Exclusivity as (in)efficient insurance

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Abstract

It is well established in the economic literature that an incumbent firm can use exclusivity contracts so as to monopolize an industry or deter entry. Such an anticompetitive practice could be tolerated if it were associated with some efficiency gains. The issue tackled in this paper is the one of a possible efficiency justification of exclusive dealing on grounds of risk-sharing. We revisit the seminal model of Aghion and Bolton (1987) under risk-aversion and show that exclusivity contracts induce efficient risk-sharing and can thus be preferable to the outcome arising from a contract-free environment in spite of their deterrent effect on entry. The insurance arrangement can be maintained and the entry distortion eliminated by the use of a simple financial instrument. However, we show that the availability of such financial instruments may help the incumbent achieve exclusion in special circumstances.

JEL codes:

Keywords: exclusive dealing, contracts, monopolization, risk-aversion, damages

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1 Introduction

It is well established in the economic literature that an incumbent firm can in certain circumstances use exclusivity contracts so as to monopolize an industry or deter entry. Such an anticompetitive practice could be tolerated if it were associated with some sizeable efficiency gains. The issue tackled in this paper is the one of a possible efficiency justification of exclusive dealing on grounds of risk-sharing. Indeed, consumers in the industry may value the certainty of a constant, known if high price over the sizeable yet uncertain price slash brought about by potential entry.

For example, a big energy-intensive manufacturer may have to decide today about the technology to adopt for its new plant, scheduled to operate over the next twenty years. The uncertain development of alternative energy production means as well as the unsettled nature of the discussions surrounding future energy policy make that choice risky. Because he commits to a long-term investment, the manufacturer may value long-term arrangements with current energy suppliers over the vagaries of energy prices. In other terms, he may be risk-averse with respect to the input prices.

Can the insurance provided by a long-term exclusivity contract be invoked in order to justify its use in the face of its negative impact on competition? To address this question, we revisit the seminal model of Aghion and Bolton (1987) under risk-aversion. We show that exclusivity contracts induce efficient risk-sharing and can thus be preferable to the outcome arising in a contract-free environment in spite of their deterrent effect on entry. However, the insurance arrangement can be maintained and the entry distortion easily eliminated by using a simple financial instrument (forward contract). Thus, there seem to be little room for an insurance efficiency defense of exclusivity contracts and little reason to worry about standard financial arrangements. We note, though, that when such financial instruments are freely available, an incumbent firm could use them in special circumstances so as to commit itself to be overly aggressive after entry, to the point of deterring again a more efficient rival. Therefore, complete laissez-faire with regards to the use of financial contracts by incumbent firms is not warranted.

The problem we tackle is by no means hypothetical. For instance, in the past years, a series of cases involving energy companies were dealt with by European competition

authorities. In the 2007 *Distrigas* decision, the European Commission forced the main Belgian gas distributor to reduce the gas volumes tied in long-term contracts and to decrease the duration of those comtracts so as to make room for entrants. Similar requirements were implemented in decisions *Synergen*, *Gas Natural/Endesa*, *Repsol* or *E.ON Ruhrgas*. Each time, the concern was that an incumbent firm or merged entity was using long-term exclusivity contracts in order to shield a big portion of market sales from competitive pressure. In French case *KalibraXE*, which gave rise to a provisional decision in 2007, a small entrant complained that the former electricity monopolist was using exclusivity provisions to prevent it from accessing industrial consumers. The French competition authority stressed that any assessment of those clauses could not take place without serious consideration being given to the conditions under which those clauses could be terminated or breached and the economic gains that accrued to customers under the contract, especially those derived from the certainty associated to a fixed price.

There is an active literature studying the possibility of vertical foreclosure or entry deterrence through the use of vertical arrangements.[1] When it comes to the deterrence of a potential rival's entry by an incumbent through the use of exclusivity contracts, two main lines of reasoning stand out of the literature. In Aghion and Bolton (1987), an incumbent firm offers an exclusivity contract to a single buyer before a potential rival decides about entry. By specifying damages for breaching the contract, the incumbent can ensure that upon entry, the buyer pays a lower price. This lower market price translates into an additional surplus to the buyer, which the incumbent can extract upfront through the transaction price specified in the contract. Because there is uncertainty surrounding the cost of the potential entrant, the incumbent is led to trade-off the likelihood of entry with surplus extraction and inefficiently deters entry.

The other theory of harm is associated with the “naked exclusion” story put forth by Rasmusen, Ramseyer and Wiley (1991) and Segal and Whinston (2000a). The model explains how an incumbent firm can use contracting externalities among several

[1] Excellent discussions are found in Bernheim and Whinston (1999) and Rey and Tirole (2007).

customers so as to prevent a potential entrant from reaching the minimum viable scale. A review of the most recent developments can be found in Argenton (2008).

There is also a large literature describing the gains in efficiency associated with exclusivity contracts, which could arise from promoting relation-specific investments by solving the hold-up problem (e.g. de Meza and Selvaggi, 2007), reducing intra-brand or inter-brand competition (e.g. Besanko and Perry, 1993), sharing risk (e.g. Rey and Tirole, 1986), upholding quality standards (e.g. Marvel and McCafferty, 1984), or fostering efficient product selection (Yehezkel, 2008). Motta (2004) offers a good review of this line of research.

By contrast, there are very few contributions studying the trade-off between the efficiency gains and the exclusionary effects, as we try in this paper. An early example is Spiegel (1994), who shows that in a modified version of the Aghion and Bolton model, liquidated damages remain excessive and continue to serve as a barrier to entry even in the presence of relation-specific investment, but may nonetheless have an overall positive on welfare. Similarly, in a model that builds upon Segal and Whinston (2000b), Fumagalli, Motta and Rønde (2007) explore a model where exclusive dealing can both promote investment and foreclose a more efficient supplier.

Several papers have studied the contracting decisions of firms with market power and their impact on product market competition. The main message in this literature is that firms may use financial contracts as a commitment device to influence the equilibrium in the spot market and increase their overall profit. The precise strategy depends on the type of competition. If some oligopolists compete à la Cournot, then they will sell forward contracts (or integrate vertically) to compete more aggressively in the market (Allaz and Vila, 1993), which increases their market share at the expense of the other participants. Willems (2005) shows that those results also hold for other option contracts. On the other hand, if oligopolists compete à la Bertrand, then they have an incentive to buy forward contracts, and commit to being less aggressive (Mahenc and Salanié, 2004). Willems and De Corte (2008) argue that governments should therefore regulate the risk exposure of (electricity) firms so as to give firms an incentive to reduce their exposure to the spot market and to mitigate market power in the spot market.

This literature has been criticized for overemphasizing the positive effects of contracts, by not taking into account the impact of contracting on entry incentives. Indeed, contracts might have a beneficial effect on spot market competition but may well reduce long-run dynamic efficiency, by destroying the incentives to enter the market. Our paper precisely addresses that shortcoming. We show that even after accounting for the impact on entry, the use of forward contracts decreases welfare only in special circumstances.

Furthermore, our analysis illustrates that the incentives to sign contracts are drastically affected when we take entry into account. Indeed, in contrast with Mahenc and Salanié (2004), in our model a price-setting incumbent may have an interest in *selling* forward contracts so as to commit to being *more* aggressive on the spot market, in order to deter entry.

The structure of this paper is as follows. In Section 2, we describe the model. Section 3 contains the analysis. In Section 4, we discuss the welfare and policy implications of the results. We conclude in Section 5. An appendix covers the case where the incumbent firm is allowed to take a speculative financial position.

2 Model

This paper models the effect of long-term contracts signed between an incumbent producer and consumers when consumers are risk averse. We study the trade off between the beneficial effect of a long-term relationship (risk sharing) and the associated harmful effect (exclusion of potentially more efficient producers).

In order to do so, we extend the classical model of Aghion and Bolton (1987) by introducing risk-aversion on the part of consumers and by studying different contracting environments. In the first scenario we assume that no contract can be signed. In the second scenario the incumbent can sign an exclusive contract with consumers as in the original model. In the third scenario the incumbent and consumers can sign a standard financial (forward) contract whereby the buyer promises to pay the incumbent the difference between the forward price and the spot price.

Next to adding risk-averse consumers and enriching the contract environment, two additional, technical modifications of the original model are introduced.

First, we assume that there is a very small "fringe buyer" that does not sign a long-term contract with the incumbent. This fringe buyer is introduced in the model to obtain a unique, meaningful spot price in the case when the incumbent firm and the main buyer sign a financial contract and are therefore perfectly hedged against any variation in the spot market price.

Second, we assume that it is not profitable for the entrant to enter the market if it can only supply to fringe consumers. This is modeled by assuming that the entrant incurs a very small entry cost.

This being said, the set-up of the game follows the model of Aghion and Bolton as closely as possible. In the game there are four players: the main buyer, the fringe buyer, the incumbent and the entrant.

The *main buyer* buys at most one unit of the good. His reservation price for the good, i.e. the maximal price that he is willing to pay, is equal to 1. The main buyer is risk averse and his preferences are represented by a von Neumann-Morgenstern utility function. The expected utility of the main buyer when consuming 1 unit of the good is equal to

$$E[U(1-p)] \tag{1}$$

where expectations are taken over the different states of the world, and p is the price faced by the buyer in a specific state. The utility function of the main buyers is upward-sloping and concave ($U'>0$ and $U''<0$), and is such that $U(0)=0$. Next to the main buyer there is a small, risk-neutral *fringe buyer* who wants to buy ε units of the good. His expected utility of consuming ε units of the good is equal to

$$E\left[\varepsilon(1-p)\right] \tag{2}$$

The *incumbent* producer is risk-neutral and has a production cost $c_I<1$. He seeks to maximize expected profit.

The *entrant* producer is also risk-neutral and has a production cost c_E which is drawn from a uniform distribution over $[0,1]$. The cumulative distribution function of her production costs is thus $F(c_E)=c_E$. Uncertainty about c_E is the only source of

uncertainty in our model.[2] The entrant incurs a small entry cost which is equal to $(1+\varepsilon)\varepsilon$. This entry cost guarantees that the entrant will not enter the market if she can only sell to the fringe buyer, as the profit she can then make $\varepsilon(p-c_E)$ will always be smaller than the entry cost $\varepsilon(1+\varepsilon)$ because $p \leq 1$ and $c_E \geq 0$. The entrant strives to maximize profit.

The game consists of four stages. In first stage the incumbent offers a contract to the main buyer. Depending on the scenario it can offer one of two types of contracts. The first type of contract is an *exclusivity contract* as in Aghion and Bolton where the buyer agrees ex-ante to pay a price P to the incumbent for consuming the good or pay a penalty P_0 if he breaches the contract. The second type of contract is a *forward contract,* according to which the main buyer promises to pay the incumbent the difference between the forward price f and the spot price p.

In the second stage of the game, the main buyer decides whether he accepts the contract offered by the incumbent or not.

In the third stage the entrant and all other players in the game learn about c_E. The entrant decides whether she enters the market and incurs the entry cost.

In the fourth stage, Bertrand competition in the spot market takes place. Both the incumbent and the entrant bid into the spot market. Firms are committed to serve all demand addressed to them at their posted price. In case marginal costs are equal, we assume that consumers select the entrant. The payoffs of the fringe buyer and the entrant depend directly on the spot market price and sales. The profit of the main buyer and the incumbent producer depends not only on the spot market sales but also on the contract that may have previously signed.

[2] We assume that players play pure strategy equilibria. Hence, there are no additional 'strategic' sources of risk in the model.

2.1 Efficiency

We now characterize efficient market outcomes. Three market performance dimensions matter: allocative efficiency, productive efficiency and risk sharing. As regards the first dimension, it is clear that, as the production costs are always lower than consumers' willingness to pay, total production should be equal to $1+\varepsilon$ units. Second, production efficiency requires that the entrant enters the market only when she has a production cost advantage *vis-à-vis* the incumbent which outweighs her entry cost. Hence entry should occur as long as the average production cost of the production cost of the entrant ($\frac{c_E(1+\varepsilon)+\varepsilon(1+\varepsilon)}{1+\varepsilon} = c_E + \varepsilon$) is smaller than the average production cost of the incumbent c_I.

Third, because the main buyer is risk-averse and the incumbent is risk-neutral, the incumbent should sell insurance to the main buyer. In the optimum, the marginal utility of the main buyer should be equal across of the world. This implies that the main buyer pays the same price in all situations.

3 Analysis

We will first consider the benchmark case when contracting is impossible and the game starts with the entry decision by the entrant. We will then analyze the outcome of the game when the incumbent is allowed to offer an exclusivity contract to the main buyer or, alternately, a standard financial contract (forward).

3.1 No contract

3.1.1 Bertrand Competition

Following the entrant's decision to enter the market, Bertrand competition determines the (spot) market price. Thus, the equilibrium market price is given by $p = \max\{c_I, c_E\}$. In case the entrant decides not to enter, then the spot market price is determined by the reservation price of the buyers, which is equal to 1 for the main and the fringe buyer:

3.1.2 Entry Decision

At time 3, the entrant will enter as long as she expects to obtain a positive profit. The condition boils down to

$$(c_I - c_E)(1+\varepsilon) - (1+\varepsilon)\varepsilon \geq 0. \tag{3}$$

The first term stands for the profit she makes by selling at price c_I to $1+\varepsilon$ users, while the second term is the entry cost. When $c_E > c_I - \varepsilon$, the entrant chooses not to enter, for it would not make enough sales to cover the entry cost. The probability of entry ϕ is thus given by

$$\phi^{NC} = \text{Prob}(c_E < c_I - \varepsilon) = c_I - \varepsilon. \tag{4}$$

The expected profit of the entrant, Π_E, is equal to the expected post-entry profit.

$$\begin{aligned} \Pi_E^{NC} &= \int_0^{c_I-\varepsilon} (1+\varepsilon)(c_I - c_E - \varepsilon) dF(c_E) \\ &= \frac{(c_I-\varepsilon)^2}{2}(1+\varepsilon) \end{aligned} \tag{5}$$

The incumbent makes a profit only when entry does not take place, in which case he extracts all the surplus from consumers. His expected profit Π_I is

$$\begin{aligned} \Pi_I^{NC} &= (1-\phi^{NC})(1-c_I)(1+\varepsilon) \\ &= (1-c_I+\varepsilon)(1-c_I)(1+\varepsilon) \end{aligned} \tag{6}$$

Conversely, the main buyer derives a surplus only when entry occurs, so that his expected utility V is

$$\begin{aligned} V^{NC} &= \phi^{NC} \cdot U(1-c_I) \\ &= \big(c_I - \varepsilon\big) U(1-c_I) \end{aligned} \tag{7}$$

Similarly, the fringe consumer makes in expectations

$$\phi^{NC}(1-c_I)\varepsilon = (c_I - \varepsilon)(1-c_I)\varepsilon \tag{8}$$

3.2 Exclusivity contract

Section 3.2 studies the case where the incumbent is allowed to offer an exclusivity contract to the main buyer in stage 1. Again we solve the equilibrium with backward induction.

3.2.1 Bertrand Competition

Upon entry, Bertrand competition in the spot market takes place in stage 4 of the game: the entrant and the incumbent post a price p_I and p_E. The fringe buyer buys its good from the producer with the lowest price at the spot market price $p = \min\{p_E, p_I\}$. The main buyer will procure the good from the incumbent and pay the contractual price P, or breach the contract, pay a penalty P_0 and buy the good on the spot market at spot market price p. The main buyer will breach the contract only if the gains from breaching outweigh the penalty, that is, only if $P - p \leq P_0$.

The market equilibrium thus depends upon the exclusivity contract (P, P_0) signed between the main buyer and the incumbent and the production cost of the entrant c_E. We can consider three cases.

If $P - P_0 < c_E$, then the entrant can never make a spot market profit which outweighs the entry costs. Given the parameters of the game, entry can only be profitably if she sells to the main buyer. However, in this instance she can only attract the main buyer by selling below cost.

If $P - P_0 > c_I, c_E$, market interaction reduces to standard Bertrand competition. Both firms will post prices $p_I = p_E = \max\{c_I, c_E\}$ and both buyers will buy from the firm with the lowest marginal cost.

If $c_E < P - P_0 < c_I$, then the entrant will instead post a price p_E equal to $P - P_0$ and snatch both buyers. Indeed, by posting a higher price, she would make a higher margin on the fringe buyer but would not be able to convince the main buyer to breach and buy from her, which is unprofitable.

3.2.2 Entry Decision

All in all, entry takes place when $c_E < \min\{c_I, P - P_0\} - \varepsilon$. Given that c_E is uniformly distributed, the probability of entry is given by

$$\phi^{EC} = \min\{c_I, P - P_0\} - \varepsilon) \quad (9)$$

Entry is less likely the smaller $P - P_0$. The entrant needs to set a lower price in order to win the main buyer, making entry less profitable.

The equilibrium price is then equal to $p = \min\{c_I, P - P_0\}$ and all consumers buy from the entrant upon entry.

3.2.3 Incumbent's choice

At time 1, the incumbent chooses P and P_0 so as to maximize expected profits, taking into account the participation constraint of the main buyer, and the entry decision of the entrant. His program is the following:

$$\begin{aligned} &\max_{P,P_0} \phi^{EC} P_0 + (1-\phi^{EC})(P - c_I) + (1-\phi^{EC})(1-c_I)\varepsilon \\ &s.t. \\ &(i) \quad U(1-P) \geq (c_I - \varepsilon)U(1-c_I) \\ &(ii) \quad \phi^{EC} = \min\{c_I, P - P_0\} - \varepsilon \end{aligned} \tag{10}$$

Indeed, the incumbent recognizes that the entrant will not enter unless she can snatch the main buyer. Upon entry, the incumbent therefore expects the latter to breach and pay penalty P_0. Conversely, if the entrant stays out, the contract will be honored: the main buyer will get the good at contractual price *P*, while all surplus will be extracted from the fringe buyer. Two relations constrain the behavior of the incumbent, however. First, he has to leave the main buyer with at least as much utility as in the no-contract case in order to induce acceptance at time 2. Second, the contract terms affect the likelihood of entry, through their effect on the post-entry price.

Assume for the time being that $P - P_0 < c_I$. (This will be true in equilibrium, for the contract has no impact on the market outcome otherwise.) Ignoring the profit made on the fringe buyer, observe that the objective function of the incumbent can be rewritten as follows:

$$(P - c_I) + \left(P - P_0 - \varepsilon\right)\left[c_I - \left(P - P_0\right)\right].$$

That is, under the terms of the contract, the incumbent is entitled to profit $P - c_I$. However, with probability $P - P_0 - \varepsilon$ the contract is breached, in which case the

incumbent saves c_I in production costs but loses the difference between the contractual sale price and the liquidated damages, $P - P_0$. Write *a* for this latter number. Ignoring the profit made on the fringe buyer[3], the programme of the incumbent can now be understood as comprising two separate tasks: (i) directly extracting rent from the main buyer by setting *P*; (ii) indirectly extracting rent from the entrant by setting *a*. It is as if the incumbent always sold the good to the main buyer at a price that is subject to monopoly power and only constrained by the buyer's option to refuse the contract, but could buy it from a supplier (the entrant) on which he exerts monopsony power. As in any monoposony calculation, the price at which the input is bought, *a*, is thus determined by the trade-off between the quantity purchased and the price paid.

Of course, the presence of the fringe buyer somehow complicates the computation of the optimal pricing scheme. Solving the programme gives:

$$\begin{aligned} U(1-P) &= (c_I - \varepsilon)U(1-c_I) \\ P - P_0 &= \frac{c_I}{2}(1+\varepsilon) \end{aligned} \tag{11}$$

That is, the main buyer is held at reservation utility level, while *a* is chosen so as to allow for entry only when the entrant's cost is about half the incumbent's.

Thus, in this game, the main buyer expects his utility to be

$$V^{EC} = V^{NC} = (c_I - \varepsilon)U(1-c_I)\,. \tag{12}$$

The entrant expects

$$\begin{aligned} \Pi_E^{EC} &= \int_0^{P-P_0-\varepsilon} (P - P_0 - c_E - \varepsilon)(1+\varepsilon)dF(c_E) \\ &= (1+\varepsilon)\int_0^{P-P_0-\varepsilon} c_E dc_E \\ &= \frac{1}{2}(1+\varepsilon)(\tfrac{c_I}{2}(1+\varepsilon) - \varepsilon)^2 \end{aligned} \tag{13}$$

The incumbent plans on pocketing

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[3] The incumbent's profit on sales to the fringe buyer is $\varepsilon(1-c_I)(1-\phi^{EC})$. This is decreasing in the probability of entry.

$$\begin{aligned}\Pi_I^{EC} &= P + a^2 + (1+\varepsilon)(\varepsilon - 2a) \\ &= \left[P + (1+\varepsilon)\left(c_I(\frac{c_I}{4} - 1)(1+\varepsilon) + \varepsilon \right) \right]\end{aligned} \tag{14}$$

The fringe buyer's expected surplus is given by

$$\begin{aligned}W^{EC} &= \phi^{EC}(1 - (P - P_0))\varepsilon \\ &= \varepsilon((P - P_0)(1+\varepsilon) - \varepsilon - (P - P_0)^2) \\ &= \varepsilon\left((1+\varepsilon)^2 \tfrac{c_I}{2}(1 - \tfrac{c_I}{2}) - \varepsilon \right)\end{aligned} \tag{15}$$

3.3 Financial contract

3.3.1 Bertrand competition

Suppose now that the incumbent offers the main buyer a non-breachable financial contract which specifies that the main buyer has to transfer the amount $f - p$ to the incumbent when the spot market closes at price *p*. A negative amount stands for a transfer from the incumbent to the main buyer. In effect, this is a forward (sale) contract with forward price f.

Assume that such a contract has been accepted by the main buyer at time 2 and that the entrant has decided to enter the market. In the pricing subgame, both the incumbent and the main buyer are perfectly hedged against the variations in the spot market price: they have already agreed to transact at price f. Competition takes place only for selling to the fringe buyer. Both producers compete a la Bertrand and in equilibrium will post the same price $p_I = p_E = \max\{c_I, c_E\}$, which determines the spot market price p. Buyers will buy from the firm with the lowest marginal cost.

3.3.2 Entry decision

The entrant will enter only if her own marginal cost is small enough to allow her to make positive sales and cover the entry cost, so that

$$\phi^{FC} = c_I - \varepsilon .$$

In case the entrant stays out, then the incumbent will post a price p_I equal to 1. He will extract all surplus from the fringe buyer. By contrast, the financial contract caps the gains to be made on the main buyer to f.

3.3.3 Incumbent's choice

At time 1, the incumbent will thus offer the main buyer a contract solving

$$\begin{aligned} &\max_f \phi^{FC}(f - c_I) + (1 - \phi^{FC})[(f - c_I) + \varepsilon(1 - c_I)] \\ &s.t. \\ &(i) \quad \phi^{FC} = c_I - \varepsilon \\ &(ii) \quad U(1 - f) \geq (c_I - \varepsilon)U(1 - c_I) \end{aligned} \tag{16}$$

Observe that there is nothing that the incumbent can do to affect entry. The programme thus boils down to extracting as much surplus as possible from the main buyer through the forward price by holding him to his reservation utility level. In equilibrium, we have

$$\begin{aligned} &\Pi_I^{FC} = \phi^{FC}(f - c_I) + (1 - \phi^{FC})[(f - c_I) + \varepsilon(1 - c_I)] \\ &= (f - c_I) + \varepsilon(1 - c_I + \varepsilon)(1 - c_I) \end{aligned} \tag{17}$$

The entrant expects to make

$$\Pi_E^{FC} = (1 + \varepsilon)\int_0^{c_I - \varepsilon} (c_I - c_E - \varepsilon) dF(c_E) = \tfrac{1}{2}(c_I - \varepsilon)^2(1 + \varepsilon) \tag{18}$$

The main consumer is held down to his reservation utility level

$$V^{FC} = V^{NC} = (c_I - \varepsilon)U(1 - c_I) \tag{19}$$

while the fringe consumer makes a surplus only when entry occurs

$$W^{FC} = \phi^{FC}(1 - c_I) = (c_I - \varepsilon)(1 - c_I). \tag{20}$$

4 Discussion and extension

4.1 Normative implications

We now discuss the effects of variations in the contracting environment (no contract, exclusivity contract, and financial contract) on the utility of the three main players in the game, the main buyer, the incumbent and the entrant.

We discuss first the effect for the *main buyer*. As the incumbent has all the bargaining power vis-à-vis the main buyer, he will keep him at his reservation utility level. Hence the main buyer's utility is identical in all three cases.

The *incumbent* prefers the situation where he offers an exclusivity contract to the main buyer to the case where he can only sign a financial contract. Indeed, the forward contract f is equivalent to an exclusivity contract (P, P_0) where the contract price is equal to the forward price ($P = f$) and the penalty for breach is equal to ($P_0 = P - c_I$). Hence the incumbent can always do at least as well with the forward contract as with the exclusivity contract. As a matter of fact, under the optimal exclusivity contract, the incumbent will set $P = f$, as the participation constraint of the main buyer is identical and binding under both contracts, and $P_0 > P - c_I$, as this allows him to extract rents from the entrant upon entry, as shown in Aghion and Bolton.[4] The case without contract gives the incumbent the lowest profit. Hence, if the incumbent were free to set the terms of the contract offered to the incumbent, our model would predict the use of contracts with exclusivity clauses even when a standard financial instrument is available to arrange for risk-sharing.

The *entrant* is indifferent between the situation with the financial contract and the situation without any contracts. He obtains, however, a lower profit under the exclusivity contract as entry is restricted.

We now compare the different scenarii from the point of view of efficiency.

The scenario where the main buyer and the incumbent sign a *financial contract* Pareto-dominates the *no contracting* outcome, as the surpluses of the main buyer and the entrant remain constant, while the profit of the incumbent increases. Introducing a financial contract improves risk sharing between the entrant and the incumbent, without restricting entry.

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[4] In addition, by deterring entry, the incumbent will also extract more rents from the fringe buyer. This is a second reason for setting a higher penalty for breaching the contract.

If we replace the financial contract with an exclusivity contract, then the profit of the incumbent goes up, the entrant is worse off and the main buyer is kept at its reservation utility. The equilibrium is however suboptimal, as entry happens too little of the time. The incumbent acts as a monopsonist which drives down the post-entry price, extracting rents from the entrant. This leads to a deadweight-loss: the total joint profit of the incumbent and entrant decreases.

Comparing the scenario with an exclusivity contract with one without any contracts, we identify the following trade-off. The incumbent makes more profit with an exclusivity contract as he receives a premium on offering an insurance contract to the main buyer, and as he extracts rent from the entrant. At the same time, the entrant loses as she sells at a lower price. When consumers are very risk-averse, then total profit may be higher with the use of exclusivity contracts than without contracts. Indeed, if the main buyer is very risk-averse, then the value of eliminating that risk is very high and may more than compensate for the inefficient entry profile associated to exclusive dealing.

4.2 Policy implications

Prohibiting exclusivity contracts in the absence of financial instruments to spread risk could thus well be welfare-detrimental. On the other hand, the use of a simple forward contract dominates exclusive dealing, as an exclusivity clause is not necessary for reaping the gains from risk-sharing.

Thus, where does that leave the possibility of a risk-sharing efficiency defense to justify an exclusivity contract known to be exclusionary?

We have shown that an exclusivity contract does indeed reduce market risk for the main buyer, and that it may be preferred on efficiency grounds to the situation without contract if the buyer is sufficiently risk averse, for in that case the benefit of a reduction in the risk faced by the main buyer outweighs the cost of insufficient entry. However, this does not imply that antitrust authorities should allow firms to sign an exclusive contract, as the exclusivity clause is not necessary for reaping the gains from risk-sharing. A simple financial contract does the job. We therefore conclude that there is little room for an insurance defense of exclusionary exclusive dealing arrangements.

Our results also suggest that antitrust authorities should not be too concerned with financial contracts being signed between incumbent firms and the main buyer, as it will lead to efficient entry and optimal risk sharing. No other contract can directly improve on such a financial contract.

4.3 Reservations

As in Aghion and Bolton, we have made strong assumptions about the elasticity of demand. Demand is perfectly inelastic, hence market power does not directly lead to a reduction of total surplus in the market. (No deadweight loss.)

In the model with financial contracts, after entry the price in the spot market will be equal to the marginal cost of the incumbent. Fierce competition drives down the price, to the point where the incumbent is no longer making a profit. Given this assumption, entry will be efficient, as the entrant pays a price which is equal to the loss of profit of the incumbent. If competition would be less fierce, the price upon entry may be higher, and we could obtain too much entry in the market.

We have assumed that the "fringe buyer" is very small. If this were not the case, we would expect results to change. The presence of a large fringe buyer creates additional contracting externalities. In relative terms this makes exclusion cheaper for the monopolist as he will be able to extract rents not only from the entrant, but also from the fringe buyer. As a result, deadweight loss will further increase. The precise nature of those results further depends on how entry costs and market size are related. A detailed discussion of these effects is outside the scope of the paper.

In the case of the financial contract we assumed that main buyer and the incumbent sign a financial contract that fully hedged their positions, i.e. they signed a forward contract for exactly one unit of output. In the appendix we show that the incumbent may be able to exclude the entrant if he sells more financial contracts than the amount of contracts that fully hedges his position. In other words, the incumbent can achieve entry deterrence if he speculates. The intuition for this is the following: In the Aghion and Bolton model, the incumbent would like to sign a contract that forces the entrant to charge a low price upon entry. This increases the surplus of the main buyer but that surplus can be extracted by the incumbent through the transfer specified in the contract.

By selling more forward contracts than his expected production level, i.e. by taking a speculative short position, the incumbent can "commit" itself to compete aggressively in the spot market and drive the price down upon entry. By choosing the forward price, the surplus that is extracted from the entrant can then be shared between the incumbent and the main buyer.

This strategy of using financial contracts to "commit" to an aggressive action is more costly to the incumbent than using an exclusivity contract:

- The main buyer buys more forward contracts than he needs to hedge his demand. As a result of over-contracting, the incumbent therefore needs to refund the main buyer for the increased risk.
- When entry does not take place, the incumbent sells at a price below cost to the main and the fringe buyer. This is costly for him as he does not recoup the surplus of the fringe buyer.

Given that the strategy is costly, we expect it to be used only when exclusivity contracts are not available (e.g. because of regulatory constraints), the fringe buyer is small (i.e. the incumbent is able to sign up a large fraction of buyers in the industry), the main buyer is not very risk-averse, and financial positions are easily observed by the entrant. Clearly, these circumstances are special.

Moreover, this strategy can be identified by competition authorities as the incumbent and the main buyer need to take a financial position which covers more than the total demand of all the buyers in the entire market, the incumbent sells at a price below cost with or without entry, and the spot price increases upon entry. Those three conditions are unusual and their simultaneous presence can be used by competition law enforcers as a signal that the market is not functioning competitively.

This being said, as this entry deterrence strategy relies on the incumbent selling at a too low price, concerns for the protection of small consumers (the fringe buyer) might make the issue less pressing.

5 Conclusion

In this paper, we have revisited the seminal Aghion and Bolton model by introducing risk averse consumers and allowing for a richer contracting environment. We have shown that from the point of view of efficiency, exclusivity contracts, although detrimental to entry, could be preferred to the absence of any long-term relationship between the incumbent and the main buyer. Yet, a simple forward contract can take care of insuring consumers without distorting entry. So, there is no room for an insurance justification for using exclusivity contracts whenever direct financial arrangements are possible. On the contrary, we have shown that even when forward contracts are available, an incumbent would actually prefer to offer an exclusivity provision, as this contract form allows him to extract more surplus from the main buyer and the potential entrant. Thus, by allowing an insurance defense of exclusivity contracts, a jurisdiction would run the risk of making like too easy for an anti-competitive incumbent.

In our simple model, a standard forward contract achieves full efficiency. This suggests that this type of arrangement does not raise competition issues. Still, we have shown that in special circumstances the incumbent could use financial instruments to take a speculative position and deter the entry of a more efficient rival. Although arguably unlikely, this possibility shows that complete laissez-faire with respect to the long-term contracts of a dominant incumbent is not advisable. Once again, vigilance on the part of competition authorities is what is called for.

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6 References

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Appendix: Speculative contracts

In the Aghion and Bolton model, the incumbent would like to sign a contract that forces the entrant to charge a low price upon entry. This increases the surplus of the main buyer but that surplus can be extracted by the incumbent through the transfer specified in the contract.

In this appendix we will show that the incumbent could also use forward contracts to "commit" itself to compete aggressively in the spot market and drive the price down for the entrant. It can do so by selling more forward contracts than his expected production level i.e. by taking a speculative short position. By choosing the forward price, the surplus that is extracted from the entrant can then be shared between the incumbent and the main buyer.

The game is identical to the one used in section 4.3 with the exception that we assume that the incumbent now sells $x > 1+\varepsilon$ forward contracts to the main buyer at forward price f.

As before, a forward contract specifies that the main buyer pays the incumbent the difference between the spot market price p and the forward price f. The spot market price is taken to be the lowest price posted by active firms in stage 4. Although those definitions were previously innocuous, they now define a forward contract as a particular type of transfer.

Indeed, upon entry, the profit of the incumbent is the following:

$$\Pi_I = (p_I - c_I)q_I + (f - p)x \tag{21}$$

where q_I denotes the sales the incumbent makes. That is, the incumbent makes an *operational profit* on his activity as producer (first term) but he also reaps the *financial gains* associated to his financial position (second term).

The utility of the main buyer is

$$U(1 - p_{MB} + x(p - f)) \tag{22}$$

For $x>1$, if the price at which the main buyer transacts, p_{MB}, is susceptible to affect the market price, p, then the main buyer would have an interest in being charged as high as possible a price. If instead the main buyer were be unable to affect the market price, then it would be happy to transact at a low price.

Thus, the incentives in this model depend on what definition is adopted for the market price. As we take it to be the lowest price posted by active firms, and not the price at which the main buyer transacts, the strategic use of his purchasing behavior by the main buyer is ruled out.[5]

The profit of the entrant, in any case, is unaffected by those subtleties and given by

$$\Pi_E = (p_E - c_E)q_E \tag{23}$$

where q_E stands for her sales in the spot market.

Reaction functions

In any candidate equilibrium in which the market price is below 1, it is optimal for the main buyer to buy the good at price *p*, as it is unable to affect the spot market price, and therefore his financial losses by not buying the good. On the contrary, he makes a direct surplus by purchasing one unit of the good.

The entrant will undercut any price of the incumbent as long as the price is above her production costs.

The incumbent will undercut as long as the gains on the financial gains from decreasing the price outweigh the operational losses from selling below cost.

By not undercutting, the incumbent is guaranteed $(f - p_E)x$. Upon undercutting, he makes

$$(p_I - c_I)(1+\varepsilon) + (f - p_I)x \tag{24}$$

[5] If we think about the spot market as a centrally organized two-sided auction that clears demand and supply bids, then the spot market price would indeed be equal to the lowest posted price. The microstructure of the spot market is not modeled.

If the contract is such that $x > 1+\varepsilon$, then the incumbent has an incentive to undercut to the point where $p_I = 0$. In this case his profit is:

$$fx - c_I(1+\varepsilon) \tag{25}$$

Therefore, undercutting is profitable as long as $p_E > \frac{c_I(1+\varepsilon)}{x}$.

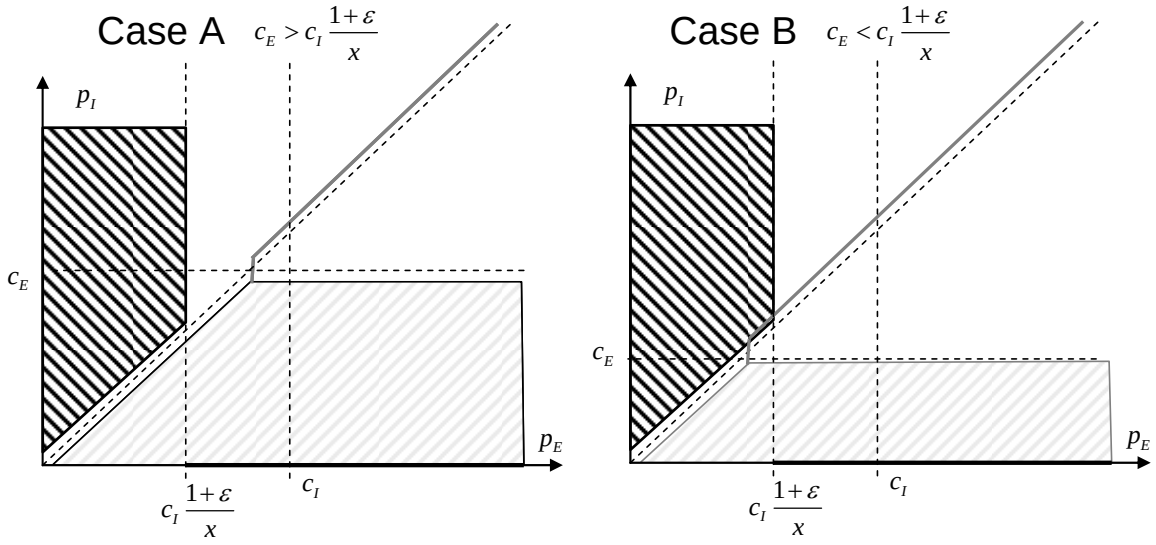

Figure 1: Best response correspondences of the Entrant and the Incumbent

Equilibrium

Several cases must be distinguished. The associated best-response correspondences are displayed in Figure 1.

Case A. If $c_E > c_I \frac{1+\varepsilon}{x}$ then the incumbent will bid $p_I = 0$ and the entrant will set a price $p_E \geq c_E > \frac{1+\varepsilon}{x} c_I$. The market price $p = 0$.

Case B. If $c_E < c_I \frac{1+\varepsilon}{x}$ there are two classes of equilibria:

In the first class the incumbents bids a price $p_I = 0$, and the entrant sets a price $p_E \geq \frac{1+\varepsilon}{x} c_I$.

In the other class of equilibria, the incumbent and the entrant set the same price $p_E = p_I = \frac{1+\varepsilon}{x} c_I > c_E$. As a matter of fact all bids such that $c_E < p_E = p_I \leq \frac{1+\varepsilon}{x} c_I$ are

equilibria. However, as in the standard Bertrand game, we take interest only in the one with the highest price, the other ones involving the play of weakly dominated strategies.

This multiplicity raises an equilibrium selection problem. In the class of equilibria with zero price, the profits of the incumbent and the entrant are as follows:

$$\Pi_I = fx - (1+\varepsilon)c_I, \qquad \Pi_E = 0 \tag{26}$$

In the other equilibrium the profits of the incumbent and the entrant are:

$$\Pi_I = fx - (1+\varepsilon)c_I \qquad \Pi_E = (1+\varepsilon)(\tfrac{1+\varepsilon}{x}c_I - c_E) \tag{27}$$

Thus, the second equilibrium bring strictly more profit to both firms. We therefore assume that it is the one played by the firms. The market price after entry occurs is equal to: $p = c_I \frac{1+\varepsilon}{x}$

If there is no entry in the market, then the incumbent has an incentive to price at zero as it has an interest to set the price as low as possible to reap financial gains ($p = 0$).

Entry decision

The entrant will only enter if it makes enough profit to cover her entry cost $c_E < c_I \frac{1+\varepsilon}{x} - \varepsilon$. The probability of entry under speculation is thus equal to $\phi^{SC} = c_I \frac{1+\varepsilon}{x} - \varepsilon$.

The expected utility of the main buyer is:

$$V^{SC} = (1-\phi^{SC})U(1-xf) + \phi^{SC}U(1-xf+(x-1)c_I\tfrac{1+\varepsilon}{x}) \tag{28}$$

Programme of the incumbent

The programme of the incumbent can be written as:

$$\begin{aligned} &\max_{P,\phi} P - c_I(1+\varepsilon) \\ &s.t. \\ &(1-\phi^{SC})U(1-P) + \phi^{SC}U(1-P-\phi^{SC}-\varepsilon+c_I(1+\varepsilon)) \geq (c_I-\varepsilon)U(1-c_I) \end{aligned} \tag{29}$$

with $\phi^{SC} = c_I \frac{1+\varepsilon}{x} - \varepsilon$ and $P = xf$. The optimal probability of entry is given by the following first order condition:

$$U(1-P-\phi-\varepsilon+c_I(1+\varepsilon)) - U(1-P) = \phi^{SC}U'(1-\phi-\varepsilon+c_I(1+\varepsilon)) \tag{30}$$

The left hand side of expression is the marginal benefit of entry being more likely, the right hand side is the marginal effect on utility of a price change when entry occurs.

Given the strict convexity of U, for all $y>0$ the following is approximation is valid $U(x+y)-U(x)>U'(y)y$. From this it follows that

$$\phi^{SC} > \frac{c_I(1+\varepsilon)-\varepsilon}{2} \tag{31}$$

This equality is strict given the strict concavity of the utility function.

Hence, entry is more likely with the speculative contract than with the exclusive contract for which we found above that $\phi^{EC}=\frac{c_I(1+\varepsilon)}{2}-\varepsilon$. The reason for this is that being aggressive and excluding the entrant comes at a cost: (i) the incumbent needs to pay the main buyer to take up some risky contracts, (ii) in the cases where entry does not occur, he will sell goods below cost to the fringe buyer. By making entry less likely those costs are reduced.

Given the additional cost of exclusion, the profit of the incumbent will be lower with speculative contracts than with the exclusive contract. Formally this can be proven by relaxing participation constraint *(iii)* of the main buyer using Jensen's inequality, and comparing the resulting relaxed programme with the incumbent's programme the exclusive contract.

Relaxing (iii) using Jensen's inequality, the incumbent solves the following program:

$$\begin{aligned} &\max_{P^*,\phi^{SC}} P^* - c_I(1+\varepsilon) + \phi^{SC}(c_I(1+\varepsilon)-\phi-\varepsilon) \\ &s.t. \\ &U\{1-P^*\} \geq (c_I-\varepsilon)U(1-c_I) \end{aligned} \tag{32}$$

with $P^* = xf - \phi^{SC}(-\phi-\varepsilon+c_I(1+\varepsilon))$.

Given that the participation constraint has been relaxed, the incumbent is able to make a larger profit: $\Pi_I^{RP} > \Pi_I^{SC}$. We now compare the profit of the relaxed program with the incumbent's profit under the exclusivity contract. For the exclusivity contract we obtained the following programme:

$$\max_{P,\phi^{EC}} P - c_I(1+\varepsilon) + \phi^{EC}(c_I(1+\varepsilon) - \phi^{EC} - \varepsilon)) + (1-\phi^{EC})\varepsilon$$
$$s.t. \qquad (33)$$
$$U(1-P) \geq (c_I - \varepsilon)U(1-c_I)$$

Comparing programs (32) and (33), it is clear that incumbent prefers to offer an exclusivity contract $\Pi_I^{RP} < \Pi_I^{EC}$. Indeed, in the two programmes the constraints are the same, but the objective function is higher under the exclusive contract (additional term).

Conclusion

The incumbent is able to deter entry and extract rent from the entrant by taking a speculative position in the forward market: it will sell more forward contracts than total market demand.

These contract positions will give the incumbent an incentive to behave more aggressively in the spot market, both in situations where entry occurs, and in situations where it does not.

The incumbent is able to recoup the low prices it charges to the main buyer by adjusting the price at which it sells the forward contract to the main buyer.

However, this aggressive behaviour comes at a cost: (1) The incumbent sells the product to the fringe buyer at a price below his cost, when entry does not occur. (2) The strategy requires that the main buyer takes up a large amount of risk. The incumbent needs to refund this compensate the buyer for this risk.

As a result of this costly strategy, the incumbent will allow more entry than in the exclusive contract case, and receive a lower profit in equilibrium. Thus, the incumbent is more likely to prefer a speculative contract to a standard hedging contract when the fringe supplier is smaller and the main buyer is less risk-averse.