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EXCLUSIVITY CONTRACTS, INSURANCE AND FINANCIAL MARKET FORECLOSURE*

CÉDRIC ARGENTON†
BERT WILLEMS‡

We study the trade-off between the 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 into 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, risk-sharing alone cannot be invoked to defend exclusivity contracts.

I. INTRODUCTION

IT IS WELL ESTABLISHED THAT AN INCUMBENT FIRM may use exclusivity contracts to monopolize an industry or deter entry.[1] Such an anticompetitive practice could be tolerated if it were associated with sizeable efficiency gains. This paper examines a possible efficiency justification for exclusive dealing: risk-sharing. When challenged by antitrust authorities, parties to an exclusive dealing contract indeed often present an efficiency defense running along the following lines: First, the future price of the good is

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†Authors' affiliations: CentER & TILEC, Tilburg University, Postbus 90153, 5000LE Tilburg, The Netherlands.
email: c.argenton@uvt.nl
‡CentER & TILEC, Tilburg University, Postbus 90153, 5000LE Tilburg, The Netherlands.
email: bwillems@uvt.nl

[1] An excellent overview is provided by Bernheim and Whinston [1999].

uncertain, and the buyer is risk-averse. Hence, the buyer would like to sign a contract to hedge his risk. Second, a working financial market does not exist in the sector. Hence, the buyer needs to contract with the incumbent to reduce his risk.

Can the absence of a counterparty that is willing to insure the buyer at reasonable rates really justify the use of long-term exclusivity contracts in the face of their negative impact on competition? To address this question, we extend the seminal model of Aghion and Bolton [1987; henceforth, AB] to deal with risk aversion and financial arrangements. AB show that an incumbent seller and a buyer can sign a contract that profitably but inefficiently deters the entry of a potential rival by providing for high liquidated damages in case of breach. We allow the buyer to be risk averse, introduce financial investors who can supply insurance to him at competitive rates, and provide for a richer contracting environment between him and the incumbent seller.

We show that exclusivity contracts between the incumbent and the buyer, although they induce efficient risk-sharing, can be used not only to deter the entry of a more efficient rival into the product market, but also to crowd out financial investors. Thus, exclusivity clauses can foreclose entry into *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 (forward contracts), as these do not distort product market outcomes.[2] Thus, our model invites the presumption that a simple insurance defense of exclusivity contracts is not acceptable. On the contrary, what the parties present as a defense of such contracts may actually be evidence of an aggravating circumstance, as the absence of a working financial market can be the consequence, not the cause, of exclusivity contracts.

The problem we address is by no means hypothetical. First, exclusive dealing is perhaps the most common form of vertical restraint.[3] Second, although (large) firms are typically held by shareholders with diversified portfolios, they often act as if they were risk-averse.[4] Third, exclusivity contracts remain a contentious area of antitrust enforcement. For example,

[2] Note that it is not obvious that financial instruments are without exclusionary consequences. Rey and Tirole [2007; footnote 91] explain that the contract in AB is equivalent to a physical option: the buyer pays a fixed fee in order to acquire the right to acquire the good at a pre-specified price. Thus, the availability of physical derivatives, i.e., contracts involving the actual delivery of the commodity, does not guarantee that exclusion is unfeasible. We show that purely financial instruments, i.e., involving payments but no transfer of commodities, are needed. The distinction between physical and financial rights in the presence of market power had already been stressed in the specific context of electricity transmission markets by Joskow and Tirole [2000].

[3] See Lafontaine and Slade [forthcoming].

[4] The corporate risk management literature abounds with reasons why firms should hedge their risk. See Chew [2007] for a recent overview of practices and Tirole [2006] for a state-of-the-art exposition of corporate finance theory. The use of commodity derivatives by firms is

in recent years, a series of cases involving long-term contracts offered by energy companies were dealt with by European competition authorities. It was recognized that energy-intensive manufacturers might well prefer long-term arrangements with incumbent energy suppliers to buying on highly volatile spot markets. Nonetheless, the exclusionary effects of such arrangements were a matter for concern. In the *Distrigas* decision[5], the European Commission accepted the closing of an abuse-of-dominant-position case after the Belgian gas supplier committed to reducing the gas volumes tied in long-term contracts and to decrease the duration of those contracts so as to make room for entrants.[6] In the French *KalibraXE* case, an entrant complained that the former electricity monopolist was using exclusivity provisions to prevent it from accessing industrial consumers ahead of the liberalization of the sector. In its decision, the French Competition Authority stressed that any assessment of those contracts could not take place without considering the conditions under which they could be terminated, as well as the economic gains that customers derive from the certainty of a fixed price, which may justify their use in the face of their foreclosing effect.[7]

Our main result arises from the externalities which are present in the contracting process between the incumbent seller and the risk-averse buyer. If the buyer were to buy a forward contract from a financial investor to hedge his spot market risk, then he and the incumbent would subsequently find it profitable to sign an exclusivity contract to extract rent from this financial investor. Indeed, by signing a contract that forecloses entry, they can ensure that the product price will remain high and thus force 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 on the insurance market is not constrained by any competitive pressure and exclusivity contracts end up being used so as to extract rents from the entrant *and* from the buyer.

The crux of the problem is that in our model, as well as in real life, derivatives contracts come with very few restrictions. They typically specify the underlying asset and the terms of delivery or payment. Contrary to

well-documented, see for instance Nance, Smith and Smithson [1993], Mian [1996], Tufano [1996], Berkman and Bradbury [1996], Haushalter [2000], Graham and Rogers [2002], Guay and Kothari [2003] or Adam and Fernando [2006]. With regards to input purchase behavior, see, e.g., Wolak and Kolstad [1991].

[5] European Commission decision COMP/B-1/37966—Distrigas.

[6] Similar requirements were implemented in decisions involving Synergen, Repsol, EDF, and E.ON/Ruhrgas. (European Commission decision COMP/E-3/37732—Synergen, COMP/B-1/38348—Repsol, COMP/39386—EDF, German competition authority (*Bundeskartellamt*) decision B8-113/03-1—E.ON Ruhrgas.)

[7] See *Conseil de la concurrence*, Decision 07-MC-01, especially recitals 48 and 50.

standard debt contracts, covenants are rare.[8] In particular, parties to a derivative contract can continue trading the underlying asset and its derivatives unhampered. It is this possibility to contract unrestrainedly with third parties that creates moral hazard. Our model captures this feature by allowing the buyer to contract with the incumbent after he has dealt with a financial investor.[9]

The AB model has been criticized (e.g., by Harbord and von der Fehr [2007]) for assuming that the monopolist has a first-mover advantage (if the entrant could offer a contract as well, exclusion would not ensue) and for featuring an equilibrium contract that is not renegotiation-proof (once the efficient entrant is on the market, the parties have an incentive to procure from her).

We nevertheless use the AB model as a basis, as in many markets a dominant incumbent firm indeed has an advantage *vis-à-vis* entrants with uncertain production costs. It certainly captures the configuration of liberalized energy markets where former monopolists are already in contact with customers but foresee potential entry by renewable energy producers, whose costs are unknown at this stage.

Moreover, renegotiation-proofness is a disputed issue in the literature. The concern does not only apply to the AB model, but to all models of strategic contracting that predict *ex-post* inefficient outcomes, including other models of vertical restraints and exclusion.[10] The commitment power of contracts *vis-à-vis* third-parties can be (partially) restored if a party to the contract can take irreversible decisions such as investing in capacity or the quality of a specific relationship[11] or if there is asymmetric information at the time of renegotiation[12]. For these reasons many contributors regard the question of the relevance of renegotiation-proofness as an empirical issue.[13] Our analysis applies only to the case where renegotiation cannot take place following entry.

[8] For the importance of covenants in debt contracts, see, e.g., Tirole [2006], especially sections 2.3 and 2.8. The absence of restrictive covenants can be directly verified for exchanged-traded derivatives. For contracts negotiated over-the-counter, the main concern is to deal with (counterparty) credit risk and it is not customary to include negative covenants. So-called master agreements mainly cover netting, early termination, collateralization and payment provisions. See for instance Franzen [2001].

[9] In theory, if the parties to a derivative contract could commit not to further trade the underlying asset, then the moral hazard problem would disappear. In our model, that would correspond to different timings. We come back to this issue in the conclusion.

[10] See Caillaud and Rey [1995] for a general treatment of commitment and credibility in delegation games. For the AB model, see the discussions in Masten and Snyder [1989] and Spier and Whinston [1995]. For similar implications in the 'naked exclusion' case, see Simpson and Wickelgren [2007].

[11] See Spier and Whinston [1995].

[12] See Dewatripont [1987], Katz [1991], and Caillaud, Jullien and Picard [1995].

[13] See, e.g., Brodley and Ma [1993], Bernheim and Whinston [1998] or Fumagalli, Motta, and Rønde [2009].

The structure of this paper is as follows. In Section II, we discuss the related literature. In Section III, we describe the model. In Sections IV and V we analyze this model in both the absence and presence of financial investors, respectively. Section VI discusses the policy implications and concludes.

II. RELATED LITERATURE

Our model relates to several strands of literature. A first line of research examines socially harmful instances of foreclosure through the use of exclusivity contracts. Two theories of entry deterrence stand out in the literature, one being associated to AB, the other to the 'naked exclusion' scenario put forth by Rasmusen, Ramseyer and Wiley [1991] and Segal and Whinston [2000a].[14,15] We contribute to the first theory by showing that exclusivity contracts can have even more deleterious effects than previously thought. To the best of our knowledge, we are the first to study the possibility of leveraging market power in a product market to extract rents from the financial market.

A second line of research describes efficiency gains associated with exclusivity contracts. They could arise from promoting relation-specific investments (e.g., Segal and Whinston [2000b], or de Meza and Selvaggi [2007]), solving adverse-selection problems at the retail level (e.g., Martimort [1996]), or fostering efficient product selection (e.g., Yehezkel [2008]). As do Rey and Tirole [1986], we examine how vertical restraints affect risk-sharing (although in an environment where information is symmetric between buyers and sellers).

A third line of research contains a few contributions studying the possible trade-off between efficiency gains and exclusionary effects.[16] In contrast with our paper almost all focus on investment decisions. Spiegel [1994] shows that in a modified version of the AB 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 effect on welfare. Spier and Whinston [1995] further expand the models by allowing for *ex-post* renegotiation of the exclusivity contract and by looking at legal remedies. Fumagalli, Motta and Rønde [2009] also

[14] In those latter models, an incumbent firm exploits contracting externalities among several customers and prevents a potential entrant from reaching the minimum viable scale. See Argenton [2010] for a review of recent developments.

[15] Both theories give an incumbent a first-mover advantage. Bernheim and Whinston [1998] show that if both upstream firms can *simultaneously* offer a downstream firm contracts that are contingent on exclusive or common representation, then in the Pareto-dominant equilibrium, the joint profits of the industry are maximized. Hence, inefficient exclusion does not arise in the absence of a first-mover advantage or another type of contracting externality.

[16] Lafontaine and Slade [2008] provide a review of the empirical evidence.

explore investment decisions, but by building upon Segal and Whinston [2000a] rather than AB. By contrast, Bernheim and Whinston [1998; section V] study a model where two incumbents simultaneously offer linear contracts to a risk-averse retailer who must set unverifiable prices (moral hazard) but cannot perfectly anticipate the level of demand (uncertainty). Exclusivity arises in equilibrium because it helps solve a problem arising under common agency (free riding between manufacturers in providing insurance to the retailer). Given the presence of moral hazard and risk aversion, exclusivity is efficient. In our model there is no moral hazard on the side of the buyer, and financial investors can insure him, thus eliminating any conflict between risk-sharing and incentive contracting. However, given the sequential nature of our game, both financial investors and the potential entrant do not take part in the exclusivity contracting stage, leading to inefficient exclusion.

A fourth line of research is concerned with the impact of firms' financial positions on product market competition. Typically, this literature studies whether sellers can use financial contracts as a commitment device to affect the spot market equilibrium. The precise strategy depends on the type of competition. See Allaz and Vila [1993], Mahenc and Salanié [2004] or Willems [2005]. However, contrary to our paper, this line of research neglects the effects of contracts on entry incentives.

III. MODEL

We extend the AB model by introducing risk-aversion on the part of the buyer and by allowing financial investors to offer insurance to the buyer. We study three scenarios corresponding to various contractual relationships between the incumbent and the buyer. In the first scenario no contract can be signed between the two. In the second scenario the incumbent can offer an exclusivity contract, as in the original model. In the third scenario the incumbent can offer a standard financial (forward) contract.

Next to those innovations, we make two additional modifications to the original AB model. First, we assume that there is a very small 'fringe buyer' who does not sign a long-term contract with the incumbent. This fringe buyer is introduced to obtain a unique spot price in the case in which the incumbent seller and the main buyer sign a forward contract and are therefore perfectly hedged against variations in the spot market price. Indeed, in that case, the incumbent firm is indifferent to the price it posts and there is therefore no meaningful competition between the incumbent and the entrant. The presence of the fringe buyer maintains an incentive for the incumbent to compete in prices.[17] Second, we assume

[17] In Section VI we sketch how our results change when the fringe firm is not small.

that the entrant incurs a small entry cost, which makes it unprofitable for her to enter the market if she can only supply the fringe buyer.

Those two modifications preserve the spirit of the original AB model in which the entrant could not make any profit if the (main) buyer did not buy from her.

III(i). *Set-Up of the Game*

In our model there are five types of players: the main buyer, the fringe buyer, the incumbent, the entrant and the financial investors.

The *main buyer* buys one or zero units of the good. His reservation price for the good is equal to 1. The main buyer is risk-averse and his expected utility of consuming 1 unit of the good is equal to $V = E[U(1-p)]$, where expectations are taken over the different states of the world, p is the price faced by the buyer in a specific state, and $U(\cdot)$ is the von Neumann-Morgenstern utility function ($U' > 0$ and $U'' \leq 0$), which we normalize by imposing $U(0) = 0$.

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 $E[\varepsilon \cdot (1-p)]$.

The *incumbent* producer is risk-neutral and has a production cost $c_I < 1$. He seeks to maximize expected profit.[18]

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 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 $c_E \geq 0$. We denote by $k \equiv \frac{K}{1+\varepsilon}$ the average fixed cost of the entrant. The entrant strives to maximize expected profit.

There are two *financial investors*. They are risk-neutral and maximize expected profit from selling forward contracts.

Uncertainty about the entrant's cost, c_E, is the only source of uncertainty in our model.[19]

The game consists of 6 stages (Table I). In *stage 1* financial investors compete *à la* Bertrand for the sale of a forward contract 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. In effect, the buyer of the contract is certain to procure the

[18] Even if the incumbent firm were risk-averse our results would not be affected, because with either an exclusivity contract or a financial contract all equilibria involve full hedging for the incumbent firm. Hence, he would have no incentive to change his strategy.

[19] We solve for pure-strategy equilibria. Hence, there is no additional, 'strategic' source of risk in the model.

good at price φ. Bertrand competition at this stage 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 or not.

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 entails not entering into any contractual relationship (*no contract*). In the second scenario, the offer consists of an *exclusivity contract* as in AB, 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 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 to accept the offer of the incumbent or not.[20]

In *stage 5* the entrant and all other players in the game learn about c_E. The entrant decides whether to enter the market and incurs the entry cost or not.

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.[21]

We solve for a subgame-perfect equilibrium, and use backward induction.

TABLE I
TIMELINE OF THE GAME

Stage	Description
	Financial market operates
1	Financial investors offer forward contract
2	Main buyer accepts or rejects
	Contracting by incumbent
3	Incumbent offers contract
4	Main buyer accepts or rejects
	Product market
5	Entrant decides whether to enter
6	Bertrand competition in spot market

[20] This is of course inconsequential in the scenario in which the incumbent offers no contract.

[21] Thus, in the spot market, firms cannot offer different prices to different buyers. However, the main buyer may end up paying a different price than the fringe buyer due to previously agreed contractual arrangements.

III(ii). *Efficiency*

We now characterize efficient market outcomes. For efficiency, three dimensions matter: (i) allocative efficiency, (ii) productive efficiency, and (iii) risk-sharing. First, as the production costs are always lower than consumers' willingness to pay, total production should be equal to $1 + \varepsilon$ units.

Second, the entrant should enter 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 ($\frac{c_E(1+\varepsilon)+K}{1+\varepsilon} = c_E + k$) is smaller than the average production cost of the incumbent, c_I. Under efficient entry, the probability of entry is thus equal to $\text{Prob}(c_E + k < c_I) = c_I - k$.

Third, because the main buyer is risk-averse and other players are risk-neutral, the main buyer should get full insurance, be it from the incumbent or financial investors. This implies that the main buyer should pay the same price, net of financial transfers, in all contingencies.

IV. IN THE ABSENCE OF FINANCIAL INVESTORS

This section considers the situation in which financial investors are not present in the market and thus skips stages 1 and 2 of the game. We first show that without contracting between the incumbent and the main buyer, the main buyer remains uninsured although entry is efficient. Then, we show that an exclusivity contract insures the main buyer, but at a cost, as it partially excludes the efficient entrant. In the last scenario we consider a bilateral forward contract between the main buyer and the incumbent, which leads to full efficiency.

IV(i). *No Contract*

In the first scenario, the incumbent cannot enter into any contractual relationship with the main buyer. Following the entrant's decision to enter the market, Bertrand competition determines the spot market price in *stage 6*. Thus, the equilibrium market price is given by

$$p = \max\{c_I, c_E\} \tag{1}$$

and buyers buy from the lowest-cost firm. 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 5*, the entrant will enter as long as she expects to obtain a positive profit.

$$(c_I - c_E)(1+\varepsilon) - K \geq 0. \tag{2}$$

The profit she makes by selling $1 + \varepsilon$ units at price c_I, should outweigh the entry cost. When $c_E > c_I - k$, the entrant chooses not to enter, for she would not make enough sales to cover the entry cost. Entry decisions are efficient, the probability of entry being given by

$$\phi^{NC} = \text{Prob}(c_E + k < c_I) = c_I - k, \tag{3}$$

where superscript NC stands for 'no contract'. So, there are two cases: either the cost of the entrant is low enough, in which case she enters and the market price is c_I, or she stays out and the market price is 1. The main buyer derives a surplus in the first case only, so that his expected utility V is

$$V^{NC} = (c_I - k)U(1 - c_I) \tag{4}$$

To sum up, if the incumbent and the entrant cannot sign any contract, entry will be efficient, but the main buyer will remain uninsured.

IV(ii). *Exclusivity Contract*

We now consider the case in which the incumbent can offer an exclusivity contract to the main buyer. In this scenario, the incumbent faces the same trade-off as in the original AB model in *stage 3*. He chooses P and P_0 so as to maximize expected profits, taking into account the participation constraint of the main buyer *(i)* and the entry decision of the entrant *(ii)*:

$$\begin{aligned} &\max_{P,P_0} \quad \phi^{EC} P_0 + (1 - \phi^{EC})(P - c_I) + (1 - \phi^{EC})(1 - c_I)\varepsilon \\ &s.t. \\ &(i) \quad U(1 - P) \geq (c_I - k)U(1 - c_I) \\ &(ii) \quad \phi^{EC} = \min\{c_I, P - P_0\} - k \end{aligned} \tag{5}$$

where superscript EC stands for 'exclusivity contract.' The only difference with the AB model is that the main buyer is risk averse. Upon entry, the incumbent expects the main buyer 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.

Proposition 1. If the incumbent is allowed to offer an exclusivity contract, then it will fully insure the buyer and partially foreclose entry by offering an exclusivity contract (P, P_0) such that

$$\begin{aligned} U(1 - P) &= (c_I - k)U(1 - c_I) \\ P - P_0 &= \frac{(1 + \varepsilon)c_I - \varepsilon + k}{2}. \end{aligned} \tag{6}$$

Proof. Consider program (5). If $P - P_0 \geq c_I$, then the contract will not affect the probability of entry and P_0 can be increased. So, at the optimum $P_0 = P - \phi^{EC} - k$. As P is a transfer from the main buyer to the incumbent, the participation constraint *(i)* will bind. The program can then be rewritten as follows:

$$(7) \quad \max_{0 \leq \phi^{EC} \leq 1} \underbrace{(1+\varepsilon)(1-c_I)}_{\substack{(1)\text{ No Entry} \\ \text{Profit}}} + \underbrace{\phi^{EC}(c_I - \phi^{EC} - k)}_{(2)\text{ Rent From Entrant}} - \underbrace{W}_{\substack{(3)\text{ Compensation} \\ \text{of buyer}}} - \underbrace{\phi^{EC}\varepsilon(1-c_I)}_{\substack{(4)\text{ Profit Loss} \\ \text{On Fringe} \\ \text{Upon Entry}}}$$

where $U(W) = (c_I - k)U(1 - c_I)$.

This is a well-behaved program with a unique solution.[22] Simple differentiation delivers the optimal value for ϕ^{EC}. It is easily verified that it lies between 0 and 1. Constraints *(i)* and *(ii)* then characterize P and P_0.[23] ■

Ignoring the fringe player, the profit of the incumbent consists of three parts: (1) the joint 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 faced a monopsony problem *vis-à-vis* the entrant under the participation constraint of the main buyer. However, the incumbent also insures the main buyer against variations in the spot market price. So, the exclusivity contract allows the incumbent to capture the gains from insuring the main buyer as well. Indeed, the incumbent only needs to compensate the main buyer for the certainty equivalent W of the lottery promising $1 - c_I$ with probability $c_I - k$, and zero otherwise. As can be easily seen, when the main buyer becomes more risk averse, the certainty equivalent decreases, and the incumbent increases its profits.

IV(iii). *Financial Contract*

In the third scenario the incumbent can offer the main buyer a forward contract with forward price f.

Assume first that the main buyer bought a forward contract from the incumbent in *stage 4* and that the entrant has decided to enter the market. In the pricing subgame, the main buyer is perfectly hedged against the variations in the spot market price. Competition takes place only for selling to the

[22] The objective function is strictly concave and the feasibility set is convex.

[23] In a more general contracting framework the incumbent can condition his price on whether the entrant entered or not. Hence, the contract specifies three components: a price P when there is no entry, a price P_E when entry occurs, and a penalty P_0 for breaching the contract. It can be shown that the incumbent will set $P = P_E$, as this contract hedges the main buyer. If the incumbent set different prices, he would then need to compensate the main buyer for this risk, lowering his surplus.

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

$$\phi^{FC} = c_I - k, \tag{8}$$

where superscript *FC* stands for 'financial contract'. 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 net revenue to be made on the main buyer to f.

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

$$\begin{aligned} &\max_{f} \quad \phi^{FC}(f - c_I) + (1-\phi^{FC})[(f - c_I) + \varepsilon(1 - c_I)] \\ &\text{s.t.} \\ &(i) \quad \phi^{FC} = c_I - k \\ &(ii) \quad U(1-f) \geq (c_I - k)U(1 - c_I). \end{aligned} \tag{9}$$

Observe that there is nothing that the incumbent can do to affect entry. The program 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:

$$V^{FC} = V^{NC} = (c_I - k)U(1 - c_I). \tag{10}$$

IV(iv). *Summary*

Table II summarizes our analysis thus far. It describes for the three kinds of contractual relationships—no contract (NC), exclusivity contract (EC), and forward contract (FC)—whether the main buyer is insured, and whether entry in the market is efficient.

TABLE II
MARKET OUTCOME WITHOUT FINANCIAL INVESTORS

Scenario	Contracts the incumbent is allowed to sign	Main buyer is insured?	Efficient entry?
NC	None	No	Yes
EC	Exclusivity Contract	Yes	No
FC	Financial Contract	Yes	Yes

Without contract (NC), entry is efficient but the main buyer inefficiently faces risk. If the incumbent is able to contract with the main buyer, whether through an exclusivity (EC) or a financial (FC) arrangement, the main buyer will be insured against price volatility. However, the exclusivity contract (EC) will distort entry, whereas the forward contract (FC) will not.

If the incumbent could choose between offering an exclusivity (EC) or a financial (FC) contract, he would always offer the exclusivity contract. In both cases, the incumbent insures the buyer and captures the gains from risk-sharing, as he can charge the risk premium to the buyer. However, under the EC scenario he can additionally extract some rents from the entrant by using an exclusivity contract to force low post-entry prices. Therefore, we do not expect bilateral financial contracts to be signed when the contracting freedom of the incumbent is unrestricted.

Comparing the exclusivity contract (EC) and the no-contract scenario (NC) from the point of view of social welfare, we identify the following trade-off: with the exclusivity contract the main buyer is insured but entry is inefficient, while the reverse is true in the no-contracting scenario. Which of the two aspects dominates depends on risk aversion. If the main buyer is very risk averse, then the value of eliminating the price risk is very high and may more than compensate for the inefficient entry profile associated to exclusivity. This comparison would suggest that risk aversion can in some cases be accepted as a defense of exclusivity contracts.

However, the exclusivity contract is not the only type of contract that the incumbent can offer. If the incumbent is restricted to offer a bilateral forward contract (FC), entry will not be affected and the main buyer will remain fully insured, which dominates the use of an exclusivity contract (EC). We therefore conclude that in the absence of financial investors, risk aversion alone cannot justify exclusive dealing.

V. IN THE PRESENCE OF FINANCIAL INVESTORS

We now add Stages 1 and 2 to the game. Note that in Section IV we already studied one part of the game tree, whereby the main buyer does not buy a forward contract from financial investors in Stage 2. In this section we therefore analyze first the subgame following the purchase by the buyer of a forward contract from financial investors. Notationwise, all variables in this subgame will carry a tilde. We then study whether financial investors will offer a contract in stage 1 that will be accepted in Stage 2 by the main buyer.

V(i). *No Contract*

Consider now the case where the main buyer has bought a forward contract φ from financial investors in stage 2. In *stage 6*, firms compete for the patronage of the fringe buyer. The spot market price does not depend on

the financial position of the main buyer and is still given by equation (1). Entry is still as in equation (3).

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

$$\tilde{V}^{NC} = U(1-\varphi). \tag{11}$$

In the financial market, investors compete *à la* Bertrand. In expectation they will make zero profit and set the forward price equal to the expected payment they will make, that is: $\varphi = \phi^{NC} \cdot c_I + (1-\phi^{NC}) \cdot 1$. Hence, given efficient entry, the forward price in *stage 1* will be equal to:

$$\varphi = 1-(c_I - k)\cdot(1-c_I). \tag{12}$$

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

$$\tilde{V}^{NC} = U[(c_I - k)\cdot(1-c_I)] > (c_I - k)\cdot U(1-c_I) = V^{NC}. \tag{13}$$

This relation follows from Jensen's inequality.

V(ii). *Exclusivity Contract*

In the second scenario the incumbent is allowed to offer an exclusivity contract.

Suppose that the main buyer has bought a *forward contract* with forward price φ from financial investors and agreed to an *exclusivity contract* (P,P_0) 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 his 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 utility of the main buyer is equal to $U[1-P-(\phi-p)]$ if he does not breach the contract, and $U(1-p-P_0-(\phi-p))$ if he decides to breach. The main buyer will thus breach only if the gains from breaching outweigh the penalty, that is, only if $p \leq P - P_0$.

Thus, the best price that the entrant can post in order to make the sale to the main buyer is $P - P_0$.[24] However, the incumbent is willing to undercut

[24] If that is lower than her cost, then the entrant will prefer to price herself out of the market.

the entrant until the price becomes equal to his marginal cost. Thus, the market equilibrium price is given by:

$$p = \min\{c_I, P - P_0\}. \tag{14}$$

As in the original AB model, entry then takes place when $c_E < p - k$. Since c_E is uniformly distributed, the probability of entry is given by

$$\tilde{\phi}^{EC} = \min\{c_I, P - P_0\} - k. \tag{15}$$

At *stage 3*, the incumbent chooses P and P_0 to maximize expected profit subject to the participation constraint of the main buyer (i), the post-entry market price (ii), and the entry decision of the entrant (iii). His program is as follows:

$$\begin{aligned} &\max_{P,P_0} \quad \tilde{\phi}^{EC} P_0 + (1-\tilde{\phi}^{EC})(P - c_I) + (1-\tilde{\phi}^{EC})(1-c_I)\varepsilon \\ &s.t. \\ &(i) \quad \tilde{\phi}^{EC} U(1-p-P_0-(\varphi-p)) + (1-\tilde{\phi}^{EC}) U(1-P-(\varphi-1)) \geq U(1-\varphi) \\ &(ii) \quad p = \min\{c_I, P - P_0\} \\ &(iii) \quad \tilde{\phi}^{EC} = p - k \\ &(iv) \quad 0 \leq \tilde{\phi}^{EC} \leq 1. \end{aligned} \tag{16}$$

We are now in the position to assert our main result: the incumbent will choose a corner solution at which, in contrast with the original AB model, entry does not occur at all.

Proposition 2. If the main buyer has earlier signed a forward contract with a financial investor, then the incumbent will offer an exclusivity contract that fully forecloses entry:

$$\tilde{\phi}^{EC} = 0, P = 1, P_0 = 1 - k. \tag{17}$$

Proof. Relax optimization program (16) by assuming that the main buyer is risk-neutral ($U(x) = x$) and replace equation *(ii)* with the equivalent constraints $p \leq c_I$ *(v)* and $p \leq P - P_0$ *(vi)*. Under risk neutrality and substituting *(iii)*, the participation constraint simplifies to

$$1 - P \geq (1 - \tilde{\phi}^{EC} - k)\tilde{\phi}^{EC}. \tag{18}$$

At the optimum, this participation constraint is binding as P is a pure transfer between the main buyer and the incumbent. Equation *(vi)* is also binding, as the objective could otherwise be increased by increasing P_0

without affecting any other constraint. Substituting *(vi)*, *(v)*, and (18) into the objective function, the incumbent's program becomes

$$\max_{0\le\tilde{\phi}^{EC}\le 1} \underbrace{(1+\varepsilon)(1-c_I)}_{\text{(1) No-entry profit}} + \underbrace{\tilde{\phi}^{EC}\left(c_I-k-\tilde{\phi}^{EC}\right)}_{\text{(2) Rent from entrant}} - \underbrace{(1-\tilde{\phi}^{EC}-k)\tilde{\phi}^{EC}}_{\substack{\text{(3) Compensation}\\ \text{of buyer}}} - \underbrace{\tilde{\phi}^{EC}\varepsilon(1-c_I)}_{\substack{\text{(4) Profit Loss On Fringe}\\ \text{Upon Entry}}}. \tag{19}$$

This is a well-behaved maximization problem as the objective function is linear and the choice set compact and convex. Its derivative with respect to $\tilde{\phi}^{EC}$ is negative everywhere since $c_I < 1$ by assumption, establishing the existence of a corner solution $\tilde{\phi}^{EC} = 0$. Hence, from constraint (18), $P = 1$ and from (ii) and (iii), $P_0 = 1 - k$.

In the case under which the buyer is risk-averse, this contract continues to be optimal. Indeed, the participation constraint in the original program (16) gets only tighter when the buyer is risk averse. Hence, the incumbent can never achieve a higher level of profit than under risk-neutrality. In addition, the solution specified in (17) is not risky for the main buyer. Hence, it still satisfies the participation constraint. ■

Note that the result the entrant will be fully excluded does not depend on the assumption of a uniform distribution function for c_E, and is valid for any level of risk aversion. With a general cumulative distribution function $F(c_E)$ with support [0,1] and ignoring the fringe buyer and the cost of entry, relaxed program (19) becomes

$$\max_{0\le\tilde{\phi}^{EC}\le 1} \underbrace{(1-c_I)}_{\text{(1) No-entry profit}} + \underbrace{F(\tilde{\phi}^{EC})\left(c_I-\tilde{\phi}^{EC}\right)}_{\text{(2) Rent from entrant}} - \underbrace{F(\tilde{\phi}^{EC})(1-\tilde{\phi}^{EC})}_{\substack{\text{(3) Compensation}\\ \text{of buyer}}}. \tag{20}$$

The profit of the incumbent consists of three parts: (1) the no-entry profit; (2) rent that can be extracted from the entrant upon entry; and (3) a compensation to the buyer for the loss in revenue on its financial contract following entry. The first two terms make up for the total joint profit of the contracting pair, while the third 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 contracting pair is able to procure the good from the entrant at price $\tilde{\phi}^{EC}$ instead of producing it at higher cost c_I (part 2). 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 1, 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 in order to be willing to accept the contract (part 3). If the incumbent allowed entry with some probability $F(\tilde{\phi}^{EC})$, then it could save $c_I - \tilde{\phi}^{EC}$ on production costs but it would need to compensate the buyer for the losses it incurs on the financial contract: $1 - \tilde{\phi}^{EC}$. This compensation is always larger than the rent it can extract, and the incumbent will then always fully exclude the entrant. If the main buyer were risk averse, then the compensation that the incumbent would need to pay to the buyer would always be larger than in the risk neutrality case.

This outcome is anticipated by financial investors, as the following proposition shows.

Proposition 3. If the incumbent can offer the main buyer an exclusivity contract, then the main buyer will not accept insurance from the financial investors.

Proof. In *stage 1*, financial investors compete *à la* Bertrand and offer a forward contract making zero expected profit. Given the previous proposition, the forward price ϕ at which investors are willing to supply insurance is equal to one ($\phi = 1$). 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, that is:

$$U(1-\varphi) > (c_I - k) \cdot U(1 - c_I). \tag{21}$$

Since the forward price φ is equal to 1, the main buyer chooses not to buy. ■

The intuition is as follows. If the main buyer buys a forward contract, he will be insured against high prices. He will therefore be led to accept exclusivity contracts which restrict entry and increase expected spot prices. Anticipating this, financial investors will offer insurance at a high forward price. The main buyer will not accept this financial contract, as he would end up paying a forward price which would be higher than the expected price when he refuses to sign any contract. This shows that the option 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.

V(iii). *Financial Contract*

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 $U(1 - p - (\phi - p) - (f - p))$, where p is the spot market price. Upon entry, p 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 she 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 $\tilde{\phi}^{FC} = c_I - k$.

In *stage 3*, the incumbent maximizes his profit by selecting the price at which he will offer a forward contract to the main buyer. 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 $f \geq 1 - \varphi^{FC}(1 - c_I)$, 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.

In *stage 1*, financial investors, anticipating that their deal is not threatened by the possibility of the incumbent's subsequently offering 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

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

Note that entry will be efficient.

V(iv). *Summary*

Table III summarizes the results of this section.

The main buyer will be insured in all scenarios, whether by buying a forward contract from financial investors, or by signing an exclusivity contract with the incumbent. Entry is efficient as long as the incumbent is not allowed to use exclusivity contracts. Financial markets will only develop if the incumbent is not allowed to sign an exclusivity contract.

As before, the incumbent's profit is highest if he is able to offer an exclusivity contract (EC). Hence, without intervention of antitrust authorities, the financial market will not develop and a potential entrant will be partially foreclosed. However, from a social welfare viewpoint, it would be

TABLE III
MARKET OUTCOME WITH FINANCIAL INVESTORS

Scenario	Contracts the incumbent is allowed to sign	Financial market develops?	Main buyer is insured?	Efficient entry?
NC	None	Yes	Yes	Yes
EC	Exclusivity Contract	No	Yes	No
FC	Financial Contract	Yes	Yes	Yes

best if exclusivity contracts could not be offered. In that case, the financial market would develop. The main buyer would buy insurance at an actuarially fair rate from financial investors. This would increase his surplus, compared to the situation with exclusivity contracts. Moreover, entry would be socially efficient.

In Section IV, in the absence of financial investors, restricting the contracting options of the incumbent to forward contracts led to a first-best outcome. In the presence of financial investors, this is still the case, although this time the financial investors insure the main buyer.

VI. DISCUSSION

In this paper we have revisited the seminal Aghion and Bolton [1987] 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 if the incumbent can choose which 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, but as financial investors will not be willing to offer (meaningful) insurance to him, he will have to pay a high price for this hedge. If the buyer is very risk-averse, this outcome may socially be preferred to a situation where neither the incumbent nor financial investors can offer any contract.

However, it does not follow that providing insurance is a good excuse 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 thus be the cause of the very problem they purportedly solve.

Of course, other causes can explain why financial markets do not develop. Even in those situations where alternative insurance providers are unavailable, our model suggests that insurance should not be allowed as an efficiency defense for exclusivity contracts. The use of a simple, purely financial forward contract indeed socially dominates exclusive dealing, as it hedges the buyer without distorting entry.

We would therefore suggest that antitrust authorities forbid the use of exclusionary clauses by incumbent firms if hedging is the only reason offered to justify them. In that case, incumbent firms should instead be steered toward signing bilateral financial forward contracts. Such contracts do not require a centralized 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. In those circumstances, the incumbent will face competition from other financial actors for insuring the main buyer and will not be able to extract the full risk premium from him.

Our paper does not imply that there are never valid efficiency defenses for exclusivity contracts. Those contracts can help solve moral hazard

problems that arise between the incumbent and the main buyer. In Bernheim and Whinston [1998; Section V], exclusivity contracts are second-best contracts that give the buyer incentives to exercise effort, while at the same time partially insuring him. Hence, antitrust authorities could allow an efficiency defense for exclusivity contracts, if for instance moral hazard and risk aversion were jointly present at the retail level.

The moral hazard problem which we identify in this paper could in theory be eliminated if traders in the derivatives market could commit not to sign physical contracts with producers without the approval of their counterparty. However, such a negative covenant would be extremely hard to enforce. Buyers of insurance would somehow have to notify all major product market transactions to their counterparties, and sellers would have to invest resources into monitoring those deals. Whether such decentralized monitoring is at all possible is debatable: derivatives are typically traded on an exchange or brokered by an intermediary, and the identity of the counterparty remains unknown to traders. Hence, the prospects for solving this problem without some form of centralized, public monitoring of (large) product market participants look dim.

This said, it is worth keeping the limitations of our analysis in mind. In our model, absent an exclusivity contract, the post-entry price in the spot market is equal to the marginal cost of the incumbent. Fierce competition drives the price down to the point where the incumbent is no longer making a profit, which induces efficient entry. If competition were less fierce, the post-entry price could be higher, and we could then obtain too much entry in the market. Hence, if spot markets are not characterized by intense price competition, then the negative effects of entry deterrence are likely to be smaller, and competition authorities might be less concerned.

We have assumed that the fringe buyer is sufficiently small for the main buyer to always be pivotal. What will happen if we relax this assumption? At first, when the market share of the fringe buyer increases, exclusion becomes cheaper to the incumbent, as he can reap additional benefits by charging this bigger buyer a high price. However, once the fringe buyer becomes too large, the main buyer ceases being pivotal for all realizations of c_E, and the ability of the incumbent to exclude the entrant is reduced. He then faces an additional constraint in his optimization problem $\left(\phi > c_I - k(1+\tfrac{1}{\varepsilon})\right)$. Whether this constraint is binding at the optimum depends on parameter values. Hence, competition authorities should be less concerned about exclusion if the fraction of the market which is covered by exclusivity contracts is relatively small.

If there are several fringe buyers and the incumbent can sign contracts with every one of them, then coordination problems among buyers arise, as in 'naked exclusion.' If buyers can perfectly coordinate, then they will act as the one buyer in our model. However, if they cannot, it can become cheaper for the incumbent to exclude the entrant, as none of the buyers will be

individually pivotal in triggering entry. Hence, in our view, the absence of a large buyer is no reason for competition authorities to be less vigilant.

REFERENCES

Adam, T. R. and Fernando, C. S., 2006, 'Hedging, Speculation and Shareholder Value,' *Journal of Financial Economics*, 81, pp. 283–309.

Allaz, B. and Vila, J. L., 1993, 'Cournot Competition, Forward Markets and Efficiency,' *Journal of Economic Theory*, 59, pp. 1–16.

Aghion, P. and Bolton, P., 1987, 'Contracts as a Barrier to Entry,' *American Economic Review*, 77, pp. 388–401.

Argenton, C., 2010, 'Exclusive Quality,' *Journal of Industrial Economics*, 58, pp. 690–716.

Berkman, H. and Bradbury, M., 1996. 'Empirical Evidence on the Corporate Use of Derivatives,' *Financial Management*, 25(2), pp. 5–13.

Bernheim, B. D. and Whinston, M., 1998, 'Exclusive Dealing,' *Journal of Political Economy*, 106, pp. 64–103.

Bernheim, B. D. and Whinston, M., 1999, *Anticompetitive Exclusion and Foreclosure Through Vertical Agreements*, (CORE lecture series, University Catholique de, Louvain, Belgium).

Brodley, J. F. and Ma, C. A., 1993, 'Contract Penalties, Monopolizing Strategies and Antitrust Policy,' *Stanford Law Review*, 45, pp. 1161–1213.

Caillaud, B.; Jullien, B. and Picard, P., 1995, 'Competing Vertical Structures: Precommitment and Renegotiation,' *Econometrica*, 63, pp. 621–646.

Caillaud, B. and Rey, P., 1995, 'Strategic Aspects of Delegation,' *European Economic Review*, 39, pp. 421–431.

Chew, D. H. (ed.), 2007, *Corporate Risk Management*, (Columbia University Press, New York, U.S.A.).

De Meza, D. and Selvaggi, M., 2007, 'Exclusive-Contracts Foster Relation-Specific Investment,' *Rand Journal of Economics*, 38, pp. 85–97.

Fumagalli, C.; Motta, M. and Rønde, T., 2009, 'Exclusive Dealing: The Interaction Between Foreclosure and Investment Promotion,' CEPR Discussion Paper 7240 (Centre for Economic Policy Research, London EC1V 3PZ, England).

Franzen, D., 2001, *Design of Master Agreements for OTC Derivatives*, (Springer Verlag, Berlin, Germany).

Graham, J. R. and Rogers, D. A., 2002, 'Do Firms Hedge in Response to Tax Incentives?' *Journal of Finance*, 57, pp. 815–839.

Guay, W. and Kothari, S. P., 2003, 'How Much Do Firms Hedge with Derivatives?' *Journal of Financial Economics*, 70, pp. 423–461.

Harbord, D. and von der Fehr, N.-H., 2007, 'The Law and Economics of Vertical Restraints: An Overview,' available at http://www.market-analysis.co.uk/PDF/Reports/Vertical%20Restraints_%2010December07.pdf (December 8, 2010)

Haushalter, G., 2000, 'Financing Policy, Basis Risk, and Corporate Hedging: Evidence from Oil and Gas Producers,' *Journal of Finance*, 55, pp. 107–152.

Joskow, P. L. and Tirole, J., 2000, 'Transmission Rights and Market Power on Electric Power Networks,' *Rand Journal of Economics*, 31, pp. 450–487.

Katz, M., 1991, 'Game-playing Agents: Unobservable Contracts as Precommitments,' *Rand Journal of Economics*, 22, pp. 307–328.

Lafontaine, F. and Slade, M. E., 2008, 'Exclusive Contracts and Vertical Restraints. Empirical Evidence and Public Policy, in Bucirossi P. (ed.), *Handbook of Antitrust Economics*, (The MIT Press, Cambridge, Massachusetts, U.S.A.).

Lafontaine, F. and Slade, M. E., forthcoming, 'Inter-Firm Contracts,' in Gibbons R. and Roberts J. (eds.), *The Handbook of Organizational Economics*, (Princeton University Press, Princeton New Jersey, U.S.A.).
Mahenc, P. and Salanié, F., 2004, 'Softening Competition through Forward Trading,' *Journal of Economic Theory*, 116(2), pp. 282–293.
Martimort, D., 1996, 'Exclusive Dealing, Common Agency and Multiprincipals Incentive Theory,' *Rand Journal of Economics*, 27, pp. 1–31.
Masten, S. E. and Snyder, E. A., 1989, 'The Design and Duration of Contracts: Strategic and Efficiency Considerations,' *Law and Contemporary Problems*, 52, pp. 63–85.
Mian, S., 1996, 'Evidence on Corporate Hedging Policy,' *Journal of Financial and Quantitative Analysis*, 31, pp. 419–439.
Nance, D.; Smith, C. and Smithson, C., 1993, 'On the Determinants of Corporate Hedging,' *Journal of Finance*, 48, pp. 267–284.
Rasmusen, E. B.; Ramseyer, J. M. and Wiley, J. S., 1991, 'Naked Exclusion,' *American Economic Review*, 81, pp. 1137–1145.
Rey, P. and Tirole, J., 1986, 'The Logic of Vertical Restraints,' *American Economic Review*, 76, pp. 921–939.
Rey, P. and Tirole, J., 2007, 'A Primer on Foreclosure,' in Armstrong, M. and Porter, R. (eds), *Handbook of Industrial Organization*, vol. 3, (Elsevier North-Holland, Amsterdam, The Netherlands), pp. 2145–2220.
Segal, I. R. and Whinston, M. D., 2000a, 'Naked Exclusion: Comment,' *American Economic Review*, 90, pp. 296–309.
Segal, I. R. and Whinston, M. D., 2000b, 'Exclusive Contracts and Protection of Investments,' *Rand Journal of Economics*, 31, pp. 603–633.
Spier, K. E. and Whinston, M. D., 1995, 'On the Efficiency of Privately Stipulated Damages for Breach of Contract: Entry Barriers, Reliance, and Renegotiation,' *Rand Journal of Economics*, 26, pp. 180–202.
Spiegel, Y., 1994, 'On the Economic Efficiency of Liquidated Damages,' *Economics Letters*, 45, pp. 379–383.
Tirole, J., 2006, *The Theory of Corporate Finance*, (Princeton University Press, Princeton, New Jersey, U.S.A.).
Tufano, P., 1996, 'Who Manages Risk? An Empirical Examination of the Risk Management Practices in the Gold Mining Industry,' *Journal of Finance*, 51(4), pp. 1097–1137.
Willems, B., 2005, 'Physical and Financial Virtual Power Plants,' *K.U.Leuven CES working paper No. 0512* (Catholic University of Leuven, Leuven, Belguim).
Wolak, F. and Kolstad, C. D., 1991, 'A Model of Homogeneous Input Demand under Price Uncertainty,' *American Economic Review*, 81(3), pp. 514–538.
Yehezkel, Y., 2008, 'Retailers' Choice of Product Variety and Exclusive Dealing under Asymmetric Information,' *Rand Journal of Economics*, 29, pp. 115–143.