Exclusive dealing, entry, and mergers*

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Abstract

We extend the literature on exclusive dealing by allowing the incumbent and the potential entrant to merge. This uncovers new effects. First, exclusive deals can be used to improve the incumbent's bargaining position in the merger negotiation. Second, the incumbent finds it easier to elicit the buyer's acceptance than in the case where entry can occur only by installing new capacity. Third, exclusive dealing reduces welfare because (i) it may trigger entry through merger whereas de-novo entry would be socially optimal (ii) it may deter entry altogether. Finally, we show that when exclusive deals include a commitment on future prices they will increase welfare.

1 Introduction

The possible anti-competitive effects of exclusive contracts have been at the centre of several important antitrust cases both in the US and in Europe, and the debate on how the law should treat such contracts is still open.[1]

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[1] Among early prominent decisions related to exclusive dealing arrangements, see Standard Oil Co. of California vs. United States 337 US 293 (1949), and United States vs. United Shoe Machinery Corporation, 347 U.S. 521 (1954). Among recent cases, see Schöller v. Commission, European Court Case T-9/95, Omega Environmental, Inc. v. Gilbarco Inc, 127 F.3d 1157 (1997) and United States vs. Microsoft (1995 Consent Decree)). In the EU, the use of exclusive dealing by a dominant firm is by and large *per se* prohibited. In the US, there is often a presumption that they entail pro-competitive effects. Jacobson (2002) reviews recent exclusive deal cases in the US and concludes: "The analysis reflected in the recent decisions will generally result in the approval, usually through summary dispositions, of most exclusive dealing restraints. Instances of true competitive harm are few and far between. But in the unusual case where exclusionary dealing creates, enhances, or preserves power over price and output, antitrust intervention remains appropriate–irrespective of the percentage of the market "foreclosed". Recent policy discussions of exclusive contracts include Jacobson (2002) Farrell (forthcoming) and Whinston (2001).

Since the Chicago School critique which challenged the rationale of anti-competitive exclusive dealing,[2] this issue has been the object of a number of papers. It is now formally established that an incumbent is able to profitably deter entry of an efficient new firm, by exploiting externalities among buyers or between buyers and the entrant: see for instance Rasmusen et al. (1991), Segal and Whinston (2000), Bernheim and Whinston (1998), or Aghion and Bolton (1987).[3] However, a consequence of these models is that some surplus is lost when efficient entry is deterred. A question which naturally arises is therefore whether there might be ways for the entrant and the incumbent to find a mechanism which allows to capture extra surplus for the industry, and whether this has implications on either the profitability of using exclusive dealing, or on its welfare implications.

In this paper, we analyse one such mechanism: we assume that the entrant might enter the industry either via independent production, that is establishing a new plant (we call it *de novo* entry, a term borrowed from the literature on foreign direct investments) - or through a merger: in the latter case, the merged entity will be able to employ the entrant's more efficient technology in the incumbent's existing plant. (The case where the incumbent and the entrant agree about using the latter's technology in the former's plant could also be interpreted as a licensing agreement or a transfer of technology: the incumbent buys the efficient technology from the entrant, who will not independently operate in the market. Firms then bargain not on the terms of the merger, but on the price of the licensing agreement.) We also introduce an Antitrust Agency which scrutinises the merger proposal and which approves only welfare-improving operations.

One may think that allowing the entrant to merge with the incumbent (i.e. allowing efficient entry to take place) would eliminate the possibility that the incumbent might profitably use exclusive dealing for anti-competitive purposes. In fact, we show that this is not the case: when merging with the entrant is possible, the incumbent will still be able to profitably use exclusive contracts and this will have a negative impact on welfare.

Indeed, we show that the consideration of mergers (or licensing agreements) uncovers three new effects of exclusive dealing. First, when the buyer has signed an exclusive contract with the incumbent, the latter is in a stronger bargaining position vis-à-vis the entrant in the merger negotiation: if the negotiation collapsed, de novo entry would not be possible and the incumbent would receive its monopoly profits. When the buyer has not signed an exclusive deal, if the merger negotiation collapsed,

[2] Posner (1976) and Bork (1978) argued that an incumbent monopolist would not be able to induce a buyer to sign an exclusive agreement. For their arguments, see more below or see Motta (2004: 363-4) for a textbook presentation.

[3] Aghion and Bolton (1987) is distinct from the others papers (where the incumbent aims at excluding), because entry is deterred only "by mistake" by the incumbent. The incumbent uses the exclusive contract, which includes a price commitment and a penalty to be paid in case the buyer switches to the entrant, to extract rents from the entrant. If it knew with certainty the costs of the entrant, the incumbent would always prefer to set the contract terms so as to allow the entrant into the industry and collect the rents created by its more efficient technology through the penalty. Under uncertainty, a penalty which is optimal ex-ante might turn out to be too high for an entrant and entry might therefore be unvoluntarily deterred. Spier and Whinston (1995) show that, in the presence of noncontractible relationship-specific investments, the inefficient use of stipulated damages identified by Aghion and Bolton emerges despite the buyer's and seller's ability to renegotiate the initial contract.

de novo entry would occur and the incumbent would receive zero profit. Therefore, the incumbent's threat point payoff is larger under exclusive dealing.

Second, when mergers are possible the incumbent will find it easier than in the standard Chicago School model (where mergers are not allowed) to induce the buyer to accept exclusivity. In the latter case signing the contract deters entry altogether, and the incumbent should compensate the buyer for paying the monopoly price instead of the price prevailing under de-novo entry, in order to elicit his acceptance. By the monopoly deadweight loss the incumbent's gain from entry deterrence (the monopoly profits) is insufficient to profitably offer this compensation (equal to the difference between the consumer surplus under Bertrand competition and under monopoly) and the exclusive deal will not be signed at equilibrium. Allowing for mergers makes it profitable to elicit the buyer's acceptance for two reasons. First, there are cases where the merger will occur independently of whether the exclusive dealing has been signed or not: here the buyer would require no compensation to sign exclusivity. Second, there are cases where the merger will occur only when exclusivity has been signed (de-novo entry occurring otherwise). In this case, inducing the buyer to sign exclusivity is facilitated by the fact that the merger makes the incumbent more efficient: on the one hand, the buyer will pay a lower price than if he had to buy from the less efficient monopolist; on the other hand, the incumbent will extract part of the merger surplus. Relative to the standard 'Chicago-school' type model without mergers, the buyer will demand a lower compensation to sign exclusivity, and the incumbent will have higher gains from it.

Third, we show that - despite the existence of the merger option, which allows the more efficient technology to find its way into the industry - exclusive dealing is still welfare-reducing. This happens for two reasons: (i) exclusive deals may trigger an inefficient entry mode, when at equilibrium entry occurs through a merger, rather than by de novo entry. This entails an allocative inefficiency, since the merger eliminates competition and thus increases the market price. The intuition for this result is that, when no exclusive contract has been signed, the merger will not be allowed by the Antitrust Authority, because by blocking the merger de novo entry will occur and welfare will be higher. Instead, when an exclusive contract has been signed, the merger would be authorized because it allows to replace an inefficient monopoly with a more efficient one. (ii) Exclusive dealing might in some circumstances deter entry altogether. This effect can arise in the case of uncertainty, where the incumbent and the buyer decide on exclusivity before knowing the actual cost of the entrant. In this case the buyer might end up accepting ex ante an exclusive contract behind a compensation that turns out to be too small ex post (that is, after the technology of the entrant is revealed). Efficient entry is deterred by "a mistake" of the buyer who asks too small a compensation, much in a similar way as in Aghion and Bolton (1987) where entry is deterred by "a mistake" of the incumbent who sets too large a penalty for breach of contract.

This paper deals with exclusive contracts, but we suspect that similar effects would arise when an incumbent firm takes other actions aimed at making captive consumers, so as to make more difficult for them to switch to new entrants. Examples of such actions could be decisions to make a product/network incompatible with other products/networks; strategies which increase artificially switching costs of consumers, and non-compete clauses in managerial contracts.

Our discussion of anti-competitive exclusive contracts also echoes the discussion of predation when mergers are possible. In reply to McGee (1958)'s well-known critique that it would be more profitable for the incumbent to take over the rival rather than preying upon it, Telser (1966) and Yamey (1972) argued that predation and merger might well be complementary strategies: by engaging in predatory behaviour, the incumbent might induce an entrant to sell its assets at a lower price, an argument later formalised by Saloner (1987). Similarly to Saloner (1987) and Persson (2004) - although obviously with completely different mechanisms - we also find that exclusive dealing will help the incumbent in its bargaining over the terms of the acquisition.

The aforementioned results have been obtained under the assumption that the exclusive contract does not include a commitment on prices. Allowing for mergers makes it more profitable for the incumbent to elicit exclusivity also when price commitments are possible. However, when mergers are an option, exclusive deals including a price commitment are shown to be welfare beneficial. The intuition is that price commitment creates the scope for the incumbent to establish a low contractual price and extract the buyer's surplus from paying such a low price. On top of this, when it occurs, the negotiation for the merger allows the incumbent to extract some of the efficiency gain associated to the entrant's superior technology. This gives the incumbent the incentive to commit to a price weakly below its marginal cost, and not only promotes allocative efficiency but also creates more scope for entry, thereby making it more likely that the more advanced technology is introduced into the industry.

Our paper is organised in the following way. Section 2 describes a simple example to illustrate our first two results, that is that in presence of mergers exclusive dealing improves the bargaining terms of the incumbent, and that it is easier for the incumbent to elicit the buyer's acceptance of the exclusive contract. This simple example is also meant to render the reader familiar with the game in a streamlined setting where the presence of a merger is the only difference relative to the standard Chicago-school treatment. Section 3 presents our model in a more realistic setting, where (i) merger proposals will be screened by an Antitrust Agency, (ii) mergers may be costly, and (iii) at the time when an exclusive deal is offered and signed, neither the incumbent nor the buyer know how efficient the entrant will be. In this setting (but not in the basic model), we show our third result, that is that welfare will be higher if exclusive dealing will be prohibited.[4] Section 4 contains two extensions. Section 4.1 shows that the results hold good independently of whether the Antitrust Agency maximizes total or consumer surplus; Section 4.2 considers the case where an exclusive contract can include a commitment on future prices, and shows that in this case exclusive dealing will not lead to anti-competitive effects. Section 5 concludes the paper.

2 A simple example

In this Section we study the role of exclusive deals in a very simple setting which illustrates some basic effects and intuitions.

We consider an incumbent firm (denoted as firm I) which supplies a good to a

[4] Of course, this result should not be read as an implication that exclusive dealing should be banned: our model by construction does not take into account possible pro-competitive effects of exclusive contracts, that in real life are likely to be very important.

single buyer,[5] incurring a constant marginal cost c_I. The buyer's demand is given by $q = q(p)$.

The incumbent faces a threat of entry by a more efficient firm (whose marginal cost of producing the same homogenous good is $c_E < c_I$). The entrant (denoted as firm E) can choose between two modes of entry. It can set up a new plant (*de-novo entry*) paying a fixed sunk cost $f > 0$. Alternatively, it can *merge* with the incumbent. In this case, the firm resulting from the merger will adopt the entrant's more advanced technology. For simplicity, in this Section we assume that adapting the existing plant to the entrant's technology requires no cost. In case of a merger, the incumbent and the entrant negotiate over the distribution of surplus. We do not specify any particular bargaining solution. We simply assume that the merger occurs if the bargaining solution is such that each player receives at least its threat point payoff. We also denote with $\beta \in [0, 1]$ the fraction of the realized net surplus that the incumbent can extract. For instance, if the entrant can make take-it-or-leave-it offers to the incumbent, then $\beta = 0$. If the two firms share the gain from trade equally, then $\beta = \frac{1}{2}$. In this example, we assume that there exists no anti-trust authority which examines the merger project, i.e. the merger always occurs if the involved parties agree on it.

Prior to the entry decision, the incumbent offers the buyer an exclusive contract (i.e. a contract such that the buyer commits not to buy the good from other sellers). At the time of contracting, the firms' costs are common knowledge. The exclusive contract specifies a compensation x that the incumbent commits to pay to the buyer if he signs the deal, but it does not include any commitment on prices.[6] Moreover, we assume that the exclusivity provision cannot be breached.[7]

The timing of the game is as follows:

1. At date 1 the incumbent offers the buyer an exclusive contract.

2. At date 2 the buyer decides whether to sign the contract.

3. At date 3 the entry decision is taken.

4. At date 4 active firms simultaneously name prices.

Finally, the measure of welfare we adopt is given by the sum of consumer surplus and the firms' profits (net of fixed costs).

Section 3 will relax some assumptions made for simplicity in this Section, and analyse a more general model where (i) merger proposals will be screened by an Antitrust Agency (AA) which will approve only welfare-improving mergers, (ii) mergers

[5] Considering N buyers would not change the results of the analysis. See the discussion at the end of the Section.

[6] Price commitments are unlikely if the nature of the product is not well specified at the time of the offer as well as when agreements span over a long time horizon in which unforeseen contingencies might occur. Within the general model we shall analyse both the cases where exclusive contracts do not include a price commitment (Section 3) and where they include it (Section 3.1).

[7] Equivalently, breaching the contract requires paying infinite damages. Transaction and legal costs for the buyer, or the fact that renegotiating the deal would involve lengthy and uncertain court decisions (which might imply that the buyer will be left without consuming the good until the court's judgment has arrived) may explain why breaching the contract is not possible. As in the other models in the literature, if such renegotiation would be allowed, exclusive dealing would not preempt entry.

may be costly, and (iii) at the time when an exclusive deal is offered and signed, neither the incumbent nor the buyer know how efficient the entrant will be.

Let us now solve the base model. We look for subgame perfect Nash equilibria and we solve the game backwards.

Product market interaction (date 4) If no entry occurs at date 3, the incumbent charges the monopoly price $p^m(c_I) = \arg\max_p (p - c_I)q(p)$. (We will denote as $\pi^m(c)$ the monopoly profits of a firm with marginal cost c).

If de novo entry occurs the buyer will pay the monopoly price $p^m(c_I)$ if he signed the exclusive deal. The reason is that the entrant *cannot* supply the good to the buyer if the latter has agreed to purchase only from the incumbent. Instead, if the buyer *did not sign*, competition between the entrant and the incumbent takes place. In order to highlight the possible anti-competitive effects of the merger, we assume that the difference between the entrant's and the incumbent's marginal cost is not drastic so that

$$p^m(c_E) \geq c_I. \tag{\textit{A1}}$$

Moreover, we get rid of equilibria in weakly dominated strategies. Hence, in equilibrium the more efficient entrant sells the good charging the price c_I. In order to highlight the potential anti-competitive effects of an exclusive deal contract we assume that the de-novo entry is profitable:

$$(c_I - c_E)q(c_I) - f > 0 \tag{1}$$

which requires that the entrant is sufficiently more efficient than the incumbent ($c_E < c_E^d(f)$ where $c_E^d(f) < c_I$ is the c_E that ensures that the following equality holds $(c_I - c_E)q(c_I) - f = 0$.)

Finally, in case of a merger, the new firm gains control over the incumbent's exclusive contract (if any). In other words, exclusive contracts represent an asset in the portfolio of the incumbent which is appropriated in case of a merger. Hence, the new firm monopolises the market and supplies the buyer charging the monopoly price $p^m(c_E)$, no matter whether the buyer signed the exclusive deal or not.

Let us analyse the entrant's decision at date 3.

Entry decision (date 3) At date 3 the entrant must decide among the merger, de novo entry and staying out of the market.

It can then be shown that, in equilibrium, firm E decides to enter the market by merging with the incumbent, both if the buyer signed and rejected the exclusive deal.

To see this note that, if *the buyer signed the contract*, de-novo entry is unprofitable as the unique buyer is committed to purchase from the incumbent and entry costs would remain uncovered ($\pi_E = -f < 0$). Hence, should the merger fail, the entrant would stay out of the market and the incumbent's monopoly would persist. Instead, in case of merger, the entrant's more advanced technology is adopted and the new firm monopolises the market. Since $\pi^m(c_E) > \pi^m(c_I)$, the merger increases the industry surplus and there exists scope for it. Each firm's payoff is given by the threat point payoff plus the share of the net realised surplus that each of them appropriates in the negotiation for the merger:

$$\pi_I^s = \pi^m(c_I) + \beta\,[\pi^m(c_E) - \pi^m(c_I)] > 0 \tag{2}$$

$$\pi_E^s = (1-\beta)\,[\pi^m(c_E) - \pi^m(c_I)] \geq 0 \tag{3}$$

with $\beta \in [0,1]$.

Now let us consider the case where *the buyer rejected the exclusive deal.* If the merger does not occur, the entrant will set up a new plant and will compete with the incumbent generating a profit of $(c_I - c_E)q(c_I) - f$. If the merger takes place, competition with the incumbent is removed and no fixed cost is sunk, so that the merged entity generates a profit of $\pi^m(c_E)$. It then follows that the merger increases the industry profits since:

$$\pi^m(c_E) > (c_I - c_E)q(c_I) - f \tag{4}$$

Consequently a merger takes place and each firm's payoff is determined:

$$\pi_I^r = \beta\,[\pi^m(c_E) - ((c_I - c_E)q(c_I) - f)] \geq 0 \tag{5}$$

$$\pi_E^r = \beta\,[(c_I - c_E)q(c_I) - f] + (1-\beta)\pi^m(c_E) > 0 \tag{6}$$

Note, however, that the incumbent's threat point payoff now amounts to 0.

The buyer's decision (date 2) In order to sign the exclusive deal, the buyer requires at least a compensation that makes him indifferent between signing and rejecting. Since he anticipates that, both if he signs and if he rejects, the merger will follow and he will pay the price $p^m(c_E)$, any compensation $x \geq 0$ makes the buyer sign.

The incumbent's decision (date 1) The maximum compensation that the incumbent is willing to offer to the buyer is given by:

$$\begin{aligned} x_I &= \pi_I^s - \pi_I^r = [\pi^m(c_I) - 0] + \qquad (7)\\ &\quad +\beta\,[(\pi^m(c_E) - \pi^m(c_I)) - (\pi^m(c_E) - ((c_I - c_E)q(c_I) - f))] \\ &= (1-\beta)\,\pi^m(c_I) + \beta\,((c_I - c_E)q(c_I) - f) > 0 \qquad (8) \end{aligned}$$

The merger occurs in any case, but the incumbent benefits if the buyer signs because exclusive deals, by preventing de-novo entry, increase the incumbent's threat point payoff in the bargaining process. This is the first term in equation (7). Moreover, the value of the merger will be different if the exclusive deal is signed, since the merger will replace an inefficient monopolist, rather than an efficient duopolist. This is the second term in equation (7). This term could be either positive or negative depending on the cost difference between the entrant and the incumbent and the cost of entry. However, since the incumbent's threat point is larger with the contract signed, it follows that the total effect will always be positive and the incumbent is always willing to offer a positive compensation to the buyer as seen in equation (8).

Hence, the incumbent enjoys a *stronger position in the negotiation for the merger* if the buyer signs the exclusive deal and earns a larger payoff for any given share of the net realised surplus that it appropriates. In a sense, the exclusive contract represents a coalition between the incumbent and the buyer at the expense of the entrant.[8]

This role is similar to the one played by exclusive deals when the exclusivity provision can be breached by paying stipulated damages.[9] The incumbent has an incentive to set the damages in such a way that (de-novo) entry is accommodated and that it appropriates the entire surplus that the more efficient producer brings to the market.

Since the buyer signs the exclusive deal even when he is not compensated for it, and the incumbent strictly benefits from having the contract signed, the equilibrium of the entire game is immediately determined and we have the following result:

In equilibrium the incumbent offers the buyer a compensation $x = 0$. The buyer signs the exclusive contract. Firm E enters the market by merging with the incumbent.[10]

This result illustrates several noteworthy aspects of exclusive deals when mergers are an option. First, *the fact that mergers are a potential mode of entry decreases the minimum compensation required by the buyer to sign* and creates the scope for the incumbent to profitably elicit acceptance. Indeed, if mergers were not an entry option the incumbent could not profitably induce the buyer to sign the exclusive deal - as argued by Chicago scholars. In that case, the minimum compensation required by the buyer to sign amounts to $x_B = CS(c_I) - CS(p^m(c_I)) > 0$ (where $CS(p)$ denotes the surplus enjoyed by the buyer if paying the price p). If setting up a new plant is the unique mode to enter the market, signing the exclusive contract *entirely* deters entry. In order to sign, the buyer requires to be compensated for the loss suffered paying the monopoly price $p^m(c_I)$ instead of c_I. By the monopoly deadweight loss, this compensation is larger than the monopoly profits which the incumbents earns from deterring entry.

Second, exclusive deals are welfare neutral in this simple example. They have no impact on entry, as the merger would occur irrespective of the exclusive deal contract is signed and the buyer would be as well off. Exclusive deals only affect the distribution of total welfare, making it more favourable to the incumbent. However, the absence of welfare effects is *specific to this very simple example*. Indeed, the more general model studied in Section 3 will show that exclusive deals do exert welfare effects.

Finally, the results of the analysis would not change if there existed N buyers. To see this, note that the merger would take place irrespective of the buyers' decision at date 2, which makes each buyer indifferent between signing and rejecting the exclusive deal. This allows the incumbent to have the exclusive contracts signed by *all* buyers behind the payment of no compensation.[11]

[8] The entrant's payoff would be higher if the exclusive deal was rejected: $\pi_E^r - \pi_E^s = \beta\left[(c_I - c_E)\, q(c_I) - f\right] + (1-\beta)\,\pi^m(c_I) > 0$

[9] See Aghion and Bolton (1987) and Spier and Whinston (1995).

[10] Note that the buyer is indifferent between signing and rejecting the contract, since he does not receive any compensation. Yet, an equilibrium where $x = 0$ and the buyer rejects the exclusive deal does not exist. The incumbent *strictly* benefits from the fact the the contract is signed and would have incentive to deviate offering a slightly positive compensation and eliciting the buyer's acceptance.

[11] With multiple *uncoordinated* buyers (but not with a unique buyer as in our model), the incum-

3 The model

In this Section we adopt a richer setting. Since the merger here substantially harms price competition, it might be argued that it could (or should) be scrutinized by an anti-trust authority. To this end we assume that firms that plan to engage in a merger must notify the project to an Anti-trust Agency (denoted as AA), which decides whether to authorise or block the merger (this is precisely what happens in most countries, including the US and the EU). The AA's decision is taken in order to maximise total surplus, measured by the sum of consumer and producers' surplus.[12] The existence of the AA uncovers a first reason why exclusive deals can be welfare detrimental. More precisely, in the presence of exclusive deals the AA's decision may be distorted so that at equilibrium the merger will be approved even though total welfare would be higher under de novo entry.

We also assume that, when the incumbent and the entrant take their decisions, they cannot perfectly anticipate the entrant's marginal cost. They just know its distribution function. Afterwards, Nature chooses the realisation of the entrant's marginal cost which becomes common knowledge. For simplicity we assume that the incumbent's marginal cost is $c_I = \frac{1}{2}$, that the entrant's marginal cost is uniformly distributed over $[0, 1]$ and that the buyer's demand is given by $q = 1 - p$.[13,14] Figure 1 illustrates the new timing.

Further, we assume that, in case of merger, adapting the entrant's more advanced technology to the existing plant requires a fixed cost $f_m \leq f$. In the extreme case where $f_m = f$, the entrant's technology cannot be adjusted to the existing plant, and a new plant must be installed also in case of merger.

Uncertainty, when the technology transfer is sufficiently costly, uncovers an additional reason why exclusive deals may harm welfare. In particular, entry may be deterred altogether by "a mistake" of the buyer who ex-ante requires too small a compensation.

Finally, to focus on the potential welfare reducing effects of exclusive deals in this environment we assume that, whenever the entrant is (weakly) more efficient than the incumbent, de-novo entry is desirable, i.e. total welfare is higher if de-novo entry rather than no-entry occurs:

$$CS(c_I) + (c_I - c_E)q(c_I) - f \geq CS(p^m(c_I)) + \pi^m(c_I) \quad \text{for any } c_E \leq c_I \qquad (A2)$$

bent may succeed in imposing exclusive deals also when mergers are *not* a potential entry option, as shown by Rasmusen et al. (1991) and Segal and Whinston (2000). However, the mechanism that allows the incumbent to elicit acceptance is entirely different from the one illustrated in this paper. In particular, in that case the crucial insight is that, *when individual demand does not suffice to make de novo entry profitable,* by signing the contract a buyer makes it more difficult for the entrant to reach its minimum viable scale, and thus exerts a negative externality on other buyers. It is by exploiting this externality that the incumbent may succeed in having all the contracts signed and deter entry, even though buyers end up paying the monopoly price $p^m(c_I)$ instead of the competitive price c_I.

[12] The results do not change if the AA cares about consumer surplus only. See the discussion in Section 4.1.

[13] This specific demand function does not sacrify any generality. As Appendix A shows, the properties of the threshold levels of the entrant's marginal cost that will appear in the next Section hold good with a general demand function or require very mild assumptions to be satisfied. Hence, the effects of exclusive deals that we identify are quite general. The adoption of this specific demand function facilitates the analysis on whether the exclusive deal is offered in equilibrium.

[14] Note that given this demand $p^m(c_E) = \frac{1+c_E}{2} \geq c_I = \frac{1}{2}$ for any $c_E \geq 0$.

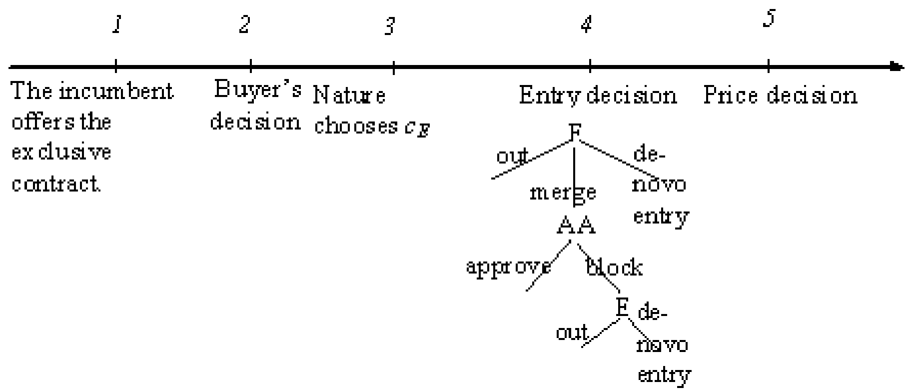


Figure 1: *Time-line.*

This requires that the fixed cost f is weakly lower than the monopoly deadweight loss.[15]

We now solve the game by backward induction.

3.1 Solution

In what follows, we solve the model. (As in the simple example of Section 2, we assume that the exclusive contract cannot include a commitment on future prices. See Section 4.2 for the case of price commitment.)

3.1.1 Product market interaction (date 5)

The pricing behavior is the same as the one described in Section 2.

3.1.2 Entry decision (date 4)

Decision of the Anti-trust Authority Let us start from the AA's decision in case the entrant and the incumbent plan to merge. This decision crucially depends on the market outcome arising if the merger is blocked, which in turn depends on whether the exclusive deal has been signed or not.

Case 1: The buyer *signed* the exclusive deal. In this case, the entrant would remain out of the market should the merger be prohibited, and the incumbent's monopoly would persist. The merger is allowed if it creates a new monopolist sufficiently more efficient than the former one so that the gain in profits and consumer surplus dominates the resources wasted incurring in the fixed cost f_m :

$$\pi^m(c_E) + CS(p^m(c_E)) - f_m > \pi^m(c_I) + CS(p^m(c_I)). \tag{9}$$

[15] This assumption ensures that the case where the AA allows the merger if the exclusive deal is signed, whereas it blocks the merger if the contract is rejected, can arise (see Appendix A).

Condition (9) is satisfied if (and only if) $c_E < c_E^{as}(f_m)$ where $c_E^{as}(f_m)$ is the level of c_E that ensures that (9) holds as equality.[16] Note that the AA applies an efficiency defence argument when approving the merger.

Case 2a: The buyer *rejected* the deal *and de-novo entry is not profitable* $\left(c_E \geq c_E^d\right)$. The AA's decision is the same as if the buyer signed the deal, since the entrant stays out of the market - should the merger be blocked - also in this case.

Case 2b: The buyer *rejected* the deal *and de-novo entry is profitable* $\left(c_E < c_E^d\right)$. In this case, in evaluating the merger the AA must trade off the cost in terms of increased market power (competition between the entrant and the incumbent is removed and the new firm charges the monopoly price $p^m(c_E) \geq c_I$) with the benefit in terms of saving of fixed costs (the merger involves lower fixed costs than de-novo entry). The merger is allowed if (and only if):

$$\pi^m(c_E) + CS(p^m(c_E)) - f_m > (c_I - c_E)\, q(c_I) + CS(c_I) - f. \tag{10}$$

Condition (10) requires that the entrant is sufficiently more efficient than the incumbent, i.e. $c_E < c_E^{ar}(f, f_m)$ with $c_E^{ar}(f, f_m) \in [0, c_I)$ for any $f_m \leq f$ and where $c_E^{ar}(f, f_m)$ is the c_E that ensures that (10) holds as equality.

Note that condition (10) is more stringent than condition (9), so that $c_E^{ar}(f, f_m) < c_E^{as}(f_m)$. This highlights a new effect of exclusive deals: *signing the contract makes the merger approval more likely as the alternative to the merger is the persistence of the former monopolist, which is less desirable than de novo entry.*

Let us study the entrant's decision.

Entrant's decision Case 1: The buyer *signed* the exclusive deal. In this case, firm E can choose between staying out of the market and merging with the incumbent. The scope for the merger exists if (and only if) the new monopolist is sufficiently more efficient than the former one that the increase in monopoly profits prevails over the fixed cost of the merger:

$$\pi^m(c_E) - \pi^m(c_I) > f_m \tag{11}$$

Condition (11) requires that $c_E < c_E^{ms}(f_m)$ with $c_E^{ms}(f_m) \leq c_I$ for $f_m \geq 0$ and where $c_E^{ms}(f_m)$ is the c_E that ensures that (11) holds as equality. Note that the AA internalises also the impact on consumer surplus of having a more efficient monopolist in the market (see condition 9). Hence, whenever there exists scope for the merger, the merger will be approved (i.e. $c_E^{ms} < c_E^{as}$), and the entrant will choose it. Firms' payoffs are given respectively by $\pi_E^s = (1-\beta)\left[\pi^m(c_E) - f_m - \pi^m(c_I)\right] \geq 0$, $\pi_I^s = \pi^m(c_I) + \beta\left[\pi^m(c_E) - f_m - \pi^m(c_I)\right]$.

Case 2a: The buyer *rejected* the exclusive deal *and de-novo entry is profitable* $\left(c_E < c_E^d\right)$. In this case, there always exists scope for the merger as it removes competition between the entrant and the incumbent and involves lower fixed costs than de-novo entry:

$$\pi^m(c_E) - f_m > (c_I - c_E)q(c_I) - f \tag{12}$$

However, the merger is approved by the AA if (and only if) $c_E < c_E^{ar}$.[17] When this is the case, firms' payoffs are given by $\pi_E^r = \beta\left[(c_I - c_E)q(c_I) - f\right] + (1-\beta)\left[\pi^m(c_E) - f_m\right] \geq$

[16] Details on the threshold levels of c_E and on their properties are provided by Appendix A.

[17] Appendix A shows that $c_E^{ar}(f_m, f) < c_E^d(f)$ for any $f_m \leq f$.

0, $\pi_I^r = \beta \left[\pi^m(c_E) - f_m - (c_I - c_E)q(c_I) + f \right]$. Otherwise, firms would like to merge but the AA blocks the project and de-novo entry occurs.

Case 2b: The buyer *rejected* the exclusive deal *and de-novo entry is not profitable* $\left(c_E \geq c_E^d\right)$. In this case, the entrant's decision is the same as the one taken when the buyer signed the exclusive deal, and the merger occurs if (and only if) $c_E < c_E^{ms}(f_m)$. The following Lemma shows that these two inequalities are mutually compatible if (and only if) the fixed cost associated with the merger is sufficiently low.

Lemma 1 *For any given f, there exists a threshold level of the fixed cost associated with the merger $\overline{f}_m \in (0, f)$ such that $c_E^d(f) \leq c_E^{ms}(f_m)$ iff $f_m \leq \overline{f}_m$.*

Proof. See Appendix B. ■

Firm $E's$ entry strategy is summarised by Lemma 2.

Lemma 2 *At date 4 the entrant takes the following decision:*

- *If the buyer signed the exclusive deal, the entrant merges with the incumbent iff $c_E \in [0, c_E^{ms})$. Otherwise, no entry occurs.*
- *If the buyer rejected the exclusive deal, the entrant merges with the incumbent either if $c_E \in [0, c_E^{ar})$ or if $c_E \in \left[c_E^d, \max\left\{c_E^{ms}, c_E^d\right\}\right)$. The merger is blocked and de-novo entry occurs iff $c_E \in \left[c_E^{ar}, c_E^d\right)$. Finally, no entry occurs iff $c_E \geq \max\left\{c_E^{ms}, c_E^d\right\}$.*

Figure 2 illustrates the impact of exclusive deals on the entry pattern. First, exclusivity may *trigger the merger instead of de-novo entry* (more precisely, this is the case where $c_E \in \left[c_E^{ar}, \min\left\{c_E^d, c_E^{ms}\right\}\right)$).[18] In particular, there exists scope for the merger both if the contract was signed and rejected, but in the former case the AA approves the merger project whereas in the latter case the merger is blocked and de-novo entry takes place. As already discussed, the AA is more lenient towards the merger project in the presence of the exclusive agreement, as the alternative to the merger is the persistence of the former, less efficient, monopolist, whereas the alternative would be de novo entry when the contract was rejected.

Second, when the fixed costs associated to the merger are sufficiently large (i.e. $f_m > \overline{f}_m$) signing the exclusive contract may *entirely deter entry.* In particular, when $c_E \in \left[c_E^{ms}, c_E^d\right)$ no entry occurs if the exclusive contract was signed. The merger would replace an existing monopolist with a more efficient one, but the technology transfer involves so high costs that the increase of monopoly rents is not enough to create scope for the merger and the new producer stays out of the market. Instead, when the contract is rejected firms would like to merge but the AA blocks the project so that de-novo entry occurs.

We now study how the impact of exclusive deals on the entry pattern affects the buyer and the incumbent's decisions.

[18] Appendix A also shows that $c_E^{ar} < c_E^{ms}$ for any $f_m \leq f$.

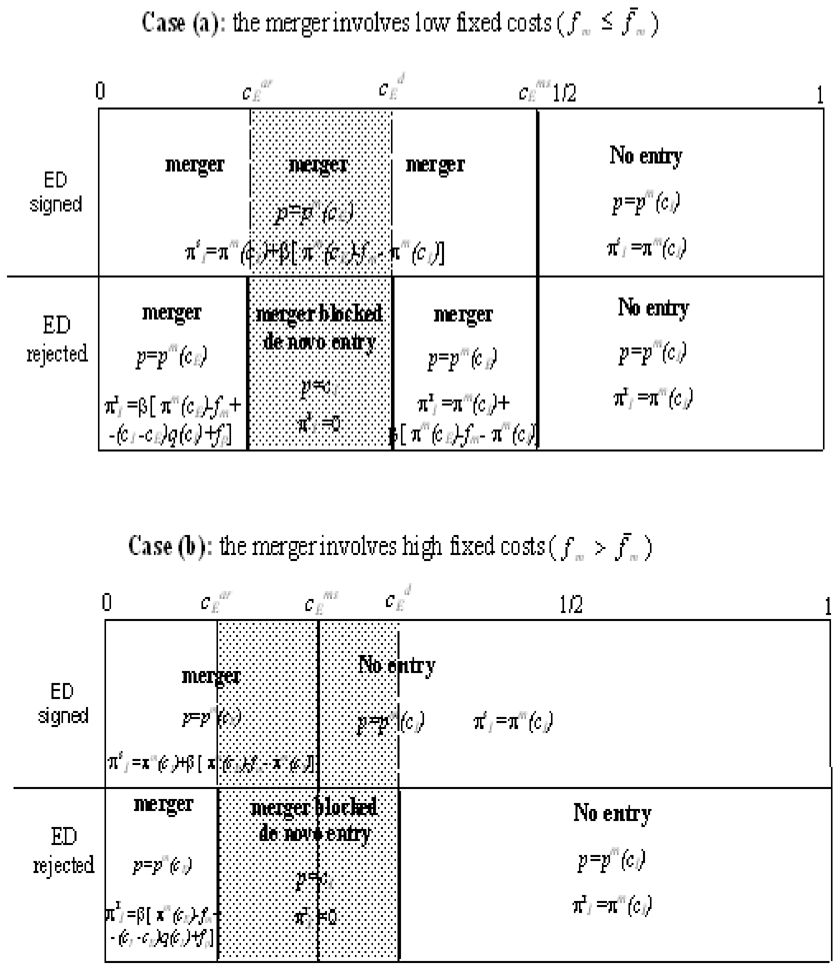


Figure 2: *Entry decision.*

3.1.3 Buyer's decision (date 2)

When the buyer decides, he does not know how efficient the entrant will be and thus he cannot perfectly anticipate which market outcome will arise after his decision. However, he is sure that, absent any compensation, he will be either indifferent or better off if he rejects the contract, depending on the entrant's cost realization. In particular, under some circumstances his rejection will cause de-novo entry instead of the merger so that he will pay the price c_I instead of $p^m(c_E) \geq c_I$ (i.e. when $c_E \in \left[c_E^{ar}, \min\left\{c_E^d, c_E^{ms}\right\}\right)$ as Figure 2 illustrates). Moreover, if the merger involves large enough fixed costs, there exist circumstances where signing the contract deters entry (i.e. when $c_E \in \left[c_E^{ms}, c_E^d\right)$). In this case, if he rejects he will pay the price c_I instead of $p^m(c_I) > c_I$. In all the other cases the buyer is indifferent between signing and rejecting: either the merger or no entry occurs in both cases, and he will pay the same price.

Hence, differently from the example illustrated in Section 2, absent any compensation the buyer expects to be *strictly better off* if he rejects the contract. Put differently, the minimum compensation that the buyer requires to sign the contract - which makes him indifferent, *in expected terms*, between signing and rejecting - is strictly positive:

$$x_B = \begin{cases} \int_{c_E^{ar}}^{c_E^d} \left[CS\left(c_I\right) - CS\left(p^m\left(c_E\right)\right)\right] dc_E > 0 & \text{if } f_m \leq \overline{f}_m \\ \begin{array}{l} \int_{c_E^{ar}}^{c_E^{ms}} \left[CS\left(c_I\right) - CS\left(p^m\left(c_E\right)\right)\right] dc_E + \\ + \left[CS\left(c_I\right) - CS\left(p^m\left(c_I\right)\right)\right]\left(c_E^d - c_E^{ms}\right) > 0 \end{array} & \text{if } f_m > \overline{f}_m \end{cases}$$

Let us study now the incumbent's decision on whether to elicit the buyer's acceptance.

3.1.4 Incumbent's decision (date 1)

Also the incumbent cannot perfectly anticipate the market outcome following the buyer's decision but it is sure that, absent any compensation to the buyer, it will be either indifferent or better off from having the contract signed.

In particular, as clarified by Figure 2, when de novo entry is profitable (i.e. when $c_E < c_E^d$), there exist three reasons why the incumbent benefits if the exclusive deal is signed. First, as already illustrated by Section 2, there exist circumstances where the merger occurs in any case but exclusive deals make the incumbent's position in the negotiation for the merger stronger and allow it to extract a larger payoff from this negotiation (i.e. when $c_E < c_E^{ar}$). Second, when the merger is approved if the exclusive deal is signed -whereas it is blocked otherwise - the incumbent earns $\pi_I^s = \pi^m(c_I) + \beta\left[\pi^m(c_E) - f_m - \pi^m(c_I)\right] \geq \pi^m\left(c_I\right)$ instead of nothing (i.e. when $c_E \in \left[c_E^{ar}, \min\left\{c_E^d, c_E^{ms}\right\}\right)$). Third, having the contract signed may deter entry altogether - whereas de-novo entry would occur otherwise (i.e. when $c_E \in \left[c_E^{ms}, c_E^d\right)$). In this case (which arises if merging involves large enough fixed costs), the incumbent's benefit amounts to the monopoly profit $\pi^m\left(c_I\right)$.

Conversely, when de novo entry is not profitable, the fact that the exclusive deal is signed makes no difference for the incumbent. Either no entry occurs both if the buyer signs and rejects the contract. Or the merger occurs in both cases and the incumbent earns the same payoff. The reason being that also when the exclusive deal is rejected, should the bargaining fail no entry would occur; thus the incumbent's position in the bargaining process is the same as when the exclusive deal is signed.

Hence, the incumbent's *expected* benefit from having the contract signed (absent any compensation) is given by:

$$x_I = \begin{cases} \begin{array}{l} \int_0^{c_E^{ar}} \{\pi^m(c_I) + \beta\left[-\pi^m(c_I) + (c_I - c_E)q(c_I) - f\right]\} \, dc_E + \\ + \int_{c_E^{ar}}^{c_E^d} \{\pi^m(c_I) + \beta\left[\pi^m(c_E) - f_m - \pi^m(c_I)\right]\} \, dc_E > 0 \end{array} & \text{if } f_m \leq \overline{f}_m \\ \begin{array}{l} \int_0^{c_E^{ar}} \{\pi^m(c_I) + \beta\left[-\pi^m(c_I) + (c_I - c_E)q(c_I) - f\right]\} \, dc_E + \\ + \int_{c_E^{ar}}^{c_E^{ms}} \{\pi^m(c_I) + \beta\left[\pi^m(c_E) - f_m - \pi^m(c_I)\right]\} \, dc_E + \\ + \left(c_E^d - c_E^{ms}\right) \pi^m\left(c_I\right) > 0 \end{array} & \text{if } f_m > \overline{f}_m \end{cases} \tag{13}$$

For the incumbent it is profitable to elicit the buyer's acceptance if its benefit from having the contract signed is larger than the minimum compensation required by the buyer (i.e. if $x_I > x_B$). The Appendix shows that is the case, so that the equilibrium of the game is the one illustrated by the following Proposition.

Proposition 1 *For any* $\beta \in [0,1]$, *in equilibrium the incumbent offers the buyer a compensation* $x = x_B$ *and the buyer signs the exclusive contract.*

Proof. See Appendix B. ∎

Hence, the general model confirms that the incumbent can profitably elicit exclusivity when mergers are an entry option. By contrast, it does not succeed in it, if the new producer can enter the market only by installing new capacity.

In the latter case, the argument is very similar to the standard case (deterministic environment of Section 2). Having the contract signed deters entry altogether, whenever it is profitable. Thus, the incumbent's expected benefit from having the contract signed amounts to $x_I' = \pi^m(c_I)c_E^d$ and the buyer requires to be compensated for the loss suffered paying the monopoly price $p^m(c_I)$ instead of c_I, i.e. he requires at least $x_B' = \int_0^{c_E^d} [CS(c_I) - CS(p^m(c_I))] \, dc_E$. By the monopoly deadweight loss the latter is larger.

Allowing for mergers as a potential entry option makes it easier for the incumbent to elicit exclusivity for two reasons. First, as already discussed in the basic example, *it decreases the minimum compensation required by the buyer* (i.e. $x_B' > x_B$). In particular, when the buyer computes the *expected* compensation, he takes into account that the merger may occur both if he signs and if he rejects the contract, so that he will not suffer any loss when signing (see Figure 2). On top of this, he anticipates that signing may trigger the merger instead of de novo entry. In this case, the buyer will still pay the monopoly price instead of the competitive price c_I, but the technology transfer creates a more efficient incumbent and the buyer will pay a lower monopoly price. In other words, the buyer must be compensated for the loss caused by the price increase $p^m(c_E) - c_I$, which is lower than the price increase $p^m(c_I) - c_I$ suffered when mergers are not a feasible option. This explains why the existence of the merger option decreases the *average* compensation required by the buyer, thereby creating the scope for the incumbent to profitably elicit acceptance.

Second, the fact that mergers are a potential entry mode *increases the incumbent's expected benefit* from having the contract signed as, when the merger occurs, it absorbs part of the net surplus realised.[19] This reinforces the previous effect.

Note also that, differently from the example illustrated by Section 2, forbidding exclusive deals would increase total *expected* welfare, as stated by the following Proposition.

Proposition 2 *Forbidding exclusive deals increases total expected welfare.*

Proof. See Appendix B. ■

In particular, in the presence of exclusive deals the AA may approve the merger even though de-novo entry would be socially optimal. In this case, the detrimental effect of exclusive deals does not stem from the fact that they deter entry and prevent the adoption of the more advanced technology, but from the fact that they distort the AA's decision and *trigger an inefficient entry mode.* On top of this, if merging involves sufficiently high costs $\left(f_m > \overline{f}_m\right)$ exclusive deals can entirely prevent entry and cause the persistence of an inefficient monopoly, thus exerting an additional negative effect on welfare. It is only when the merger occurs irrespective of exclusive deals that they do not affect total welfare.

Note that while the distortion of the AA's decision (and the associated negative impact on welfare) would well arise in a model where the buyer can perfectly anticipate that exclusivity causes the merger instead of de-novo entry, the fact that exclusive deals may end up deterring entry altogether is due to uncertainty. Put differently, the buyer would never accept exclusivity if he perfectly anticipated that, as a consequence of his decision, the entrant would stay out of the market. Instead, in our setting the buyer accepts exclusivity because when he decides the *expected* compensation he takes into account that under some realisations of the entrant's marginal costs the merger will occur and his loss from accepting exclusivity will be nil or relatively small. Ex-post, when the entrant's technology realises, the compensation received may turn out to be smaller than the loss actually suffered. Hence, efficient entry ends up being deterred by 'a mistake' of the buyer who asks too small a compensation, in a similar vein as in Aghion and Bolton (1987) where entry is deterred by 'a mistake' of the incumbent which sets too large a penalty for breach of contract.

4 Extensions

In this section, we relax two assumptions made in the previous section. First, we briefly explain that if the Antitrust Agency had a consumer welfare (rather than total welfare) objective, the results would not change. Second, and more important, we consider the case where under the exclusive contract the incumbent can commit to the price that it will charge to the buyer in the future. We show that also in this case the merger facilitates the task of the incumbent and allows it to profitably induce the buyer to accept the exclusivity clause. However, we find that the welfare implications

[19] Indeed, when $\beta = 0$ (i.e. when the incumbent does not extract any share of the net surplus), the incumbent's expected benefit is the same as in the case when mergers are not an option: $x_I = \pi^m(c_I)c_E^d = x'_I$. Since x_I is increasing in β (as shown by Appendix B), $x_I > x'_I$ when $\beta > 0$.

of exclusive dealing are dramatically different under price commitment: exclusivity provisions increase, rather than decrease, welfare.

4.1 Consumer surplus as the AA's standard

There has been a long debate among economists on whether the objective of competition policy should be to maximize total surplus or rather consumer surplus, and whether in practice Antitrust Agencies and the Courts pursue one objective or the other.[20] It is therefore important to note that the results obtained would not change if we assumed that the AA evaluates mergers on the ground of consumer surplus only. Let us consider the case where exclusive deals do not include a commitment on prices. When the buyer signed the contract (or when he rejected the deal but de-novo entry is not profitable), the entry decision is the same as in Section 3.1.2: the merger occurs whenever firms are willing to engage in it. In particular, the AA *always* approves the merger project, since it creates a more efficient monopolist and thus the buyer is charged a lower price. Instead, when the buyer rejected the exclusive deal and de-novo entry is profitable, the AA *always* prohibits the merger, as it only cares about the increased market power and does not take into account that the merger involves lower fixed costs than de-novo entry. In this case, de-novo entry always occurs.[21] Thus, it is more likely than in Section 3.1.2 that signing the exclusive deal makes the merger occur instead of de-novo entry (equivalently it is less likely that the merger occurs irrespective of the exclusive deal). On the one hand this implies that the buyer requires a larger compensation in order to accept exclusivity (it is less likely that he is indifferent between signing and rejecting the deal). On the other hand, the incumbent is willing to offer more to the buyer as, when having the contract signed triggers the merger instead of de-novo entry, it extract the largest gain from exclusivity. Overall, also in this case in equilibrium the incumbent profitably elicits the buyer's acceptance. (The argument is similar when exclusive deals include a commitment on future prices, like in the following section.)

4.2 Price commitment

In this Section we study the effect of exclusive deals when the contract includes a (credible) commitment to sell the good at a given price p. The remaining assumptions are the same as in Section 3.1.

4.2.1 Product market interaction (date 5)

Case 1: The buyer *rejected* the exclusive contract. In this case, if no entry or merger occurs, the incumbent charges the monopoly price $p^m(c_I)$. If de novo entry occurs the entrant sells the good charging the price c_I, whereas if a merger takes place the merged entity charges the monopoly price $p^m(c_E)$.

Case 2: The buyer *signed* the exclusive contract. In case of merger, the new firm inherits the contractual obligations undertaken by the incumbent. Hence, under exclusivity, the buyer pays the contractual price p irrespective of the entry decision at date 4.

[20] See Motta (2004: 19-22) for a discussion.
[21] Differently stated, it is as if $c_E^{ar} = 0$ in Section 3.1.2.

4.2.2 Entry decision (date 4)

Let us consider the case where the buyer signed the exclusive contract, as nothing changes with respect to Section 3.1 if the buyer rejected exclusivity. Firm E's decision is described by the following Lemma.

Lemma 3 *If the buyer signed the exclusive deal, the entrant merges with the incumbent iff* $c_E \in [0, c_E^s)$ *. Otherwise, no entry occurs. The threshold* $c_E^s(f_m, p) \equiv c_I - f_m/q(p)$ *is such that*

$$(c_I - c_E)\, q(p) > f_m \tag{14}$$

if (and only if) $c_E < c_E^s \leq c_I$*.*

Proof. Since the buyer accepted exclusivity, if the merger negotiation collapses the entrant stays out of the market and the incumbent supplies the quantity $q(p)$ to the buyer. The merger creates a more efficient incumbent and the quantity is produced at lower costs. Hence, it increases the industry surplus if the benefit from this offsets the fixed costs associated with the technology transfer: $(p - c_E)q(p) - f_m > (p - c_I)q(p)$, which can be rewritten as in condition (14).

Moreover, whenever there exists scope for the merger, the merger is approved: since the buyer pays the contractual price p irrespective of the merger approval, also the AA's decision is based on industry surplus.

Hence, if condition (14) is satisfied, for the entrant merging with the incumbent is (weakly) more profitable than any other choice. Firms' payoffs are given respectively by $\pi_E^s = (1 - \beta)\left[(c_I - c_E)\, q(p) - f_m\right]$, $\pi_I^s = (p - c_I)\, q(p) + \beta\left[(c_I - c_E)\, q(p) - f_m\right]$.

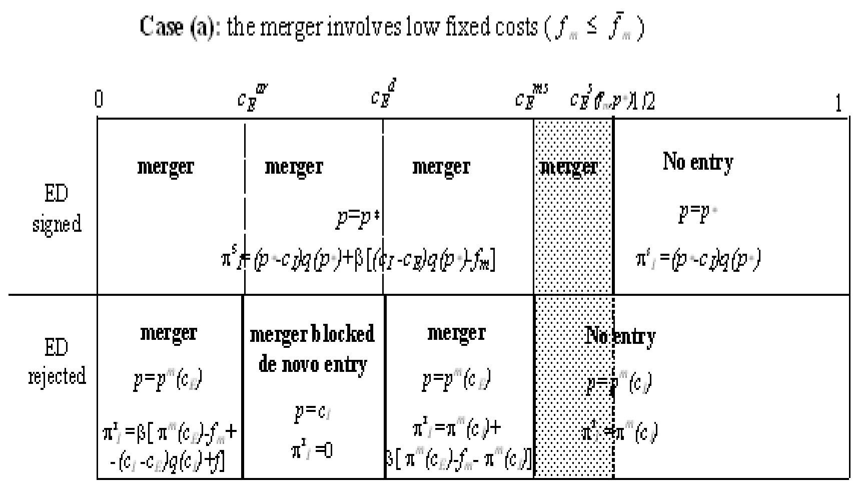
If condition (14) does not hold, the merger does not occur and the new producer stays out of the market. In this case the incumbent earns $\pi_I^s = (p - c_I)\, q(p)$. ■

The entry pattern with and without exclusive deals is illustrated by Figure 3. Note also that from condition (14) it follows immediately that the lower p the more likely the merger will take place. A lower p means that incumbent is committing to a higher level of production $q(p)$. In turn, this implies that the productive efficiency gain created by the merger (i.e., by the use of the more efficient technology) will be larger: for any given fixed cost of the merger, f_m, the scope for merging will be higher.

4.2.3 The buyer's decision (date 2)

The buyer anticipates that, if he accepts exclusivity, he will pay the contractual price p irrespective of the subsequent entry decision. Instead, if he rejects the exclusive deal, he cannot perfectly anticipate the price that he will pay, which depends on how efficient the entrant will be and thus on the market outcome arising at date 4. By Lemma 2, the buyer will pay the price $p^m(c_E)$ if the merger is approved, the competitive price c_I if the merger is blocked and de-novo entry occurs, and the price $p^m(c_I)$ if no entry occurs (see also Figure 3). Hence, the minimum compensation that induces the buyer to sign a contract committing to the price p is given by

$$x_B(p) = X - CS(p)$$



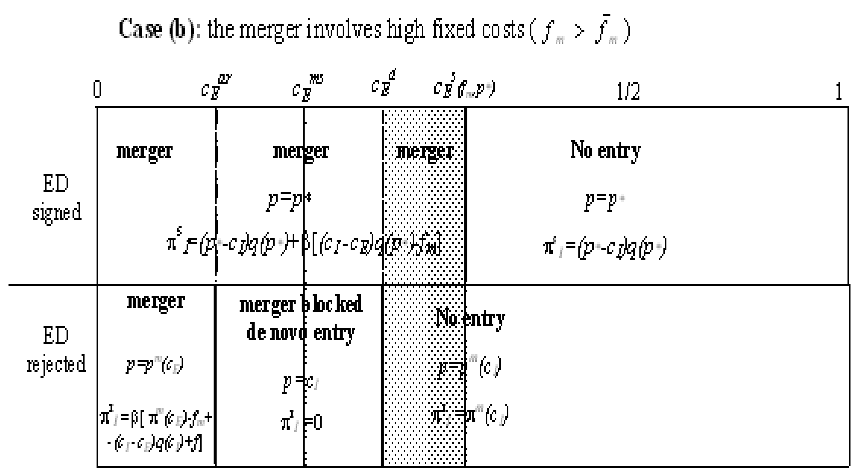


Figure 3: *Entry decision when the exclusive contract includes a price commitment (the contractual price is assumed to be $p^* \leq c_I$).*

where X indicates the buyer's *expected* payoff when he rejects the exclusive deal:

$$X = \begin{cases} \int_0^{c_E^{ar}} CS(p^m(c_E))dc_E + \left(c_E^d - c_E^{ar}\right) CS(c_I) + \int_{c_E^d}^{c_E^{ms}} CS(p^m(c_E))dc_E + \\ + \left(1 - c_E^{ms}\right) CS(p^m(c_I)) & \text{if } f_m \le \overline{f}_m \\ \int_0^{c_E^{ar}} CS(p^m(c_E))dc_E + \left(c_E^d - c_E^{ar}\right) CS(c_I) + \left(1 - c_E^d\right) CS(p^m(c_I)) \\ & \text{if } f_m > \overline{f}_m \end{cases} \quad (15)$$

Note that, if the contractual price is sufficiently low, the buyer is willing to pay in order to sign the exclusive contract (i.e. $x_B(p) < 0$).

4.2.4 The incumbent's decision (date 1)

At date 1 the incumbent decides whether to induce the buyer to accept exclusivity. In order to elicit acceptance, the incumbent must offer a contract $(p, x_B(p))$. By Lemma 3 it earns, in *expected* terms, the following payoff (see also Figure 3):

$$E[\pi_I^s] - x_B(p) = (p - c_I)\, q(p) + \int_0^{c_E^s(f_m,p)} \beta \left[(c_I - c_E)q(p) - f_m\right] dc_E - X + CS(p) \quad (16)$$

We will now solve for the incumbent's optimal decision in the case where the entrant can make take-it-or-leave-it offers, so that it extracts the entire net surplus associated with the merger (i.e. $\beta = 0$). We will then discuss the case where the incumbent's bargaining power is stronger (i.e. $\beta > 0$).

First, let us identify the optimal contract that induces the buyer to sign, and the associated incumbent's payoff.

Lemma 4 *When $\beta = 0$, the optimal contract commits to supply the good at the price $p^* = c_I$ and to offer the compensation $x^* = X - CS(c_I) < 0$. The buyer pays in order to sign this contract and the incumbent earns $\pi_I^{*s} = CS(c_I) - X > 0$.*

Proof. Since $\beta = 0$, the optimal contract solves the following problem:

$$\max_p \left\{(p - c_I)\, q(p) - X + CS(p)\right\}$$

Recalling that $CS(p) = \int_p^\infty q(t)dt$, the first order condition is:

$$(p - c_I)\, \frac{dq(p)}{dp} = 0$$

and $p^* = c_I$.

By Lemma 2, the buyer will pay a price either higher or equal to c_I when rejecting exclusivity, so that $CS(c_I) > X$ and $\pi_I^{*s} > 0$ (See also Figure 3). ■

The intuition for this result is the following. Since $\beta = 0$, the incumbent is left with its threat point payoff in the negotiation for the merger, i.e. with the profits it would earn by using its technology and supplying the buyer at the contractual price p. Hence, if the buyer accepts exclusivity the incumbent earns $(p - c_I)\, q\,(p)$ irrespective of the realization of the entrant's marginal cost and of the entry decision at date 4. Moreover, price commitment allows the incumbent to extract the buyer's surplus from paying a sufficiently low price. This gives the incentive to choose the contractual price $p^* = c_I$.

Is it profitable for the incumbent to induce the buyer to sign this contract? Appendix C shows that this is the case so that Proposition 3 illustrates the equilibrium of the game.

Proposition 3 *When $\beta = 0$, in equilibrium the incumbent offers the contract ($p^* = c_I$, $x^* = X - CS(c_I)$) and the buyer accepts exclusivity.*

Proof. See Appendix C. ■

Three issues are worth discussing. First, also in this setting, *allowing for mergers as a potential entry option makes it more profitable for the incumbent to elicit exclusivity* with respect to the standard case where mergers are not considered.

Imagine that mergers are not possible. If the buyer rejected the exclusive deal, de-novo entry would occur whenever it is profitable (i.e. when $c_E \in \left[0, c_E^d\right))$. The incumbent's monopoly power persists in the alternative case. Hence, the incumbent's expected payoff amounts to $E(\pi_I^r) = \pi^m\,(c_I)\left(1 - c_E^d\right)$. If the buyer signed the exclusive deal, no entry would occur. The incumbent supplies the good at the contractual price p and earns $(p - c_I)\, q\,(p)$ for any realization of the entrant's marginal cost. Hence, in order to sign a contract that commits to a price p, the buyer requires at least $x_B' = CS(c_I)c_E^d + \left(1 - c_E^d\right) CS(p^m\,(c_I)) - CS(p)$ and the optimal contract that elicits the buyer's acceptance solves

$$\max_p \left\{(p - c_I)\, q\,(p) + CS(p) - CS(c_I)c_E^d + \left(1 - c_E^d\right) CS(p^m\,(c_I))\right\}.$$

Also in this case the optimal price is $p^* = c_I$, and the incumbent's payoff is given by $\pi_I^{*s} = [CS(c_I) - CS(p^m(c_I))]\left(1 - c_E^d\right)$. By the monopoly deadweight loss, $\pi_I^{*s} > E(\pi_I^r)$ so that it is profitable for the incumbent to make the buyer sign the contract. Note that uncertainty is crucial for the *profitability* of the incumbent's offer. Since the new producer may not be efficient enough to enter the market, the buyer expects to pay the monopoly price with some probability when he rejects the contract. This makes him more willing to pay in order to sign a contract that commits to the price c_I and allows the incumbent to extract some surplus from him.[22]

The fact that mergers are an entry option increases further the surplus that the incumbent extracts from the buyer. The intuition is that the buyer expects to pay more often a price above the contractual price c_I, if he rejects the exclusive deal. In particular, by Lemma 2, if the entrant is efficient enough (i.e. if $c_E < c_E^{ar}$) the AA approves the merger even though de-novo entry is profitable, and the buyer ends up paying the monopoly price $p^m(c_E)$. This increases the buyer's willingness to pay to sign the exclusive contract with respect to the no-merger case and makes it more profitable for the incumbent to elicit acceptance.[23]

[22] Indeed, if the buyer and the incumbent knew that de novo entry is always profitable, the incumbent would be indifferent between making the buyer sign (and deterring entry) and letting de-novo entry occur. In both cases its payoff would amount to 0.

[23] See Appendix C for a formal proof.

Second, in contrast with the result obtained in Section 3.1, *exclusive deals are welfare beneficial*. This happens because the possibility of price commitment, by giving the incentives to choose a low contractual price, not only promotes *allocative efficiency* but also creates more scope for a merger, thereby making it *more likely that the entrant's superior technology is introduced into the industry.*

Proposition 4 *When $\beta = 0$, forbidding exclusive deals decreases total expected welfare.*

Proof. First, note that entry (in the sense of the more efficient technology being used in the industry) is more likely when the buyer signed the exclusive deal. Since the optimal contractual price is given by $p^* = c_I$, when the buyer signed the exclusive deal entry occurs (by merger) if (and only if) $c_E < c_E^s(f_m, c_I)$ where c_E^s ensures that $(c_I - c_E)\, q(c_I) = f_m$ (see Lemma 3). Instead, by Lemma 2, when the buyer rejected the exclusive deal two cases may arise. If the merger is sufficiently costly, entry occurs if (and only if) $c_E < c_E^d$ where c_E^d ensures that $(c_I - c_E)\, q(c_I) = f$ (i.e. de-novo entry must be profitable); if the fixed costs associated to the merger are low enough, entry occurs if (and only if) $c_E < c_E^{ms}$ where c_E^{ms} ensures that $\pi^m(c_E) - \pi^m(c_I) = f_m$ (i.e. there must be scope for the merger even though de-novo entry is not profitable). By $f_m \leq f$, $p^m(c_E) \geq c_I$ and $q' < 0$, it is easy to check that the condition for entry is less stringent when the buyer signed the exclusive deal. (Differently stated, $c_E^s(f_m, c_I) \geq \max\left\{c_E^{ms}, c_E^d\right\}$ for any $f_m \leq f$. See also Figure 3.)

It follows that four different market structure cases must be checked (we denote W^f as the welfare level when exclusive deals are forbidden and W^a the welfare level when they are allowed):
1. No entry occurs both if exclusive deals are forbidden and if they are allowed (when $c_E \geq c_E^s$). In the latter case total welfare is higher because the price at which the good is supplied is lower:

$$W^f = CS\left(p^m\left(c_I\right)\right) + \pi^m\left(c_I\right) < CS(c_I) = W^a.$$

2. The merger occurs in both cases (when $c_E < c_E^{ar}$ and $c_E \in \left[c_E^d, \max\left\{c_E^{ms}, c_E^d\right\}\right)$). When exclusive deals are allowed the good is supplied at a lower price and total welfare is higher:

$$W^f = CS\left(p^m\left(c_E\right)\right) + \pi^m\left(c_E\right) - f_m < CS(c_I) + (c_I - c_E)q(c_I) - f_m = W^a$$

3. Allowing exclusive deals makes the merger occur instead of de-novo entry (when $c_E \in \left[c_E^{ar}, \min\left\{c_E^{ms}, c_E^d\right\}\right)$). If so, total welfare increases because the good is supplied at the same price but merging involves lower fixed costs than setting up a new plant:

$$W^f = CS(c_I) + (c_I - c_E)q(c_I) - f < CS(c_I) + (c_I - c_E)q(c_I) - f_m = W^a.$$

4. Finally, allowing exclusive deals may create scope for the merger whereas no entry occurs when exclusive deals are forbidden (when $c_E \in \left[\max\left\{c_E^{ms}, c_E^d\right\}, c_E^s\right)$. Total welfare is higher in the former case because of lower prices *and production efficiencies* (the entry of the more efficient producer reduces production costs):

$$W^f = CS(p^m\left(c_I\right) + \pi^m(c_I) < CS(c_I) + \left(c_I - c_E\right) q\left(c_I\right) - f_m = W^a$$

■

Third, *mergers*, by representing an additional way to introduce the more advanced technology into the industry, *are crucial for exclusive deals to be welfare beneficial.* In particular, when mergers are not an option, exclusive deals deter entry altogether and prevent the adoption of the more efficient technology. Hence, allowing exclusive deals exerts ambiguous effects on welfare. Since the incumbent chooses the contractual price $p^* = c_I$, allowing exclusive deals is welfare beneficial when no entry occurs also in their absence (i.e. when $c_E \geq c_E^d$) because the buyer is charged the incumbent's marginal cost instead of the monopoly price. However, when de-novo entry occurs in the absence of exclusive deals (i.e. when $c_E < c_E^d$), allowing exclusive deals harms total welfare because the good (which is sold at the same price) is produces less efficiently. In expected terms, the impact of forbidding exclusive dealing on total welfare is given by:

$$\begin{aligned} E\left[W^f\right] - E\left[W^a\right] &= \underset{(+)}{\int_0^{c_E^d} \left[(c_I - c_E)\, q(c_I) - f\right] dc_E} + \\ &+ \underset{(-)}{\left(1 - c_E^d\right)\left[CS(p^m\left(c_I\right) - \pi^m(c_I) - CS(c_I)\right]} \end{aligned}$$

As shown by Appendix C, with linear demand, the latter effect prevails and forbidding exclusive deals increases total expected welfare when mergers are not an option.

4.2.5 Generalising the result: $\beta > 0$

To conclude, let us briefly discuss the case where the incumbent extracts some surplus associated to the merger $(\beta > 0)$. If so, under the optimal contract the incumbent commits to a price $p^* < c_I$. Indeed, the larger the incumbent's bargaining power in the negotiation for the merger (the higher β), the lower the optimal contractual price and the more exclusive deals are welfare beneficial.

The intuition for these results is the following. When it occurs, the negotiation for the merger allows the incumbent to extract a share of the net surplus that the more efficient producer brings to the market (namely, the incumbent appropriates $\beta\left[(c_I - c_E)q(p) - f_m\right]$ if $c_E < c_E^s$). Thus the incumbent maximises the sum of consumer surplus and of the profits earned by a producer whose marginal cost is below c_I, and more precisely whose marginal cost amounts to c_I *minus* a share β of the *expected efficiency gain* generated by the merger:

$$E[\pi_I^s] - x_B(p) = CS(p) + q\left(p\right)\left[p - \left(c_I - \beta \int_0^{c_E^s(p)} (c_I - c_E) dc_E\right)\right] - \beta f_m c_E^s\left(p\right) - X$$

On top of this, the lower p the more likely the merger occurs (by Lemma 3, the threshold c_E^s is decreasing in p) and the higher the expected efficiency gain associated with it. Overall, the incumbent has the incentive to decrease the price below c_I.

For a similar reason, the higher β, the higher the share of the realised net surplus that the incumbent appropriates, the stronger the incentive to decrease the contractual price.

5 Conclusion

This paper extends the existing literature on exclusive dealing by allowing a more efficient producer not only to enter the market by setting up a new venture but also by merging with the incumbent firm (or, equivalently, by licensing its more efficient technology to the incumbent).

First, we identify a new rationale for exclusive deal provisions: they allow the incumbent to extract larger surplus in the subsequent merger with the potential entrant. Consequently, a prediction of this paper is that, ceteris paribus, firms which lock a considerable proportion of buyers by using exclusivity provisions would gain more in merger deals (or, under the alternative interpretation, pay less in technology transfer agreements).

Second, we show that relative to the standard "Chicago-School" type model without mergers, the buyer will demand a lower compensation to sign exclusivity, and the incumbent will have higher gains from it. Hence, contrary to the "Chicago-School" critique, when mergers are possible the incumbent can *profitably* elicit the buyer' acceptance.

Third, we show that - despite the existence of the merger option, which allows the more efficient technology to find its way into the industry - exclusive dealing is still welfare-reducing. The reason is two-fold. First, the presence of exclusive deals may distort the AA's decision so that at equilibrium the merger will be approved, even though total welfare would be higher under de novo entry. Second, exclusive deals might in some circumstances deter entry altogether. This effect can arise in the case of uncertainty (where exclusivity is agreed upon before knowing the actual cost of the entrant) by "a mistake" of the buyer who ex-ante asks too small a compensation.

Finally, in the presence of mergers, exclusive deals which include a commitment on prices turn out to be welfare beneficial. In particular, the incumbent has the incentive to establish a contractual price weakly below its marginal cost. This not only promotes allocative efficiency but also creates more scope for the merger between the incumbent and the entrant, thereby making it more likely that the entrant's superior technology is introduced into the industry.

6 Appendix

APPENDIX A

Decision of the AA

Consider a generic demand function $q(p)$ (with $q' < 0$) and c_E distributed over the interval $[c_I - a, c_I + a]$ where $a > 0$ and $p^m(c_I - a) = c_I$. Condition (9) writes as follows:

$$\pi^m(c_E) + CS(p^m(c_E)) - f_m > \pi^m(c_I) + CS(p^m(c_I)). \tag{17}$$

Let us define $f(c_E) = \pi^m(c_E) + CS(p^m(c_E)) - f_m - \pi^m(c_I) - CS(p^m(c_I))$. By the envelope theorem, $f' = -q(p^m(c_E))\left[1 + \frac{dp^m(c_E)}{dc_E}\right]$. The monopoly price $p^m(c_E)$ solves $q'(p^m - c_E) + q(p^m) = 0$. Hence, $\frac{dp^m(c_E)}{dc_E} = \frac{q'}{q''(p-c_E)+2q'} > 0$ and $f' < 0$. By $f_m \geq 0$, $f(c_I) \leq 0$. By $f_m \leq f$ and assumption (*A2*), $f(c_I - a) > 0$. Hence, there exists a threshold $c_E^{as} \in (c_I - a, c_I]$ such that $f(c_E) > 0$ iff $c_E < c_E^{as}$. Given demand $q = 1 - p$, condition (17) translates into

$$\frac{(1-c_E)^2}{4} + \frac{(1-c_E)^2}{8} - f_m > \frac{1}{16} + \frac{1}{32} \tag{18}$$

and $c_E^{as} = 1 - \sqrt{\frac{1}{4} + \frac{8}{3} f_m}$.

Condition (10) writes as follows:

$$\pi^m(c_E) + CS(p^m(c_E)) - f_m > (c_I - c_E) q(c_I) + CS(c_I) - f. \tag{19}$$

We now show that the *assumption* $\frac{d^2 p^m(c_E)}{d^2 c_E} \leq 0$ *is sufficient (but not necessary) for the existence of a threshold* c_E^{ar} such that (19) is satisfied iff $c_E < c_E^{ar}$. Let us define $g(c_E) = \pi^m(c_E) + CS(p^m(c_E)) - f_m - (c_I - c_E) q(c_I) - CS(c_I) + f$. By $f_m \leq f$, $g(c_I - a) = f - f_m \geq 0$. By assumption (*A2*), $g(c_I) = \pi^m(c_I) + CS(p^m(c_I)) - f_m - CS(c_I) + f < 0$. Moreover, $g'' = -q'(p^m(c_E)) \left[1 + \frac{dp^m(c_E)}{dc_E}\right] \frac{dp^m(c_E)}{dc_E} - q(p^m(c_E)) \frac{d^2 p^m(c_E)}{d^2 c_E} > 0$ (recall that $q' < 0$ and $\frac{dp^m(c_E)}{dc_E} > 0$). Hence, there exists a threshold $c_E^{ar} \in [c_I - a, c_I)$ such that $g(c_E) > 0$ iff $c_E < c_E^{ar}$. It is easy to see that the threshold c_E^{ar} is decreasing in f_m and increasing in f.

Given linear demand $q = 1 - p$, condition (10) translates into:

$$\frac{(1-c_E)^2}{4} + \frac{(1-c_E)^2}{8} - f_m > \left(\frac{1}{2} - c_E\right)\frac{1}{2} + \frac{1}{8} - f \tag{20}$$

and $c_E^{ar}(f, f_m) = \frac{1}{3} - \frac{1}{3}\sqrt{1 - 24(f - f_m)}$.

Entrant's decision

Condition (11) writes as follows:

$$\pi^m(c_E) - f_m > \pi^m(c_I) \tag{21}$$

It is easy to see that it is satisfied iff $c_E < c_E^{ms}(f_m)$, where the threshold $c_E^{ms}(f_m)$ is strictly decreasing in f_m and belongs to $(0, c_I]$.

We now show that the *assumption* $\frac{dp^m(c_E)}{dc_E} \in (0,1)$ *is sufficient (but not necessary) for* $c_E^{ar} < c_E^{ms}$ *for any* $f_m \leq f$. If $c_E^{ar} < c_E^{ms}$ it must be that $\pi^m(c_E^{ar}) - f_m > \pi^m(c_I)$ for any $f_m \leq f$. Recall that the threshold $c_E^{ar} < c_I$ is such that $\pi^m(c_E^{ar}) - f_m = (c_I - c_E^{ar}) q(c_I) + CS(c_I) - CS(p^m(c_E^{ar})) - f$. Hence, it must be that $(c_I - c_E^{ar}) q(c_I) + CS(c_I) - CS(p^m(c_E^{ar})) - f > \pi^m(c_I)$ for any f where $f \leq CS(c_I) - CS(p^m(c_I)) - \pi^m(c_I)$ by assumption (*A2*). Substituting for the highest feasible value of f, one obtains that it must be that $(c_I - c_E^{ar}) q(c_I) + CS(p^m(c_I)) - CS(p^m(c_E^{ar})) > 0$. Let us define $k(c_E) = (c_I - c_E) q(c_I) + CS(p^m(c_I)) - CS(p^m(c_E))$. Note that $k(c_I) = 0$. Moreover, $\frac{dk(c_E)}{dc_E} = -q(c_I) + q(p^m(c_E)) \frac{dp^m(c_E)}{dc_E} < 0$ by the assumption that $p^m(c_E) \geq c_I$, $q' < 0$ and $\frac{dp^m(c_E)}{dc_E} \in (0,1)$. Since $c_E^{ar} < c_I$, $k(c_E^{ar}) > 0$, and $c_E^{ar} < c_E^{ms}$ for any $f_m \leq f$.

Given linear demand $q = 1 - p$, condition (11) translates into :

$$\frac{(1-c_E)^2}{4} - f_m > \frac{1}{16}$$

and $c_E^{ms}(f_m) = 1 - 2\sqrt{f_m + \frac{1}{16}}$.

Lemma 1: *For any given f, there exists a threshold level of the fixed cost associated to the merger $\overline{f}_m(f)$ such that $c_E^d(f) \leq c_E^{ms}(f_m)$ iff $f_m \leq \overline{f}_m(f)$.*

Proof. The threshold $c_E^d(f)$ is such that $(c_I - c_E^d)q(c_I) = f$. Since $f > 0$, $c_E^d < c_I$. If $f_m = 0$, $c_E^{ms}(0) = c_I > c_E^d(f)$. We now show that, if $f_m = f$, $c_E^{ms}(f) < c_E^d(f)$. If $c_E^{ms}(f) < c_E^d(f)$, it must be that $[c_I - c_E^{ms}(f)]\, q(c_I) > f$. Since $c_E^{ms}(f)$ is such that $\pi^m(c_E^{ms}) - \pi^m(c_I) = f$, it follows that $c_E^{ms}(f) < c_I$ and that it must be $[c_I - c_E^{ms}(f)]\, q(c_I) > \pi^m(c_E^{ms}) - \pi^m(c_I)$. Let us define $w(c_E) = (c_I - c_E)q(c_I) - [\pi^m(c_E) - \pi^m(c_I)]$. If $c_E = c_I$, $w(c_I) = 0$. Moreover, $\frac{dw(c_E)}{dc_E} = -q(c_I) + q(p^m(c_E)) \leq 0$ as $p^m(c_E) \geq c_I$ by assumption and by $q' < 0$. Hence, it follows that $w(c_E) > 0$ for any $c_E < c_I$. Since $c_E^{ms}(f) < c_I$, $w(c_E^{ms}(f)) > 0$ and thus $c_E^{ms}(f) < c_E^d(f) < c_I$. Since $c_E^{ms}(f_m)$ is strictly decreasing in f_m, there exists a threshold $\overline{f}_m \in (0, f)$ such that $c_E^{ms}(f_m) > c_E^d(f)$ iff $f_m < \overline{f}_m$. With linear demand $q(p) = 1 - p$, $\overline{f}_m = \frac{f}{2} + f^2$. ∎

Now we compare the thresholds c_E^{ar} and c_E^d. Since $c_E^{ar} < c_E^{ms}$ and $c_E^{ms} \leq c_E^d$ when $f_m \geq \overline{f}_m$, it follows that $c_E^{ar} < c_E^d$ for f_m large enough.

Since c_E^{ar} is decreasing in f_m and increasing in f, whereas c_E^d is decreasing in f, $c_E^{ar} < c_E^d$ for any $f_m \leq f$ if (and only if) the inequality holds good for $f_m = 0$ and $f = CS(c_I) - CS(p^m(c_I)) - \pi^m(c_I)$ (which is the upperbound by assumption (*A2*)). If $c_E^{ar} < c_E^d$, it must be that $\pi^m\left(c_E^d\right) + CS\left(p^m\left(c_E^d\right)\right) - f_m < \left(c_I - c_E^d\right) q\left(c_I\right) + CS\left(c_I\right) - f$. Substituting for $f_m = 0$ and by the definition of c_E^d it must be that

$$\pi^m\left(c_E^d\right) + CS\left(p^m\left(c_E^d\right)\right) < CS(c_I). \tag{22}$$

This inequality is satisfied if (and only if) assumption (*A2*) put enough constraint on f that c_E^d is not too low. If this is not the case, it might be that $c_E^{ar} \geq c_E^d$ for f_m sufficiently low. Hence, the case where the merger is approved in the presence of exclusive deals whereas it is blocked if the contract is rejected would not arise for f_m low enough. This is irrelevant for the results of the paper.

Given demand $q = 1 - p$ and $c_I = \frac{1}{2}$, assumption (*A2*) requires that $f \leq \frac{1}{32}$ and $c_E^d\left(\frac{1}{32}\right) = \frac{7}{16}$. Since $\pi^m\left(\frac{7}{16}\right) + CS\left(p^m\left(\frac{7}{16}\right)\right) = \frac{243}{2048} < \frac{1}{8} = CS(c_I)$, $c_E^{ar} < c_E^d$ for any $f_m \leq f$.

APPENDIX B

Proposition 3 *$x_I > x_B$ for any $\beta \in [0,1]$.*

Proof. First we show that $x_I > x_B$ for $\beta = 0$. We then show that x_I is increasing in β. Since x_B does not depend on β, this suffices to show that $x_I > x_B$ for any $\beta > 0$.

i) The minimum compensation required by the buyer is given by:

$$x_B = \begin{cases} \int_{c_E^{ar}}^{c_E^d} \left[CS\left(c_I\right) - CS\left(p^m\left(c_E\right)\right)\right] dc_E > 0 & \text{if } f_m \leq \overline{f}_m \\ \int_{c_E^{ar}}^{c_E^{ms}} \left[CS\left(c_I\right) - CS\left(p^m\left(c_E\right)\right)\right] dc_E + \\ + \left[CS\left(c_I\right) - CS\left(p^m\left(c_I\right)\right)\right]\left(c_E^d - c_E^{ms}\right) > 0 & \text{if } f_m > \overline{f}_m \end{cases}$$

Note that x_B is increasing in f_m. First, the threshold c_E^{ar} is decreasing in f_m. Hence the interval of the entrant's marginal cost where the buyer is better off by rejecting the exclusive deal expands (see Figure 2). Second, also the threshold c_E^{ms} is decreasing in f_m. Hence, when the fixed costs associated to the merger are sufficiently high (i.e. when $f_m > \overline{f}_m$), the sub-interval $\left[c_E^{ms}, c_E^d\right)$ over which signing the contract entirely deters entry (and thus the buyer enjoys the highest gain by rejecting) expands.

Given demand $q = 1 - p$ and $c_I = \frac{1}{2}$, x_B is given by:

$$x_B(f_m, f) = \begin{cases} \int_{\frac{1}{3}-\frac{1}{3}\sqrt{1-24(f-f_m)}}^{\frac{1}{2}-2f} \left(\frac{1}{8} - \frac{(1-c_E)^2}{8}\right) dc_E & \text{if } f_m \leq \frac{f}{2} + f \\ \int_{\frac{1}{3}-\frac{1}{3}\sqrt{1-24(f-f_m)}}^{1-2\sqrt{f_m+\frac{1}{16}}} \left[\frac{1}{8} - \frac{(1-c_E)^2}{8}\right] dc_E + & \\ + \left[\frac{1}{8} - \frac{1}{32}\right] \left(\frac{1}{2} - 2f - 1 + 2\sqrt{f_m + \frac{1}{16}}\right) & \text{otherwise} \end{cases} \tag{23}$$

Let us compute the highest value that x_B can take (which is achieved when $f_m = f$):

$$\begin{aligned} x_B(f,f) &= \frac{1}{8} \int_0^{1-2\sqrt{f+\frac{1}{16}}} \left[2c_E - c_E^2\right] dc_E + \frac{3}{32}\left(2\sqrt{f + \frac{1}{16}} - \frac{1}{2} - 2f\right) \\ &= \frac{7}{192} - \frac{3}{16}f - \left(\frac{1}{96} - \frac{1}{12}f\right)\sqrt{16f+1} \end{aligned} \tag{24}$$

When $\beta = 0$, $x_I = \pi^m(c_I)c_E^d = \frac{1}{16}\left(\frac{1}{2} - 2f\right)$. We now show that $x_I > x_B(f,f)$. In particular,

$$\begin{aligned} x_I - x_B(f,f) &= \frac{1}{16}\left(\frac{1}{2} - 2f\right) - \left[\frac{7}{192} - \frac{3}{16}f - \sqrt{16f+1}\left(\frac{1}{96} - \frac{1}{12}f\right)\right] \\ &= \frac{1}{16}f + \left(\frac{1}{96} - \frac{1}{12}f\right)\sqrt{16f+1} - \frac{1}{192} > 0 \text{ for any } f \leq \frac{1}{32} \end{aligned} \tag{25}$$

Hence,when $\beta = 0$, it must be that $x_I > x_B$ for any $f_m \leq f$.

ii) For a generic β, the highest compensation that the incumbent is willing to offer can be written as follows:

$$x_I(\beta) = \begin{cases} \int_0^{c_E^{ar}} \left\{\pi^m(c_I) + \beta\left[-\pi^m(c_I) + (c_I - c_E)q(c_I) - f\right]\right\} dc_E + & \\ + \int_{c_E^{ar}}^{c_E^d} \left\{\pi^m(c_I) + \beta\left[\pi^m(c_E) - f_m - \pi^m(c_E)\right]\right\} dc_E & \text{if } f_m \leq \overline{f}_m \\ \int_0^{c_E^{ar}} \left\{\pi^m(c_I) + \beta\left[-\pi^m(c_I) + (c_I - c_E)q(c_I) - f\right]\right\} dc_E + & \\ + \int_{c_E^{ar}}^{c_E^{ms}} \left\{\pi^m(c_I) + \beta\left[\pi^m(c_E) - f_m - \pi^m(c_E)\right]\right\} dc_E + & \text{if } f_m > \overline{f}_m \\ + \left(c_E^d - c_E^{ms}\right)\pi^m(c_I) & \end{cases} \tag{26}$$

Note that when de-novo entry is profitable and the merger occurs anyway (i.e. when $c_E < c_E^{ar}$), the value of the merger will be different if the exclusive deal is signed. In particular, if the contract is signed, the merger creates a more efficient monopoly whereas if the contract is rejected, the merger creates a monopoly instead of an efficient duopolist. The increase of industry surplus can be either smaller or larger in the latter case depending on the cost difference between the incumbent and the entry and the cost of entry. However, for $c_E < c_E^{ar}$ the dupolistic market is more profitable than the inefficient monopoly and the merger creates a larger surplus when the exclusive deal is signed. Hence, the sign of the squared bracket in the first integral of (26) is positive and the incumbent's benefit from having the contract signed increases as β increases.

The incumbent's benefit from having the contract signed is increasing in β also when exclusive deals make the merger occur instead of de-novo entry (i.e. when $c_E \in \left[c_E^{ar}, \min\left\{c_E^d, c_E^{ms}\right\}\right)$), since the incumbent's payoff is nil if the contract is rejected.

As a result, $\frac{\partial x_I(\beta)}{\partial \beta} > 0$. Since x_B does not depend on β, it must be that $x_I > x_B$ for any $\beta \in [0,1]$. ■

Proposition 4 *Forbidding exclusive deals increases total expected welfare.*
Proof. Forbidding exclusive deals causes the following expected welfare change:

$$E\left[W^f\right] - E\left[W^s\right] = \begin{cases} \begin{array}{c} \int_{c_E^{ar}}^{c_E^d} \left[CS(c_I) + (c_I - c_E)q(c_I) - f\right] dc_E + \\ - \int_{c_E^{ar}}^{c_E^d} \left[CS(p^m(c_E)) + \pi^m(c_E) - f_m\right] dc_E > 0 \end{array} & \text{if } f_m \leq \overline{f}_m \\ \begin{array}{c} \int_{c_E^{ar}}^{c_E^{ms}} \left[CS(c_I) + (c_I - c_E)q(c_I) - f\right] dc_E + \\ - \int_{c_E^{ar}}^{c_E^{ms}} \left[CS(p^m(c_E)) + \pi^m(c_E) - f_m\right] dc_E + \\ + \int_{c_E^{ms}}^{c_E^d} \left[CS(c_I) - CS(p^m(c_I)) - \pi^m(c_I)\right] dc_E + \\ \int_{c_E^{ms}}^{c_E^d} \left[(c_I - c_E)q(c_I) - f\right] dc_E > 0 \end{array} & \text{if } f_m > \overline{f}_m \end{cases}$$

$E\left[W^f\right] - E\left[W^s\right] > 0$ by $c_E > c_E^{ar}$ and by the monopoly deadweight loss. ■

APPENDIX C

Proposition 3 *When $\beta = 0$, in equilibrium the incumbent offers the contract ($p^* = c_I$, $x^* = X - CS(c_I)$) and the buyer accepts exclusivity.*
Proof. If the buyer rejects exclusivity, the incumbent expected payoff is given by:

$$E\left[\pi_I^r\right] = \begin{cases} \begin{array}{l} \int_0^{c_E^{ar}} \beta\left[\pi^m(c_E) - (c_I - c_E)\, q(c_I) + f - f_m\right] dc_E + \\ \int_{c_E^d}^{c_E^{ms}} \left\{\pi^m(c_I) + \beta\left[\pi^m(c_E) - f_m - \pi^m(c_I)\right]\right\} dc_E + (1 - c_E^{ms})\, \pi^m(c_I) \end{array} & \text{if } f_m \leq \overline{f}_m \\ \int_0^{c_E^{ar}} \beta\left[\pi^m(c_E) - (c_I - c_E)\, q(c_I) + f - f_m\right] dc_E + \left(1 - c_E^d\right) \pi^m(c_I) & \text{if } f_m > \overline{f}_m \end{cases}$$

When $\beta = 0$, this payoff boils down to $E\left[\pi_I^r\right] = \left(1 - c_E^d\right) \pi^m(c_I)$. Since the incumbent is left with its threat point payoff when the merger occurs, it earns the monopoly profits $\pi^m(c_I)$ - irrespective of the actual entry decision - if de-novo entry is not profitable (i.e. when $c_E \geq c_E^d$), and it always earns zero if de-novo entry is profitable.

By offering the optimal contract that elicits the buyer's acceptance, the incumbent earns $\pi_I^{*s} = CS(c_I) - X > 0$ where X is given by (15). For the incumbent it is profitable to induce the buyer to sign this contract, if (and only if) $CS(c_I) - X > E\left[\pi_I^r\right] = \left(1 - c_E^d\right) \pi^m(c_I)$.

Let us consider the case where merging and setting up a new plant involves the same fixed costs ($f_m = f$). If so, condition (10) is never satisfied and, by Lemma 1, $c_E^{ms}(f) > c_E^d(f)$. In other words, if the buyer rejected the exclusive deal, the merger never takes place, so that de-novo entry occurs whenever it is profitable while no entry occurs otherwise. Therefore, the buyer's expected payoff when rejecting exclusivity amounts to $X = c_E^d CS\left(c_I\right) + \left(1 - c_E^d\right) CS(p^m(c_I))$. By the monopoly deadweight loss,

$$\pi_I^{*s} = CS(c_I) - X = \left(1 - c_E^d\right)\left[CS(c_I) - CS(p^m(c_I))\right] > \left(1 - c_E^d\right)\pi^m(c_I) = E\left[\pi_I^r\right].$$

We now show that X is (strictly) increasing in f_m. Recall that c_E^{ar} and c_E^{ms} are decreasing in f_m. Differently stated, as merging involves larger fixed costs, it is less likely that the AA approves a merger that replaces de-novo entry. Hence, the interval over which the buyer expects to pay the lowest price c_I expands. When $f_m > \overline{f}_m$, this is the unique effect at work, and the buyer's expected payoff from rejecting exclusivity increases. When $f_m \leq \overline{f}_m$, as f_m increases it is also less likely that the AA approves a merger that replaces the former (less efficient) monopolist, and the interval over which the buyer expects to pay the highest price $p^m(c_I)$ expands, so that the overall effect is *a priori* ambiguous. Indeed,

$$\frac{\partial X}{\partial f_m} = \underset{(-)}{\left[CS(p^m(c_E^{ar}) - CS(c_I)\right]}\underset{(-)}{\frac{\partial c_E^{ar}}{\partial f_m}} + \underset{(+)}{\left[CS(p^m(c_E^{ms}) - CS(p^m(c_I))\right]}\underset{(-)}{\frac{\partial c_E^{ms}}{\partial f_m}}$$

Given linear demand $q = 1 - p$, $\frac{\partial X}{\partial f_m}$ is written as follows:

$$\frac{\partial X}{\partial f_m} = \frac{2\left[1 + 6(f - f_m)\right]}{9\sqrt{1 - 24(f - f_m)}} - \frac{2}{9} - \frac{f_m}{2\sqrt{f_m + \frac{1}{16}}}$$

Note that $\frac{\partial^2 X}{\partial^2 f_m} < 0$ and $\left.\frac{\partial X}{\partial f_m}\right|_{f_m = \overline{f}_m} = \frac{2(1+3f-6f^2)}{9\sqrt{1-12f+24f^2}} - \frac{2}{9} - \frac{f+2f^2}{1+4f} \geq 0$ for any $f \leq \frac{1}{32}$. Hence, $\left.\frac{\partial X}{\partial f_m}\right|_{f_m} > 0$ for any $f_m < \overline{f}_m$. In other words, the former effect dominates so that the buyer's expected payoff from rejecting exclusivity increases also when $f_m \leq \overline{f}_m$.

From $\frac{\partial X}{\partial f_m} > 0$ it follows that $\frac{\partial \pi_I^{*s}}{\partial f_m} < 0$. Hence, $\pi_I^{*s} > E\left[\pi_I^r\right]$ when $f_m = f$ implies that $\pi_I^{*s} > E\left[\pi_I^r\right]$ for any $f_m < f$. Put differently, as f_m decreases the buyer's expected payoff from rejected exclusivity decreases. Hence, the buyer is willing to pay more in order to sign a contract committing to the price c_I and offering such a contract becomes more profitable for the incumbent. ■

Note that when merging and setting up a new plant involves the same fixed costs ($f_m = f$), the entry pattern displayed if the buyer rejects the exclusive deal is the same as the one displayed when mergers are not a feasible entry mode. Hence, also the buyer's expected payoff from rejecting exclusivity is the same. Recall that the optimal contractual price is $p^* = c_I$ both when mergers are possible and when they are not. Hence, if $f_m = f$, the incumbent's payoff from eliciting the buyer's acceptance is the same as in the case where mergers are not an option. Since $\frac{\partial \pi_I^{*s}}{\partial f_m} < 0$, if $f_m < f$ the incumbent's payoff is larger if mergers are possible.

Finally, when mergers are not an option, forbidding exclusive deals exerts the following impact on total expected welfare:

$$E\left[W^f\right] - E\left[W^a\right] = \int_0^{c_E^d} \left[\left(c_I - c_E\right)q(c_I) - f\right]dc_E + \left(1 - c_E^d\right)\left[CS(p^m\left(c_I\right) - \pi^m(c_I) - CS(c_I)\right]$$

Considering demand $q = 1 - p$, $c_I = \frac{1}{2}$ and substituting for $c_E^d = \frac{1}{2} - 2f$, one obtains

$$E\left[W^f\right] - E\left[W^a\right] = f^2 - \frac{9}{16}f + \frac{3}{64} > 0$$

for any $f \leq \frac{1}{32}$ (which always holds under assumption*A2*).

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