [(1 - c_I)^2/4] - \varepsilon$. Since entry occurs both if the second buyer signs and if it rejects, the incumbent's payoff is always 0 and it is not willing to offer a positive compensation. Hence, the second buyer rejects the deal. If it is inactive

[12] A situation where the incumbent offers $w^s_I = w^f_I = c_I$, $\phi^s_I = \phi^f_I = 0$, and the entrant offers $w^f_E = 0$, $\phi^f_E = 1/4 - \varepsilon$ cannot be an equilibrium. Both the free buyer and the incumbent would earn 0. The incumbent might deviate and increase the wholesale price offered to the signer while offering $w^f_I = c_I$ to the free buyer. By accepting the incumbent's offer, the latter monopolizes the market. The incumbent can extract slightly less than these monopoly profits through the fixed fee. The deviation is therefore profitable.

[13] We are very grateful to John Simpson and Abraham L. Wickelgren, who pointed out an error in this subgame in a previous version of this proof.

in the subgame following $S = 0$, it earns 0 both if it signs and if it rejects. Since entry occurs anyway, the incumbent does not offer any compensation to it. The second buyer is therefore indifferent between accepting and rejecting.

The first buyer anticipates that entry will occur both if it signs and if it rejects. If it signs, it will be inactive and will earn $0 + x_1$. If it rejects, it will earn 0, if in the continuation equilibrium the second buyer rejects and is active; it will earn $[(1 - c_I)^2/4] - \varepsilon$ in both the continuation equilibrium where the second buyer rejects and is inactive, and in the one where the second buyer signs. Therefore, it requires either $x_1 \geq 0$ or $x_1 \geq [(1 - c_I)^2/4] - \varepsilon$ to sign. The incumbent is not willing, however, to offer a positive compensation. Hence, there exists a symmetric entry equilibrium where both buyers reject the contract and asymmetric entry equilibria where one buyer rejects and the other signs.

III. Discussion

In order to make the exposition simpler, we have focused so far on the case of Bertrand competition with an arbitrarily small fixed cost to operate in the downstream market. One of the consequences of focusing on such an extreme case is that when a buyer purchases the input from the entrant and the other (the signer) is committed to buy from the incumbent, at equilibrium the latter would not be active. This implies that the reward for a deviant buyer (that is, a buyer that unilaterally does not sign the exclusive contract) is very large, in turn making it difficult for the incumbent to compensate buyers for accepting exclusivity.

One may argue that the results hinge on the fact that the signer is forced to exit the industry, thus making the deviant buyer a monopolist. Indeed, there may exist circumstances where both firms are active and where intense competition *facilitates* exclusion. Consider for instance the case where firms compete à la Bertrand, upstream firms adopt linear tariffs, and no fixed cost is required to operate in the downstream market (this case differs from the example analyzed in Section I because $\varepsilon = 0$). Suppose one buyer rejected the exclusive deal and firm E entered the market. At equilibrium the entrant would offer a wholesale price $w_E^f = c_I$ and the incumbent would be indifferent between all possible prices weakly above its marginal cost c_I. Indeed, whatever the price the incumbent sets for the signer, the latter would be active but will not sell anything, as the entire market will be served by the free buyer. Therefore, there exists a multiplicity of equilibria in this subgame. In all of them, the input demand of the deviant buyer makes entry profitable. However, the price chosen by the incumbent crucially affects the payoff of the deviant buyer. Indeed, if the incumbent chooses a wholesale price sufficiently close to c_I, the deviant buyer earns very low profits (zero profits when $w_I^s = c_I$). Even though the signer makes no sales, its presence in the market forces the deviant buyer to pick a very low final price and limits dramatically the latter's profits. In this case, the incumbent need only offer both firms a small amount to induce them both to sign an exclusive contract, and exclusionary equilibria arise.[14] Instead, if the incumbent chooses a sufficiently high price, rejecting the exclusive deal is very profitable (in particular $\pi^f_{B|S=1} = (1 - c_I)^2/4$ if $w_I^s \geq (1 + c_I)/2$). Hence, the incumbent cannot profitably compensate buyers to elicit their acceptance, and exclusion is not feasible.

More generally, tough downstream competition may result in the incumbent and the entrant choosing linear prices close to each other, and may therefore erode the profits that a deviant buyer makes when it competes with a buyer committed to buy from the incumbent. This would make it cheaper for the incumbent to compensate buyers for accepting the exclusive deal and would facilitate the use of exclusive contracts to deter entry. In the same vein, exclusion would be achieved more easily if the incumbent could resort to more sophisticated contracts that allow it to commit to sell cheaply to a signer whenever it competes with a buyer

[14] Note that the entrant, by choosing a wholesale price sufficiently below c_I, could make the free buyer's profits large enough for exclusion to be unfeasible. However, the entrant picks prices *after* buyers must decide whether to accept exclusivity. Once a buyer has rejected the exclusive contract, the entrant has no incentive to give the downstream firm positive profits and its optimal price is $w_E^f = c_I$. (Recall, though, that Section I assumes a nondrastic difference between the incumbent's and the entrant's costs.)

that has not signed exclusivity,[15] thereby reducing the profits that the deviant buyer would expect to make.

In most circumstances, however, strong enough downstream competition makes it *profitable* to reject the exclusive contract—even if the signer does not exit the market—thereby limiting the possibility of using exclusive contracts in an anticompetitive way.

Consider, for instance, the case where upstream firms use nonlinear pricing. Section II showed that, when the fixed cost to operate downstream is strictly positive, the deviant buyer earns the monopoly profits and exclusion is not feasible. This result holds good even if ε is zero (and therefore the signer does not exit the market). In particular, the incumbent has the incentive to charge a very high unit price to the signer (which does not sell anyway) in order to increase the profits earned by the deviant buyer and try to extract more surplus from it through the fixed fee.[16]

Going back to the case of linear pricing, if there were a wide enough gap between the incumbent's and the entrant's marginal cost, the optimal wholesale price charged to the deviant buyer would be well below c_I. Thus, the fact that the signer remains on the market would not significantly limit the deviant buyer's profits, and exclusion would be prevented again.

Further, consider the case where downstream firms compete à la Cournot, which could be interpreted as the reduced form of a game where downstream firms first choose capacities and then compete in prices. Even though the signer stays around, capacity constraints prevent it from limiting the deviant buyer's market power. In a previous version of this paper (Fumagalli and Motta, 2002), we study a model where buyers compete in quantities and the difference between the marginal costs of the upstream firms is not too large, so as to guarantee that competition between a signer and a deviant buyer would always result in the former selling positive quantities at equilibrium. We show there that, when buyers sell homogeneous goods, exclusion is not feasible.[17]

To conclude, downstream competition can prevent exclusion even when it does not force a signer competing with a deviant buyer out of the market.

Another simplifying feature of the present paper is that it restricts attention to the case where downstream firms sell products that are perfect substitutes. Relying on the results obtained in Fumagalli and Motta (2002) (for the case of competition in quantities, which as mentioned above avoids discontinuities in demands), we can also give some insight into the possible general relationship between the intensity of downstream competition, captured by the degree of substitutability γ between the final products,[18] and the exclusionary effect of exclusive contracts.

Consider a level of the entrant's fixed costs, F, such that under independent monopolies the demand of a single buyer does not trigger entry, whereas entry would occur if exclusive deals were prohibited. As the intensity of downstream competition increases, a single buyer that rejects the incumbent's exclusivity offer will obtain an increasing share of the downstream market, which in turn will raise the profits that the entrant would make. (Relatedly, for strong enough downstream competition, the profits made by the only deviant buyer become so large that the incumbent will not be able to

[15] In order for this mechanism to work, however, such contingent contracts should not be renegotiable.

[16] More precisely, under two-part tariffs and Bertrand competition, if $\varepsilon = 0$ the equilibria following $S = 1$ would be such that the incumbent offers $w^s_{I|S=1} \geq (1 + c_I)/2$, $\phi^s_{I|S=1} = 0$ to the signer and $w^f_{I|S=1} = c_I$, $\phi^f_{I|S=1} = 0$ to the free buyer. The entrant would capture the free buyer offering $w^f_{E|S=1} = 0$, $\phi^f_{E|S=1} = 1/4 - (1 - c_I)^2/4$. In any of these equilibria, the free buyer would obtain the monopoly profits $(1 - c_I)^2/4$ so that the incumbent cannot profitably exclude. Equilibria where the incumbent offers $w^s_{I|S=1} < (1 + c_I)/2$ would not exist because the incumbent would have an incentive to deviate, increasing $w^s_{I|S=1}$ and using the franchise fee to extract a positive payoff from the free buyer.

[17] A proof can also be found in Appendix E on line. Note, however, that if the entrant's fixed cost F is very high, even in this case the deviant buyer's demand is not enough to trigger entry and the incumbent may be able to use exclusive dealing to deter entry: this is because in this setting the deviant buyer would not be able to capture the entire downstream market, and therefore the entrant would receive fewer orders with respect to the case of Bertrand competitors.

[18] The intensity of downstream competition could also be formalized as the degree of the integration between different geographical areas where downstream firms operate (see Fumagalli and Motta, 2002).

compensate it for signing the exclusive deal.) In the limited case of perfect substitutes (which corresponds to $\gamma \rightarrow \infty$), downstream (Cournot) competition is strong enough for the deviant buyer to serve most of the downstream market. Therefore, unless fixed costs are very high, there will exist a certain degree of substitutability, $\gamma^*(F)$, such that for $\gamma \geq \gamma^*$ only entry equilibria exist, whereas for $\gamma < \gamma^*$ exclusionary equilibria exist.

Finally, throughout the paper we have assumed that there are only two buyers. In the Bertrand case, the results we have obtained for two buyers carry over unchanged to the case of N buyers. In a more general model, however, considering N buyers would introduce some additional insights. On the one side, the critical value of intensity of competition γ^* would increase with N: the larger the number of downstream competitors the smaller the market share that a deviant buyer will obtain, and therefore the more difficult it would be for a single buyer to trigger entry. On the other side, we expect that the N-buyers case would illustrate an additional role of downstream competition. Even if individual demand were insufficient to trigger entry, the number of buyers that the entrant needs to cover its fixed costs would decrease with the intensity of competition. Therefore, the incumbent would have to compensate a larger number of buyers to prevent entry, rendering exclusionary equilibria under discriminatory and sequential offers less likely.

IV. Concluding Remarks

The literature on the anticompetitive effects of exclusive dealing usually assumes that buyers are final consumers. We have shown that this is not an innocuous assumption, at least in the setting analyzed by Rasmusen et al. (1991) and Segal and Whinston (1996, 2000): we have provided clear conditions under which fierce enough competition among buyers in the downstream markets prevents the incumbent from using exclusive dealing to deter entry.

Since manufacturers (more generally, upstream firms) typically sign exclusive contracts with retailers (downstream firms) that in turn compete downstream, this result has important implications for antitrust agencies: the intensity of competition in the downstream markets might be crucial in determining the possible foreclosing effects of exclusivity clauses.

Our model also gives an empirical prediction: controlling for other factors, in particular for efficiency reasons behind exclusive agreements, it would be more likely to observe exclusive contracts in industries with highly differentiated products than in highly competitive downstream markets.

Appendix A

(Appendices B, C, D, and E available at www.e-aer.org/data/june06_app_20030697.pdf)

We study the incumbent's optimum choice when $S = 2$. For given w_I, at the mixed strategy equilibrium buyers are active with a probability given by $\beta = \max\{1 - 4\varepsilon/(1 - w_I)^2, 0\}$, where $(1 - w_I)^2/4$ is the monopoly (gross) profit a buyer would make if it were the only active buyer. This probability makes a buyer indifferent between being active—thus having expected profits $((1 - w_I)^2/4)(1 - \beta) - \varepsilon$—and being inactive—thus earning zero profits, given that the rival buyer randomizes according to β. Hence, for any w_I each buyer's equilibrium payoff is given by $\pi_{B|S=2} = 0 + x$. Note that it must be that $\varepsilon \leq (1 - c_I)^2/4$; otherwise, a buyer would never decide to be active. At the mixed strategies equilibrium, the expected total output in the downstream market is given by $Q^e(w_I) = \beta^2(1 - w_I) + 2\beta(1 - \beta)(1 - w_I)/2 = \beta(1 - w_I)$. Hence, the incumbent chooses w_I in order to maximize $\Pi_I = (w_I - c_I)(1 - w_I)\beta$. This amounts to solving the following problem:

$$\max_{w_I}\left[(w_I - c_I)(1 - w_I)\left(1 - \frac{4\varepsilon}{(1 - w_I)^2}\right)\right].$$

Denote as Π the objective function. The FOC is given by $\Pi' = [(1 - 2w_I + c_I)(1 - w_I)^2 - 4\varepsilon(1 - c_I)]/(1 - w_I)^2 = 0$. The function Π' is strictly decreasing in w_I for $w_I \in [0, 1)$. Moreover, $\varepsilon \leq (1 - c_I)^2/4$ and $c_I < ½$ imply $\Pi'|_{w_I=c_I} = [(1 - c_I)^2 - 4\varepsilon]/(1 - c_I) \geq 0$ and $\lim_{w_I \rightarrow 1} \Pi' = -\infty$. Hence, there exists a unique

$w_I^* \in [c_I, 1)$ such that $\Pi'|_{w^*_{I=0}}=0$. w_I^* is the optimal wholesale price.

$\Pi''|_{w_I=w_I^*} < 0$ and $c_I < ½$ imply that $\partial w_I^*/\partial \varepsilon = 4(1 - c_I)/[-4 - 2c_I + 10w_I^* - 6(w_I^*)^2 + 2c_I w_I^*] < 0$. Simple algebra shows that $w_I^* = c_I$ if $\varepsilon = (1 - c_I)^2/4$ and tends to $(1 + c_I)/2$ as $\varepsilon \rightarrow 0$. The Envelope Theorem and $w_I^* \in [c_I, 1)$ imply that $\partial\Pi(w_I^*)/\partial\varepsilon = -4(w_I^* - c_I)/(1 - w_I^*) \leq 0$ with $\partial\Pi(w_I^*)/\partial\varepsilon = 0$ iff $\varepsilon = (1 - c_I)^2/4$. It is easy to check that $\Pi(w_I^*) = 0$ if $\varepsilon = (1 - c_I)^2/4$ and tends to $(1 - c_I)^2/4$ as $\varepsilon \rightarrow 0$. Finally, $\partial w_I^*/\partial\varepsilon < 0$, $c_I < ½$ and $w_I^* \in [c_I, 1)$ imply that $\partial^2\Pi(w_I^*)/\partial^2\varepsilon = [-4(1 - c_I)/(1 - w_I^*)^2][\partial w_I^*/\partial\varepsilon] > 0$.

Since $\Pi(w_I^*) \geq 0$ for any $\varepsilon \in [0, (1 - c_I)^2/4]$, $w_I^* \in [c_I, 1)$ is such that $1 - 4\varepsilon/(1 - w_I^*)^2 \geq 0$. Since $\Pi = \Pi_I$ for all w_I such that $1 - 4\varepsilon/(1 - w_I)^2 \geq 0$ and $\Pi < \Pi_I = 0$ otherwise, w_I^* also maximizes the function Π_I.

Now, let us compare the incumbent's payoff $\Pi_{I|S=2}$ (the maximum of the function Π_I studied above) with the profit of the deviant buyer $\pi^f_{B|S=1} = (1 - c_I)^2/4 - \varepsilon$. The two functions coincide when $\varepsilon = 0$ and when $\varepsilon = (1 - c_I)^2/4$. They are both strictly decreasing in ε for $\varepsilon \in [0, (1 - c_I)^2/4)$. Further, the latter is linear, whereas the former is strictly convex in ε. Strict convexity implies that $\Pi_{I|S=2} < \pi^f_{B|S=1}$ for any $\varepsilon \in (0, (1 - c_I)^2/4)$.

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