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Publication date:
2009

No. 2009–24

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April 2009

ISSN 0924-7815

Exclusivity as inefficient insurance[1]

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15 April 2009

Abstract

It is well established that an incumbent firm may use exclusivity contracts so as to monopolize an industry or deter entry. Such an anticompetitive practice could be tolerated if it were associated with sufficiently large efficiency gains, e.g. insuring buyers against price volatility. In this paper we study the trade-off between positive effects (risk sharing) and negative effects (exclusion) of exclusivity contracts. We revisit the seminal model of Aghion and Bolton (1987) under risk-aversion and show that although exclusivity contracts induce optimal risk-sharing, they can be used not only to deter the entry of a more efficient rival on the product market but also to crowd out financial investors willing to insure the buyer at competitive rates. We further show that in a world without financial investors, purely financial bilateral instruments, such as forward contracts, achieve optimal risk sharing without distorting product market outcomes. Thus, there is no room for an insurance defense of exclusivity contracts.

JEL codes: D43, D86, K21, L12, L42

Keywords: exclusivity, contracts, monopolization, risk-aversion, risk-sharing, damages

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[1] Both authors thank Jan Boone, Eric van Damme, Richard Meade, Wieland Müller, Jens Prüfer, and Gijsbert Zwart for insightful comments as well as seminar audiences at Tilburg University, the Research Institute of Industrial Economics, Stockholm, the Netherlands Bureau for Economic Policy Analysis (CPB), the Norges Handelshøyskole (NHH), Bergen, University of Cologne, and conference participants to the 2008 NAKE research day, INFRADAY 2008 (Berlin), Larsen & EUI Workshop on "Efficiency, Competition and Long Term Contracts in Electricity Markets" (Florence), and TAI 2008 (Washington, DC). The authors are responsible for any mistake or shortcoming.

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1 Introduction

It is well established in the economic literature that an incumbent firm may use exclusivity contracts so as to monopolize an industry or deter entry.[2] 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 an 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, the profit of energy-intensive manufacturers depends heavily on the price of electricity. Those prices are volatile and there is a lot of uncertainty regarding their future evolution, because of the unknown development of alternative energy production technologies as well as the unsettled nature of the discussions about future energy policy. Such manufacturers may prefer long-term arrangements with incumbent energy suppliers to the vagaries of future energy spot prices. In other terms, they may be risk-averse with respect to electricity prices.[3]

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 and extend the seminal model of Aghion and Bolton (1987) to deal with risk aversion. We show that exclusivity contracts, although they induce efficient risk-sharing, can be used not only to deter the entry of a more efficient rival on the product market but also to crowd out financial investors willing to insure buyers at competitive rates. Thus, exclusivity clauses can foreclose entry on both the product market and the financial market. We further show that in a world without financial investors exclusivity contracts are welfare-dominated by purely financial bilateral instruments, such as forward contracts, as these do not distort product

[2] An excellent overview is provided by Bernheim and Whinston (1999).

[3] Various hedging activities conducted by firms can be interpreted as evidence that they behave as if they were risk-averse; see, for instance, Gézci et al. (1997). The same applies to their input purchase behavior; see, e.g., Wolak and Kolstad (1991).

market outcomes. Thus, we argue that there is no room for an insurance defense of exclusivity contracts.

Our main result arises from the externalities which are present in the contracting process between the incumbent seller and the risk-averse buyer. In Aghion and Bolton (1987), those contracting parties have a joint interest in agreeing to high liquidated damages for breaching the contract, in order to force a more efficient entrant to charge a low price. Hence, the contract they sign hurts a third party, the entrant. Now, if the buyer were to buy a forward contract from a financial investor to hedge its spot market risk, he would subsequently have an interest in signing an exclusivity contract with the incumbent in order to extract rent from this financial investor. Indeed, by signing a contract that completely forecloses entry, the buyer can ensure that the product price will remain high and thus forces the financial investor to be true to his promise of insuring the buyer against adverse spot market outcomes. Because this moral hazard problem is anticipated by financial investors, the market for financial instruments does not develop. As a result, the incumbent's behavior is not constrained by any competitive pressure and exclusivity contracts end up being used by him so as to extract rents from the entrant and from the main buyer.

The problem we tackle is by no means hypothetical. For instance, in recent years, a series of cases involving energy companies were dealt with by European competition authorities.[4] In the 2007 *Distrigas* decision, the European Commission accepted to close an abuse-of-dominant-position case after the main Belgian gas distributor committed to reduce the gas volumes tied in long-term contracts and to decrease the duration of those contracts 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 could use 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 preliminary decision in 2007, a small entrant complained that the former electricity monopolist

[4] An early US antitrust case, *United Shoe*, can also be read along the Aghion and Bolton (1987) lines; see Brodley and Ma (1993).

was using exclusivity provisions to prevent it from accessing industrial consumers ahead of the liberalization of the sector. The French competition authority stressed that any assessment of those clauses could not take place without serious consideration being given (among other things) 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, which may justify its use in the face of its foreclosing effect.[5]

There is an active literature about socially harmful instances of vertical foreclosure or entry deterrence through the use of vertical arrangements.[6] When it comes to entry deterrence of a potential rival 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" scenario 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 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

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[5] See *Conseil de la concurrence*, Decision 07-MC-01 of 25 April 2007, especially recitals 48 and 50.

[6] An excellent discussion is found in Rey and Tirole (2007).

by solving the hold-up problem (e.g. de Meza and Selvaggi, 2007), reducing intra-brand or inter-brand competition (e.g. Mathewson and Winter, 1984; Besanko and Perry, 1993), sharing risk (e.g. Rey and Tirole, 1986), or fostering efficient product selection (Yehezkel, 2008). Motta (2004) offers an accessible review of this line of research.

By contrast, to our knowledge there are few contributions studying the possible trade-off between efficiency gains and exclusionary effects, as we try in this paper, and they all focus on investment. 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). Spier and Whinston (1995) thoroughly study this issue by allowing for ex post renegotiation of the exclusivity contract and looking at legal remedies. Fumagalli, Motta and Rønde (2007) explore the same issue but in a model that builds upon Segal and Whinston (2000b), rather than Aghion and Bolton (1987).

Several papers have studied the impact of financial positions of firms on product market competition. The main message in this literature is that firms may use financial contracts as a commitment device to affect the equilibrium in the spot market and increase their overall profit. The precise strategy depends on the type of competition. If oligopolists compete à la Cournot, then they will sell forward contracts (or integrate vertically) to compete more aggressively in the market, which increases their market share at the expense of the other participants (Allaz and Vila, 1993). Willems (2005) shows that those results also hold for 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). The main result of this literature is that oligopolists that hedge themselves by signing (long term) contracts behave more competitively in the spot market. Willems and De Corte (2008) therefore argue that governments should regulate the risk exposure of (electricity) firms so as to give producers (retailers) an incentive to buy (sell) more forward contracts.

This literature only looks at the effect of financial contracts on spot market competition but takes their existence as given and neglects their effects on entry incentives. In contrast, our paper studies the effect of long-term contracts on entry, and it further addresses the issue as to whether the market for derivatives will develop when firms that are active on the product market have market power.

The structure of this paper is as follows. In Section 2, we present a model characterized by the presence of financial investors who could provide a risk-averse buyer with a hedge against spot price volatility. In section 3 we characterize the equilibrium of this model in various contracting environments. Section 4 discusses the welfare and policy implications and Section 5 concludes.

2 Model

This paper models the effect of long-term contracts signed between an incumbent producer and a risk-averse consumer. We study the potential trade off between the beneficial effect of a long-term relationship through risk sharing and the associated harmful effect through the exclusion of competitors. In order to do so, we extend the Aghion and Bolton (1987) model by introducing risk-aversion on the part of the buyer and by giving a role to financial investors who can competitively offer insurance to the buyer. In the three scenarios we study various contractual relationships between the incumbent and the buyer. In the first scenario we assume that no contract can be signed between the two. In the second scenario the incumbent can offer an exclusive contract, as in the original model. In the third scenario the incumbent can offer 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 those innovations, two additional, related, 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 forward contract and are therefore perfectly hedged against any variation in the spot market price. (Without it, they would become absolutely indifferent to the market outcome and there would be no meaningful competition between the incumbent and the entrant.)

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

Those two modifications preserve the spirit of the original Aghion and Bolton (1987) model in which the entrant could not make any profit in case the buyer did not buy from her.

2.1 Set-up of the game

This being said, the precise set-up of the game follows the model of Aghion and Bolton (1987) as closely as possible. In the game there are five (types of) players: the main buyer, the fringe buyer, the incumbent, the entrant, and the financial investors.

The *main buyer* buys at most one unit of the good. His reservation price for the good is equal to 1. The main buyer is risk-averse and his preferences are represented by a von Neumann-Morgenstern utility function U. 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 is upward-sloping and concave ($U' > 0$ and $U'' < 0$), and, for simplicity, 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 is equal to

$$E\big[\varepsilon(1-p)\big]. \tag{2}$$

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 the 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.[7] The entrant incurs a small entry cost $K > \varepsilon$. 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 since $p \leq 1$ and $c_E \geq 0$. In order to simplify calculations, we take $K = (1 + \varepsilon)\varepsilon$. The entrant strives to maximize expected profit.

There are (at least) two *financial investors*, who are risk-neutral and maximize expected profit from selling forward contracts.

The game consists of 6 stages. In stage 1 the financial investors compete à la Bertrand for the sale of forward contracts to the main buyer. A *forward contract* stipulates that the buyer agrees to pay the seller the difference between the forward price, φ, set in the contract, and the spot market price, p. Bertrand competition thus consists for financial investors in posting a forward price φ and being committed to honor the corresponding contract upon acceptance by the main buyer.

In stage 2, the main buyer decides whether he buys a forward contract from one of the financial investors. In case several investors offer the same contract, the main buyer randomly selects one.

In stage 3, after observing the financial position of the main buyer, the incumbent makes him a take-it-or-leave-it offer. This offer can be of three types, depending on the scenario chosen. In the first scenario, the offer consists in not entering into any contractual relationship (*no contract*). In the second scenario, the offer consists in an *exclusivity contract* as in Aghion and Bolton (1987) where the buyer ex-ante agrees to pay price P to the incumbent for acquiring one unit or pay penalty P_0 if he breaches the contract. In the third scenario, the offer consists in a *forward contract*, according to

[7] We solve for pure-strategy equilibria. Hence, there are no additional 'strategic' sources of risk in the model.

which the main buyer promises to pay the incumbent the difference between the forward price, f, set in the contract, and the spot market price, p.

In stage 4 of the game, the main buyer decides whether he accepts the offer of the incumbent or not.[8]

In stage 5 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 stage 6, Bertrand competition takes place in the spot market. Active firms post bids. They are committed to serve all demand addressed to them at their posted price. The payoffs of the fringe buyer and the entrant depend directly on the spot market price and sales. The utility of the main buyer and the incumbent producer depends not only on the spot market sales but also on the contract(s) that they may have previously signed.

We solve this game by backward induction.

2.2 Efficiency

We now characterize efficient market outcomes. From the point of view of social welfare, three dimensions matter: (i) allocative efficiency, (ii) productive efficiency, and (iii) 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 such a production cost advantage vis-à-vis the incumbent as to outweigh her entry cost. Hence, entry should occur as long as the average total 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. In an efficient market, the probability of entry is thus equal to $\text{Prob}(c_E < c_I - \varepsilon) = c_I - \varepsilon$.

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[8] This of course inconsequential in the scenario where the incumbent offers no contract.

Third, because the main buyer is risk-averse and other players are risk-neutral, the main buyer should be covered by insurance, be it from the main buyer or financial investors. At the optimum, the marginal utility of the main buyer should be equal across states of the world. This implies that the main buyer pays the same price, net of financial transfers, in all situations.

3 Analysis

We now take the three scenarios of interest (no contract, exclusivity contract, bilateral forward contract between the incumbent and the main buyer) in order and solve for subgame-perfect equilibrium.

3.1 No contract

In the first scenario, the incumbent cannot enter into a contractual relationship with the main buyer. Suppose first that the latter has not bought any forward contract from financial investors. Following the entrant's decision to enter the market in stage 5, Bertrand competition determines the spot market price. Thus, the equilibrium market price is given by

$$p = \max\left\{c_I, c_E\right\}. \tag{3}$$

In case the entrant decides not to enter, the incumbent will charge buyers their reservation price and the spot market price will be equal to 1.

In stage 3, the entrant will enter as long as she expects to obtain a positive profit. The precise condition is

$$(c_I - c_E)(1+\varepsilon) - (1+\varepsilon)\varepsilon \geq 0. \tag{4}$$

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

$$\phi^{NC} = \text{Prob}(c_E < c_I - \varepsilon) = c_I - \varepsilon. \tag{5}$$

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

$$\begin{aligned} V^{NC} &= \phi^{NC} \cdot U(1-c_I) + (1-\phi^{NC})U(0) \\ &= \left(c_I - \varepsilon\right)U(1-c_I) \end{aligned} \tag{6}$$

Consider now the case where the main buyer has bought a forward contract φ from financial investors in stage 2. (All variables in that case will be annotated with a tilde.) In stage 6, the spot market price does not depend on the financial position of the main buyer and is still given by equation (3). Entry is still as in equation (5).

The main buyer is perfectly insured and receives a surplus of $U(1-\varphi)$, independently of the entry decision of the entrant:

$$\begin{aligned} \widetilde{V}^{NC} &= \phi\, U(1-c_I-(\varphi-c_I)) + (1-\phi)U(1-1-(\varphi-1)) \\ &= U(1-\varphi) \end{aligned} \tag{7}$$

In the financial market investors compete à la Bertrand. In expectation they will not make a profit and we have $\phi \cdot c_I + (1-\phi)\cdot 1 = \varphi$. Hence, given efficient entry, the forward price in stage 1 will be equal to:

$$\varphi = 1 - (c_I - \varepsilon)\cdot(1-c_I) \tag{8}$$

The main buyer will buy such a contract in stage 2 as it will allow him to reduce uncertainty and gains from risk-sharing accrue to him. Indeed, his surplus is larger when he buys a forward contract than when he doesn't:

$$\widetilde{V}^{NC} = U((c_I-\varepsilon)\cdot(1-c_I)) > (c_I-\varepsilon)\cdot U(1-c_I) = V^{NC}. \tag{9}$$

This inequality follows from Jensen's inequality.

3.2 Exclusivity contract

In the second scenario the incumbent is allowed to offer an exclusivity contract to the main buyer in stage 3.

Suppose that the main buyer has bought a *forward contract* with forward price φ from financial investors and agreed to an *exclusivity contract* $\left(P, P_0\right)$ with the

incumbent. Upon entry, Bertrand competition in the spot market takes place in stage 6 of the game. The entrant and the incumbent post prices p_I and p_E. The fringe buyer buys its good from the producer with the lowest price at 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 profit of the main buyer is equal to $U(1 - P - (\varphi - p))$, if he does not breach the contract, and $U(1 - p - P_0 - (\varphi - p))$, if he decides to breach. The main buyer will breach 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 enough profit to outweigh the entry cost. Given the parameters of the game, entry can only be profitable 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 sell to 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.

Given the various possibilities above, entry takes place when $c_E < \min\{c_I, P - P_0\} - \varepsilon$. Since c_E is uniformly distributed, the probability of entry is given by

$$\tilde{\phi}^{EC} = \min\{c_I, P - P_0\} - \varepsilon. \tag{10}$$

Hence, the key externality in this contracting model is that by its choice of P and P_0, the contracting pair can affect the entry decision of the potential entrant.

At stage 3, the incumbent chooses P, P_0 to maximize expected profit subject to the participation constraint of the main buyer and the entry decision of the entrant. In case the latter does not enter, then the incumbent charges price 1 to the fringe buyer, while the post-entry price is given by equation (3).

The program of the incumbent is therefore the following:

$$\begin{aligned} &\max_{P,P_0} \quad \tilde{\phi}^{EC} P_0 + (1 - \tilde{\phi}^{EC})(P - c_I) + (1 - \tilde{\phi}^{EC})(1 - c_I)\varepsilon \\ &s.t. \\ &(i) \quad \tilde{\phi}^{EC}\, U\big(1 - P - (\varphi - p)\big) + (1 - \tilde{\phi}^{EC})\, U\big(1 - P - (\varphi - 1)\big) \geq U(1 - \varphi) \\ &(ii) \quad p = \min\{c_I, P - P_0\} \\ &(iii)\, \tilde{\phi}^{EC} = p - \varepsilon \\ &(iv)\; 0 \leq \tilde{\phi}^{EC} \leq 1 \end{aligned} \tag{11}$$

Assume for now that $P - P_0 < c_I$ (which will be true in equilibrium), then the solution to this optimization problem is such that:

$$\tilde{\phi}^{EC} = 0, P = 1, P_0 = 1 - \varepsilon \tag{12}$$

That is, the incumbent chooses a corner solution at which entry does not occur at all and the contractual price is equal to one. If the main buyer is risk-neutral and the fringe buyer is negligible ($\varepsilon = 0$), this follows directly from the optimization problem.

To see this, notice that in that case the participation constraint of the buyer, (i), will bind and φ can be substituted out of the problem. The programme reduces to

$$\begin{aligned} &\max_{0 \leq \tilde{\phi}^{EC} \leq 1} \quad \underbrace{(1 - c_I)}_{\substack{\text{No-entry} \\ \text{profit}}} + \underbrace{\tilde{\phi}^{EC}\left(c_I - \tilde{\phi}^{EC}\right)}_{\text{Rent from entrant}} - \underbrace{V}_{\text{Compensation of buyer}} \\ &where \quad V = \tilde{\phi}^{EC}\left(1 - \tilde{\phi}^{EC}\right) \end{aligned} \tag{13}$$

The profit of the incumbent consist of three parts: (1) the no-entry profit; (2) rent that can be extracted from the entrant; and (3) a compensation to the buyer for the loss in

revenue on its financial contract. The two first terms make up for the total profit of the contracting pair while V is the amount of money that must be rebated by the incumbent to the main buyer in order to induce him to accept the contract.

It is as if the incumbent always served the buyer and charged price 1 as a result of monopoly power (part 1). Yet, when entry occurs, the incumbent is able to procure the good from the entrant at price $\tilde{\phi}^{EC}$ instead of producing it himself at higher cost c_I. It is then as if the incumbent had monopsony power vis-à-vis the entrant and faced the usual monopsony trade-off between price and quantity (part 2). This is the mechanism that allows the contracting pair to extract rent from the entrant. In addition, entry affects the gains the buyer makes on its forward contract. Instead of benefiting from insurance when the entrant stays out (and the price is one), the main buyer receives less money from the financial investor when entry occurs (and the price is $\tilde{\phi}^{EC}$ instead). He must then be compensated for this in order to be willing to accept the contract. (part 3)

The incumbent will chose a corner solution $\tilde{\phi}^{EC} = 1$ and will fully exclude the entrant as the compensation he needs to pay to the buyer in case of entry (part 3) is larger than the rent he could extract from the entrant (part 2). Marginally increasing the probability of entry increases rents received from the entrant at rate $c_I - 2\tilde{\phi}^{EC}$ while it increases the compensation paid to the buyer at rate $1 - 2\tilde{\phi}^{EC}$.

In the case where the buyer is risk-averse and the fringe buyer cannot be neglected, this contract continues to be optimal. Indeed, (i) the participation constraint in (11) gets harder to satisfy when the buyer is risk-averse; hence, the incumbent can never achieve a higher level of profit than under risk-neutrality; and (ii) the solution specified in (12) is not risky for the main buyer; hence, it is also feasible under risk aversion.

In stage 1, financial investors behave competitively as a result of Bertrand competition. They will therefore offer a forward contract making zero expected profit. If the incumbent is allowed subsequently to offer an exclusivity contract, then

anticipating (12), the forward price φ at which investors will be willing to supply insurance will be equal to one.

In stage 2, the main buyer will buy a forward contract whenever his utility of buying is larger than the utility he receives without insurance contract[9], that is:

$$U(1-\varphi) > (c_I - \varepsilon) \cdot U(1-c_I) \tag{14}$$

Since financial investors only offer a contract with forward price equal to 1, the main buyer is not interested in buying. In effect, the possibility for the incumbent to offer an exclusivity contract after the closure of the financial market destroys the possibility of insurance arrangements between financial investors and the main buyer.

Thus, in stage 3, the incumbent faces the same trade-off as in the original Aghion and Bolton (1987) model. 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 now the following:

$$\begin{aligned} &\max_{P,P_0} \quad \phi^{EC} P_0 + (1-\phi^{EC})(P - c_I) + (1-\phi^{EC})(1-c_I)\varepsilon \\ &s.t. \\ &(i) \quad U(1-P) \geq (c_I - \varepsilon) U(1-c_I) \\ &(ii) \quad \phi^{EC} = \min\{c_I, P - P_0\} - \varepsilon \end{aligned} \tag{15}$$

Indeed, the incumbent recognizes that the entrant will not enter unless she can convince the main buyer to switch. 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 by posting price 1. 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

[9] Note that the incumbent has all bargaining power in the game, the buyer will be kept at its reservation utility, it is, it will receive the utility it would receive the same utility as when he would refuse the contract. (V^{NC}.)

acceptance at stage 4. Second, the contract terms affect the likelihood of entry through their effect on the spot market 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, the programme of the incumbent can be rewritten as follows:

$$\max_{0 \le \tilde{\phi}^{EC} \le 1} \underbrace{(1 - c_I)}_{\substack{\text{No Entry} \\ \text{Profit}}} + \underbrace{\phi^{EC}(c_I - \phi^{EC})}_{\text{Rent From Entrant}} - \underbrace{V}_{\text{Compensation of buyer}} \qquad (16)$$
$$where \quad U(V) = c_I U(1 - c_I)$$

The profit of the incumbent consists again of three parts: (1) the profit of the contracting pair in the absence of entry; (2) rent that can be extracted from the entrant by manipulating the entry decision; and (3) a compensation that the incumbent needs to leave to the buyer in order to induce him to accept the contract.

It is as if the incumbent always sold the good to the main buyer at a price that is subject to monopoly power (part 1) and only constrained by the buyer's option to refuse the contract (part 3), but could buy the good from a supplier (the entrant) on which he exerted monopsony power (part 2). As in any monoposony calculation, the price at which the input is bought is thus determined by the trade-off between the quantity purchased and the price paid. Because this time the main buyer is not insured against variation in the spot market price, a change in the probability of entry leads to a change in the risk born by the main buyer, which must be compensated. This amount obviously depends on the level of risk-aversion of the main buyer. Indeed, if λ stands for the risk premium associated to the lottery promising $1 - c_I$ with probability c_I and zero otherwise, then we have:

$$V = c_I(1 - c_I) - \lambda ,$$

which shows that the profit of the incumbent is increasing in the risk premium, that is, in the level of risk aversion.

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

$$U(1-P) = (c_I - \varepsilon)U(1-c_I)$$
$$P - P_0 = \frac{c_I}{2}(1+\varepsilon) \tag{17}$$

That is, the main buyer is held at reservation utility level, while $P - P_0$ is chosen so as to allow for entry only when the entrant's cost is below about half the incumbent's.

3.3 Financial contract

In the third scenario the incumbent offers the main buyer a 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. This is a forward (sale) contract with forward price f.

Assume first that the main buyer did not buy a forward contract from financial investors in stage 2 but bought one from the incumbent in stage 4. Suppose 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 à la Bertrand and in equilibrium they post the same price $p_I = p_E = \max\{c_I, c_E\}$, which determines the spot market price, p. Buyers buy from the firm with the lowest marginal cost.

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 the probability of entry is

$$\phi^{FC} = c_I - \varepsilon. \tag{18}$$

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

In stage 3, the incumbent will thus offer then main buyer a contract solving

$$\begin{aligned}
&\max_{f} \phi^{FC}(f - c_I) + (1 - \phi^{FC})[(f - c_I) + \varepsilon(1 - c_I)] \\
&s.t. \\
&(i) \quad \phi^{FC} = c_I - \varepsilon \\
&(ii) \quad U(1 - f) \geq (c_I - \varepsilon)U(1 - c_I)
\end{aligned} \tag{19}$$

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:

$$V^{FC} = V^{NC} = (c_I - \varepsilon)U(1 - c_I) \tag{20}$$

Suppose now that the main buyer has bought one forward contract from the incumbent at forward price f and one forward contract from a financial investor at forward price φ.

The profit of the main buyer is equal to $U(1 - p_{MB} - (\varphi - p) - (f - p))$ where p is the spot market price and p_{MB}, the price at which the main buyer transacts. If the main buyer cannot affect the spot price by buying at a higher price himself, then the main buyer has an incentive to buy at the lowest possible price and $p_{MB} = p$. Hence, upon entry the price in the spot market is equal to the standard Bertrand outcome and the buyers buy from the firm with the lowest cost.

In stage 5, the entrant will enter as long as it makes a positive profit in the spot market. Since the contractual arrangements do not affect the spot market outcomes, we have efficient entry happening with probability:

$$\tilde{\phi}^{FC} = c_I - \varepsilon. \tag{21}$$

In stage 3, the incumbent maximizes its profit by selecting the price at which it will offer a forward contract to the main buyer. However, the incumbent cannot influence the probability of entry.

The incumbent will only be willing to sell a forward contract to the main buyer if, in expectation, this increases his profit. This is the case if $f \geq 1 - \phi^{FC}(1 - c_I)$, i.e. if the forward price is at least as great as the fair "insurance price".

For the main buyer to accept such a contract, it should increase his utility. As taking an additional forward contract "over-insures" the main buyer (and hence is risky for him), he will only do so if the price is strictly lower than the fair "insurance price".

Hence, the incumbent and the buyer will not be able to sign a contract which is profitable to both of them. The equilibrium thus dictates that the incumbent will offer a forward contract which is at most actuarially fair and that the main buyer will decline to take it.

In stage 1, financial investors, anticipating that their deal is not threatened by the possibility for the incumbent subsequently to offer a forward contract, will sell insurance to the main buyer at the fair insurance price. In stage 2, the main buyer will accept the forward contract of the financial investors as it guarantees a utility of

$$U\left((c_I - \varepsilon)(1 - c_I)\right) > V^{NC} \tag{22}$$

Entry will be efficient.

4 Discussion

4.1 Normative implications

Table 1 summarizes the results of section 3. It describes for the three kinds of contractual relationships —no contract (NC), exclusivity contract (EC), and forward contract (FC)— whether the financial market will develop, whether the main buyer is insured, and whether entry in the market is efficient.

Scenario	Contracts that the incumbent is allowed to sign	Financial market develops?	Main Buyer is insured?	Efficient Entry?
NC	**None**	Yes	Yes	Yes
EC	**Exclusive Contract**	No	Yes	No
FC	**Forward Contract**	Yes	Yes	Yes

Table 1 Market Outcome in the three scenarios

The main buyer will be insured in all scenarios, whether by buying forward contract from financial investors, or whether by signing an exclusivity contract with the incumbent.

Entry is efficient as long as the incumbent is not allowed to use exclusive contracts. If exclusive contracts are allowed, then there is too little entry.

Financial markets will only develop if the incumbent is not allowed to sign an exclusivity contract. If the incumbent is allowed to offer such an exclusive contract, then financial investors, wary of moral hazard, will offer forward contracts at prohibitive prices and the financial market will break down.

Scenario	Financial investors present?	Contracts that the incumbent is allowed to sign	Risk sharing		Entry		Total Surplus
			Main buyer	Incumbent	Incumbent	Entrant	
Benchmark	**No**	**None**	0	0	0	0	0
NC	**Yes**	**None**	*	0	0	0	*
EC	**Yes**	**Exclusive Contract**	0	*	+	--	*-
FC	**Yes**	**Financial Contract**	*	0	0	0	*

* surplus created by hedging the risk of the main buyer
+ positive change in surplus associated to entry distortion
-- negative change in surplus associated to entry distortion

Table 2: Surplus of Main Buyer, Incumbent and Entrant in the three scenarios

Table 2 presents the utility levels of the three main players: the main buyer, the incumbent and the entrant. Utilities levels are normalized with respect to a benchmark scenario. The benchmark assumes that financial investors are absent and that the incumbent is not allowed to offer any contract. The utility levels of the players are affected by the development of financial markets (column 3 in Table 1) and by the entry decisions (column 5 in Table 1). Table 2 disentangles the utility effects of those two factors.

Gains from insuring the main buyer accrue entirely either to him or to the incumbent (the financial market, when it develops, is competitive and all gains accrue to the main buyer) and they are denoted by a star. Distorting entry by forcing the entrant to price low penalizes the entrant (minus signs) but benefits the incumbent (plus sign). Changes in total surplus are found by summing all effects.

We first discuss the effect for the *main buyer*. As long as the financial market does not develop, the incumbent has all the bargaining power vis-à-vis the main buyer. He will keep the main buyer at his reservation utility level, which is determined by the outside option in which the main buyer does not sign any contract. Hence, the main

buyer's utility is identical in the benchmark scenario and the exclusivity contract scenario (EC). If the financial market develops, the incumbent loses his dominant position in the insurance market, and the main buyer will buy a forward contract from financial investors at the competitive rate. The surplus of the main buyer will therefore increase in scenarios NC and FC.

Entry is efficient in all scenarios, except for the EC scenario. In this scenario the *entrant* obtains a lower profit. She is indifferent between all other scenarios (benchmark, FC and NC) since entry is unaffected.

The profit of the *incumbent* depends on two parts. First, by restricting entry, the incumbent can extract rents from the entrant. The profit of the incumbent thus increases under scenario EC. Second, selling insurance to the main buyer is profitable for the incumbent if he is the sole seller of forward contracts. He then has monopoly power in the insurance market. He obtains this monopoly profit in the insurance market only in the EC scenario. In the other scenarios the incumbent does not sign a contract with the main buyer (benchmark, NC and FC), and those give 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 forward contract is available on financial markets to arrange for risk-sharing*.

We now compare the various scenarios from the point of view of total surplus (last column in Table 2). Efficiency requires that the main buyer is insured and efficient entry. In all cases, the main buyer ends up insured; only the distribution of gains from risk sharing is affected. In contrast, the use of exclusivity contracts allows the incumbent inefficiently to deter entry. Thus, scenario NC and scenario FC are equivalent and welfare-dominate scenario EC in the presence of financial investors.

4.2 In the absence of financial investors

It is possible that financial markets do not develop for reasons that are unrelated to the moral hazard problem we identify in this paper. Liquidity is an obvious issue: with a limited number of buyers in the industry, there may be few agents interested

in trading derivatives. One can thus wonder how the conclusions of our analysis are affected by the absence of financial investors.

The analysis in section 3 of those subgames in which the main buyer had not bought a forward contract from financial investors allows us to answer this question. Table 3 summarizes the outcomes in the three scenarios when financial investors are absent.

Scenario	Contracts that the incumbent is allowed to sign	Main Buyer is insured?	Efficient Entry?
NC (benchmark)	**None**	No	Yes
EC	**Exclusive Contract**	Yes	No
FC	**Financial Contract**	Yes	Yes

Table 3 Summary of the three scenarios in the absence of financial investors

In this context, scenario NC actually corresponds to the benchmark we considered above. As long as the incumbent is able to contract with the main buyer, the latter ends-up insured against price volatility. Scenario EC distorts entry, whereas the use of a forward contract (or the absence of contract) does not distort the product market outcome.

Table 4 compares the utility levels of the various scenarios. The main buyer achieves the same utility level in each scenario because the incumbent has all bargaining power, and holds the main buyer at his no contract reservation utility. The incumbent, as long as he can contract with the main buyer, captures the gains from risk sharing (as financial investors are absent there is no competitive pressure on the incumbent in providing insurance). In addition he can extract some rents from the entrant by using an exclusivity contract to force low post-entry prices. Thus, he makes more profit in scenario EC and our model would still predict the use of contracts with exclusivity clauses in the absence of financial investors.

Therefore, the *incumbent* prefers scenario EC to scenario FC. Therefore, even in the absence of financial investors, if the incumbent had the choice of the contract to offer to the main buyer, our model would predict the emergence of exclusivity contracts in equilibrium.

We now compare total surplus in the difference scenarios. Scenario FC Pareto-dominates the NC outcome, as the surpluses of the main buyer and the entrant remain constant, while the profit of the incumbent increases. Allowing a financial contract improves risk sharing between the entrant and the incumbent, without restricting entry.

Scenario	Contracts that the incumbent is allowed to sign	Risk sharing		Entry		Total Surplus
		Main buyer	Incumbent	Incumbent	Entrant	
NC (benchmark)	None	0	0	0	0	0
EC	Exclusive Contract	0	*	+	--	*-
FC	Financial Contract	0	*	0	0	*

* surplus created by hedging the risk of the main buyer
+ positive change in surplus associated to entry distortion
-- negative change in surplus associated to entry distortion

Table 4: Surplus of Main Buyer, Incumbent and Entrant in the absence of financial investors

If we replace the financial contract (FC) with an exclusivity contract (EC), then the profit of the incumbent goes up, the entrant is worse off and the main buyer remains at his 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 joint profit of the incumbent and entrant decreases.

Comparing exclusive contract and the no contract scenario (EC vs NC), we identify the following trade-off: with the exclusive contract, entry is inefficient, but the main buyer is insured. Which of the two effects dominates, depends on the risk aversion of the main buyer. If the main buyer is very risk-averse, then the value of eliminating price risk is very high and may more than compensate for the inefficient entry profile associated to exclusivity.

Comparing the results of this section with the previous one allows us to determine the role of financial markets. Their development has two effects. (1) It improves the bargaining position of the main buyer vis-à-vis the incumbent as long as the financial market does not break down. (2) It provides an alternative hedging instrument for the main buyer if the incumbent is not allowed to sign contracts. The first effect does

not affect total surplus, as it merely is a transfer between the main buyer and the incumbent. The second effect increases efficiency in the scenarios in which the incumbent is not allowed to sign any contract with the main buyer.

4.3 Policy implications

Often, an incumbent firm and a buyer will sign an exclusivity contract. If this contract is questioned by antitrust authorities, the parties will typically present an efficiency defense running along the following lines:

(1) The future price of the good is uncertain, and the buyer is risk-averse. Hence the buyer would like to sign a contract to hedge its risk.

(2) A financial market does not exist in the sector; hence, the buyer needs to turn to the incumbent as a counterparty in a trade to reduce its risk

In this paper, we show that, although both arguments are seemingly correct, it does not follow that an insurance defense of exclusivity contracts should be allowed.

Our model shows that if the incumbent can choose what contract to offer the main buyer, then he will go for an exclusivity contract. This contract will insure the buyer against variations in the spot price. Financial investors will not be willing to offer insurance to the buyer, and financial markets will not develop. If the buyer is very risk-averse, this outcome may socially be preferred to a situation without contracts. Hence, the arguments of the parties are seemingly correct.

However, insuring the buyer should not be allowed as an efficiency defense for using exclusivity contracts. Those contracts not only foreclose the product market but also hinder the development of financial markets, which could provide alternative means for the buyer to hedge his risk. They can be the cause of the problem they allegedly set to solve!

Of course, other causes may be at play for the financial market not to develop. Even in those situations where alternative insurance providers are unavailable, insurance should not be allowed as an efficiency defense for exclusivity clause. The use of a simple financial forward contract socially dominates exclusive dealing, as it hedges the buyer without distorting entry. Such a forward contract does not require a

financial market to exist, and can be signed between the buyer and the incumbent as long as there exists a well-functioning spot market, upon whose price to base the contract.

We therefore conclude that there is no room for an insurance defense of exclusionary exclusive dealing arrangements.

4.4 Reservations

Following Aghion and Bolton (1987), 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.

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 profit loss of the incumbent. If competition were be less fierce, the price upon entry could 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 incumbent 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 Argenton and Willems (2008), 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.

5 Conclusion

In this paper, we have revisited the seminal Aghion and Bolton model by introducing risk-aversion on the part of the buyer, leaving some room for financial markets to develop, and allowing for a richer contracting environment. We have shown that from the point of view of efficiency, exclusivity contracts, although useful in hedging a risk-averse buyer, are instrumental in allowing the incumbent seller to exclude its rivals both on the product market and the financial market. Even in the absence of financial investors, a simple forward contract can take care of insuring consumers without distorting entry. So, there appears to be no room for an insurance justification for using exclusivity contracts whenever direct financial arrangements are possible. On the contrary, we have shown that an incumbent would always prefer to offer an exclusivity contract, as this contract form allows him to extract more surplus from the main buyer and the potential entrant. This comes at the cost of preventing financial markets to develop. We therefore conclude that by allowing an insurance defense of exclusivity contracts, policy-makers would run the risk of favoring anti-competitive incumbents at great cost to both the real and the financial sides of the economy.

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