DISCUSSION PAPER SERIES

No. 4525

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Christian Groh and Giancarlo Spagnolo

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ISSN 0265-8003

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Christian Groh, Universität Bonn
Giancarlo Spagnolo, Universität Mannheim and CEPR

Discussion Paper No. 4525
August 2004

Centre for Economic Policy Research
90–98 Goswell Rd, London EC1V 7RR, UK
Tel: (44 20) 7878 2900, Fax: (44 20) 7878 2999
Email: cepr@cepr.org, Website: www.cepr.org

CEPR Discussion Paper No. 4525

August 2004

ABSTRACT

Exclusive Contracts, Loss to Delay and Incentives to Invest*

We model a new effect of exclusivity on non-contractible investments in buyer/seller relationships. By restricting the buyer to purchase from only one seller, exclusivity increases the buyer's costs of haggling during renegotiation and hence the seller's relative bargaining power and bargaining share. This in turn fosters the seller's incentives to invest even for investments that are fully specific to the relationship ('internal investments'), in contrast to a recent finding by Segal and Whinston (2000b).

JEL Classification: C78, D23, L20 and L42
Keywords: bargaining, contracting, exclusive dealing, foreclosure, incomplete contracts and investment

Christian Groh
University of Bonn
Konrad-Adenauerallee 24-42
53113 Bonn
GERMANY
Tel: (49 228) 739 241
Email: groh@wiwi.uni-bonn.de

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Giancarlo Spagnolo
Department of Economics
Universität Mannheim
D-69131 Mannheim
GERMANY
Tel: (49 621) 181 1873
Fax: (49 621) 181 1874
Email: gianca@uni-mannheim.de

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www.cepr.org/pubs/new-dps/dplist.asp?authorid=135047

*We are grateful to Hongbin Cai, Martin Hellwig, Wolfgang Köhler, Benny Moldovanu, Abhinay Muthoo, Georg Nöldeke and workshop participants in Bonn, Mannheim, Stockholm (EEA 2003) and San Diego (NAES 2004) for comments and discussions. Spagnolo gratefully acknowledges funding from the European Commission (RTN/CPIM). This Paper is produced as part of a CEPR Research Network on 'Competition Policy in International Markets', funded by the European Commission under the Research Training Network Programme (Contract No: HPRN-CT-2001-00429).

Submitted 11 July 2004

1 Introduction

Exclusive contracts – agreements prohibiting a contracting party to deal with third parties – are common in many businesses.[1] Firms adopting such practices and legal scholars have traditionally motivated their extensive use with the need to protect/stimulate investments specific to a business relation (see e.g. Frasco (1991)). Klein (1988) framed this in terms of "hold-up" problems linked to contractual incompleteness. He argued that when – at the beginning of the last century – General Motors signed a contract prohibiting it to buy car bodies from other suppliers than Fisher Body, it did so to ensure that Fisher had sufficient incentives to invest in costly GM-specific machines and dies.[2]

In a recent paper, Segal and Whinston (2000b) analyze the effect of an exclusive contract restricting a buyer of a specific input to buy from one seller only on this seller's incentives to undertake a noncontractible investment. Little support is found for the above motivation for exclusive dealing. In their elegant model the exclusivity provision turns out to be irrelevant for the seller's investment decision if the specific investment is purely "internal", in the sense that it affects only gains from trade between the buyer and the seller. Exclusivity affects the seller's incentive to invest only when the investment is "external", when it increases the value of trade with some third party.

We argue instead that exclusivity terms can be relevant even for internal investments

[1] These contracts have drawn considerable attention in the recent economic literature because of their potential anticompetitive effects (See e.g. Aghion and Bolton, 1987; Rasmusen, Ramseyer and Wiley, 1991; Bernheim and Whinston, 1998; and Segal and Whinston, 2000a).

[2] Without exclusivity, once Fisher had undertaken the large specific investments it might have been "held up" by GM, who would have been in a very strong bargaining position (it could have threatened to buy bodies elsewhere unless the price were substantially reduced). The exclusivity provision reduced GM's post-investment freedom and bargaining power, curbing its ability to "hold up" Fisher after the investment. The continuation of this famous story, following Klein's interpretation, is that the demand for Fisher's metal body then grew at unexpected levels, so that the contract did not induce Fisher to invest as desired (locating close to GM's plants) but instead allowed it to "hold up" GM through its cost-plus clause. The contract became then such a burden for GM that it eventually decided to integrate vertically by acquiring Fisher Body.

when they affect the parties' loss from delayed agreement in renegotiations. The crucial ingredient of Segal and Whinston's irrelevance result is that "...the role of exclusivity is to establish the disagreement point for renegotiation" (p. 604). Since parties split the surplus - independent from exclusivity terms - 50/50 over the disagreement point, an exclusivity provision cannot have any effect on the seller's marginal incentive to invest, which remains constant at 1/2. We believe that exclusivity does not only establish the disagreement point for renegotiation, but that it also often affects parties loss to delay, their costs of haggling and waiting for counteroffers, which in turn affect relative bargaining power (the *shares* of the surplus) and incentives to invest.

A first channel through which parties' loss to delay may affect relative bargaining power is agents' "patience". In dynamic bargaining situations à la Rubinstein (1982) parties' discount factors determine relative bargaining power. When there is a positive probability that a bargaining party is replaced, this probability determines the discount factor toghether with time preferences. Exclusivity may affect the parties' probability of leaving the bargaining table, i.e. their patience, hence their relative bargaining power and incentives to invest. Here are two plausible stories on how this may happen.

Example 1. A manufacturer regularly buys a specific input from a high quality supplier, although other input suppliers of lower quality exist. Firms are run by professional managers that enjoy incumbency rents but are fired and replaced with a per-period probability decreasing in profits.[3] In the middle of the production process the supplier interrupts supply and claims that the costs are higher than expected, so that a price adjustment is needed; the managers start renegotiating. While renegotiation takes place, both firms face fixed running costs (wages, interest rates, rents). Without exclusivity, while bargaining with the usual supplier, the manager of the manufacturer can temporarily acquire intermediate goods from alternative sources and go on producing although with lower quality. With an exclusive contract, this is more difficult and it is more likely that the manufacturer's profits fall and that the manufacturer's manager is fired. Thus,

[3] We have in mind a situation where monitoring and contracting costs prevent owners from using more detailed information than firm profits in evaluating managers. Fudenberg and Tirole (1995) provide an elegant model where this replacement policy obtains endogenously.

the manufacturer's manager becomes less patient in the renegotiation, which decreases his bargaining share. The supplier's share - and his investment incentives - increase.

Example 2. Suppose firms are run by their owners but are leveraged and their revenues are subject to exogenous (e.g. demand) shocks. These two features determine a positive risk of bankruptcy. Again, while renegotiation takes place firms face fixed running costs. If a firm goes bankrupt, its owner looses control and debtholders or a judge/lawyer start running the firm and conducting negotiations.[4] Contractual exclusivity increases the bankruptcy probability for the manufacturer since it does not allow him to cover running costs (e.g. wages) by buying low quality imput from alternative sources and producing. Without exclusivity, the manufacturer could buy inputs from an alternative supplier and produce while bargaining, increasing its resilience to revenue shocks and reducing the probability of bankruptcy. The exclusivity provision then increases the manufacturer's loss to delay during renegotiation and its probability of bankruptcy, decreasing his patience and bargaining share wihle increasing the seller's incentive to invest.

After explaining Segal's and Whinston's irrelevance result in section 2, in section 3 we present a simple model which illustrates these stories. The renegotiation game is based on the Rubinstein (1982) alternating offers protocol. Each of the two parties faces a positive probability of not reaching the next period after having rejected an offer. This probability increases for the manufacturer if there is an exclusive contract. Our model is analogous to an alternating offers bargaining model with an exogenous risk of breakdown à la Binmore, Rubinstein and Wolinsky (1986), with two differences: first, the breakdown probabilities in our model are endogenous since they depend on exclusivity terms agreed upon by the parties. Second, the event that negotiations completely break down has zero probability: in example 1, an unsuccessful manager gets replaced and the bargaining goes on; in example 2, a bank or lawyer continues negotiations if an owner looses control.[5] Exclusivity then protects and fosters the seller's internal investment: it

[4] We have in mind an incomplete financial contracting environment analogous to Bolton and Scharfstein (1990), where pre-commitment effects à la Brander and Lewis (1986) are not relevant.

[5] A positive probability of break down could be incorporated in the model, it would not change the qualitative results.

increases the buyer's loss to delay, making him less patient, thereby increasing the share of the surplus apropriated by the seller.

We view the result as an illustration of a more general point. The literature models contractual rights like exclusivity provisions as changes of disagreement payoffs and/or outside options. We think contractual rights may affect players' relative bargaining power as well as the level of threat points. We believe people in bargaining situations perceive the presence of alternative trading opportunities as an increase in their relative bargaining power although - in the parlance of bargaining theory - there is an effect on the level of disagreement points "only". Then, people might not behave according to the separation between threat points and bargaining power as it is suggested by theory. In the present context, this implies that purely internal investment behavior is affected by a change of exclusivity terms. A recent experiment by Sonnemans, Oosterbeek and Sloof (2001) supports this view, as we discuss in section 4. This experiment reports that marginal incentives to invest change even though there is a change in the level of disagreement payoffs only.

To show that our argument is more general and does not depend on one specific bargaining model, we present a second model in section 4.1 where exclusivity terms change the players' relative bargaining power in a very simple way that fits closely the intuition of practitioners and legal scholars like Frasco (1991). This model also refers to Rubinstein's (1982) classical bargaining paper, but it uses his model with constant time cost. In each period, while bargaining, both parties face (fixed) per-period costs of an ongoing concern (wages, rents). Suppose that these cost are higher for the manufacturer than for the supplier. Then, with exclusivity, the seller receives all the renegotiation surplus and invests efficiently. Without exclusivity, the manufacturer covers his per-period costs since he can buy inputs from an alternative supplier and go on producing while bargaining with the usual supplier. This implies a cost advantage for the manufacturer, leaving no surplus to the seller, who does not invest at all.

The explanations given above suggest that payoffs which players obtain while bargaining are crucial for our result. In the parlance of bargaining theory such payoffs

are called "inside options".[6] In our model, exclusivity decreases the buyer's inside option, since exclusivity decreases expected profits during the renegotiation. However, *if* exclusivity has *not* the additional effect on the loss to delay (i.e. on the probability of a manager getting fired), exclusivity terms are irrelevant for investment incentives. To understand this insight note that inside option payoffs are to be identified with the disagreement points in the Nash Bargaining solution.[7] But if exclusivity terms affect inside options(=disagreement points) only, we know from Segal and Whinston (2000b) that exclusivity plays no role for internal investments. We provide a formal discussion of this point in section 4.2, where we present a model close to our first one but yielding an irrelavance result as in Segal and Whinston (2000b). An inside options model is also used in the experiment by Sonnemans, Oosterbeck and Sloof (2001).

Our conclusion in section 5 argues that effects of "inside options" on the loss to delay in renegotiation may also be relevant for the property rights theory as developed by Grossman and Hart (1986).

2 Internal investment and bargaining power

To understand SW's irrelevance result, consider the example in section 2 of their paper.[8] A buyer B and a seller S contract initially while the buyer may later buy from another supplier E. At the initial stage, B and S can sign an exclusive contract which prohibits B from buying from E. The other details of the contract remain unspecified; there is need for renegotiation. B wishes to buy one unit valued at v. S produces the good at cost c_S while E's production cost is c_E. The ex-ante investment cost for S of achieving cost level c_S is $\phi_S(c_S)$. Buyer B cannot make any cost reducing investments. In the presence of E, the three parties renegotiate to an ex post efficient outcome. If E is the more efficient supplier, B buys from him, even if an exclusive contract was written.

SW assume that E receives no surplus and that B and S split their renegotiation surplus 50/50 over the disagreement point. Let $e = 1(e = 0)$ denote an exclusive

[6] See ch.6 of Muthoo (1999) for an overview of inside options models.

[7] See, e.g. Muthoo (1999), ch.6.

[8] SW obtain the irrelevance result in a much more general model.

(nonexclusive) contract and let $U_S^0(c_S, e)$ and $U_B^0(c_S, e)$ denote disagreement utilities. The renegotiation surplus is

$$TS(c_S) - U_S^0(c_S, e) - U_B^0(c_S, e), \tag{1}$$

where

$$TS(c_S) = \max\{v - c_S, v - c_E, 0\} \tag{2}$$

is the total available ex post surplus. Then $S's$ utility is

$$U_S(c_S, e) = U_S^0(c_S, e) + \frac{1}{2}\left[TS(c_S) - U_S^0(c_S, e) - U_B^0(c_S, e)\right]. \tag{3}$$

The seller's investment decision problem is

$$\max_{c_S} \qquad U_S(c_S, e) - \phi_S(c_S).$$

With a nonexclusive contract, the two parties' utilities at the disagreement point are $U_S^0(c_S, e = 0) = 0$ and $U_B^0(c_S, e = 0) = \max\{v - c_E, 0\}$. Since S captures 50 % of his investment, $S's$ incentive to invest is suboptimal.

With an *exclusive* contract, disagreement utilities are $U_S^0(c_S, e = 1) = U_B^0(c_S, e = 1) = 0$. Then we obtain in (3)

$$U_S(c_S, e = 1) = U_S(c_S, e = 0) + \frac{1}{2}\max\{v - c_E, 0\}. \tag{4}$$

From (4) we see that exclusivity is irrelevant for the seller's optimal investment level. Exclusivity e does make S better off, but by an amount $\frac{1}{2}\max\{v - c_E, 0\}$ independent of S's investment. As long as investments do not affect the trading surplus between B and E (the cost c_E), exclusivity is irrelevant for investment. SW extend this example to a more general setting (Proposition 1 in their paper) and show that exclusivity matters for "external" investments that affect the value of the coalition BE. A crucial assumption behind the irrelevance result is that parties split the surplus according to the same proportion $\lambda = 1/2$ with and without exclusivity.[9]

[9] They also show that with outside option bargaining, as in Binmore, Rubinstein and Wolinsky (1986), exclusivity may even decrease investment.

To clarify now our point, consider the asymmetric Nash bargaining solution (see Muthoo (1999), ch. 2.8) and let λ denote the parameter determining $S's$ share. Equation (4) becomes

$$U_S(c_S, e = 1) = U_S(c_S, e = 0) + \lambda \max\{v - c_E, 0\}. \tag{5}$$

The Nash bargaining solution implies a *separation* between the share of the pie a player receives, λ, and the value of the disagreement point: a change in the disagreement point does not have any effect on the share of the pie, λ. We believe that when exclusivity increases haggling costs λ should be a function of e, with $\lambda(e = 0) < \lambda(e = 1)$: B faces higher costs of waiting for a counter offer during negotiations, when he cannot trade with third parties.

The basic logic of bargaining and the conventional interpretation of the generalized Nash bargaining solution suggests that it should be so. When we justify the use of the Nash bargaining solution by deriving it in the limit from Rubinstein's (1982) alternating offer model with discounting, we obtain that a party's share of the pie is decreasing in his discount rate. We find this result appealing because a lower discount rate implies a lower cost of rejecting the opponent's offer and waiting one more period to make a counteroffer, a lower loss to delay; *because of this,* we argue, it is sound that a player's equilibrium share – his bargaining power – is increasing in his patience (see e.g. Muthoo (1999), p. 51). By this same fundamental logic, other factors affecting parties' relative losses to delay should also affect bargaining power and the equilibrium *shares* of the pie. In the next section, we present a model which captures this point.

3 A model where exclusivity matters

A supplier S can produce a specific input good at cost c_S determined by his ex ante cost reducing investment. The ex-ante investment cost for S of achieving cost level $c_S \in [\underline{c}_S, \overline{c}_S]$ is $\phi_S(c_S)$. The function ϕ_S is decreasing in c_S with $\phi_S(\overline{c}_S) = 0$ and strictly convex, $\phi'' > 0$.

A manufacturer B wishes to buy one unit of the specific input good to produce one unit of a final good which yields a revenue v. He cannot make any cost reducing

investments and further units of the final good are valueless. Let $TS(c_S) = v - c_S$ and let c_S^* denote the efficient level of investment that maximizes $TS(c_S) - \phi(c_S)$.

Firms are run by managers enjoying rents positively related to profits, and/or subject to the threat of being fired/replaced and/or are leveraged and subject to the risk of bankrupcty. For the exposition of our model we focus on the case where firms are run by two managers B and S. Each manager enjoys positive rents increasing in profits when running the firm, and is subject to a positive per-period probability (p_k, $k = B, S$) of being fired/replaced and left with his lower reservation wage forever after. The probability that a manager is replaced in a given period decreases with that period's firm profits Π_k, i.e. $p_k(\Pi_k)$ with $p_k' < 0$.[10]

Each manager maximizes discounted expected profits and discounts future utility with an intertemporal discount factor $d_i \in (0, 1)$.

The timing is as follows.

Stage 1: B and S decide on an exclusive contract, $e = 1$, or a non-exclusive contract, $e = 0$. The contract specifies whether S has exclusivity in supply to B, and possibly monetary transfers (side payments) between the parties. It cannot specify terms of trade, which thus must be renegotiated at the time of exchange. The contract cannot be unilaterally broken or cancelled by any party.

Stage 2: S invests (chooses c_S).

Stage 3: Bargaining (Renegotiation) between the managers of the two firms. Before the input is delivered, B's manager and S's manager renegotiate according to an alternating offers protocol.

We shall next explain the renegotiation game in detail.

[10] In the bankruptcy example, the probability of bankruptcy would be decreasing in firm expected profit.

The Renegotiation Game

Periods in the renegotiation game are denoted $t = 1, 2....$ Suppose that, in period 1, S makes an offer, which B may accept or reject.[11] If B accepts the offer, the negotiation game ends immediately, the two parties trade and realize the surplus $TS(c_S)$. If B rejects the offer, he is fired and replaced with probability $p_B(\Pi_B)$. If a manager is fired, his utility is zero.

We let

$$\delta_B x_B \equiv (1 - p_B(\Pi_B))d_B x_B \tag{6}$$

denote B's discounted utility from receiving a share x_B tomorrow rather than today. Then the game goes to the next round with the manufacturer's manager making a counteroffer. With probability $1 - p_B(\Pi_B)$, the "old" manager makes this offer, with probability $p_B(\Pi_B)$, a "new" manager makes this offer. If S accepts the offer, the negotiation game ends immediately. If S rejects the offer, he gets fired with probability $p_S(\Pi_S)$, which denotes the probability that the supplier makes a negative profit. Then the game proceeds to period 3, with the supplier's manager making the next offer. With probability $1 - p_S$, the "old" manager makes this offer and with probability p_S, a "new" manager is in place etc. Let $\delta_S = (1 - p_S(\Pi_S))d_S$. Note that the event that the bargaining process breaks down has zero probability since any manager who gets fired is replaced.[12]

Suppose that the manufacturer's per-period profit during renegotiation is given by $\widetilde{\mu}_B R_B(e) - k_B$ where k_B denotes per-period fixed costs such as wages and $R_B(e)$ denotes the firm's revenue, which is function of exclusivity only during renegotiations. The random variable $\widetilde{\mu}_B$ is distributed according to some distribution function F with mean 1 and variance σ_B^2.[13] The realization of the random variables occurs after an agent's decision to accept or reject.

[11] Our results do not change qualitatively if the buyer starts in period 1.

[12] For completeness, we assume that there two pools of manager types, a pool of type B-managers and a pool of type S-managers. All managers of the same type are identical, that is, they have the same preferences and use the same (stationary) strategies: each manager of the same type uses the same strategy during renegotiation.

[13] We assume that the random variables $\widetilde{\mu}$ are independently and identically distributed over time.

We assume $R_B(1) < R_B(0)$: without exclusivity, $e = 0$, the manufacturer can make some additional revenue during the renegotiation since he can buy inputs from an alternative low quality supplier, while this is not possible without exclusivity, $e = 1$. Thus, p_B, the probability that the manager gets fired depends on exclusivity terms, e, and we write now $p_B(e)$. The probability that profits are negative and the manager gets fired is then given by

$$p_B(e) = \text{Prob}(\widetilde{\mu}_B R_B(e) - k_B < 0) = F\left(\frac{k_B}{R_B(e)}\right). \tag{7}$$

Clearly this implies

$$p_B(1) > p_B(0) \quad \Leftrightarrow \quad \delta_B(1) < \delta_B(0) \tag{8}$$

since $R_B(1) < R_B(0)$. Similarly, let p_S denote the probability that the seller's profits are negative.

For simplicity we illustrate our point assuming that a manager is fired and replaced (or the firm goes bankrupt) if and only if profits are negative. What we actually only need is a negative correlation between per-period profits and the firing (bankruptcy) probability.

Analysis of the Game

We start from the back with the renegotiation game. Let $x_i(c_S), i = B, S$ denote the share player i obtains from the total surplus $TS(c_S)$.

Following Rubinstein (1982), in a subgame perfect equilibrium of the bargaining game both both players must be indifferent between accepting and rejecting an offer in any negotiation period t; consequently for the equilibrium shares $x_i(c_S)^*$, $i = B, S$, the following two equations must hold

$$TS(c_S) - x_S^*(c_S) - k_B = R_B(e) - k_B + (1 - p_B(e))d_B(x_B^*(c_S)) \tag{9}$$

$$TS(c_S) - x_B^*(c_S) - k_S = R_S - k_S + (1 - p_S)d_S(x_S^*(c_S)). \tag{10}$$

Consider the first of these two equations. On the left-hand side, there is B's payoff from accepting any equilibrium offer from S,x_S^*. If B accepts the proposal, trade takes place

and the parties realize the surplus (net of k_B). Since we assumed that equilibrium shares are large enough to cover k_B, the probability that B gets fired is zero. On the right-hand side, there is B's payoff should he reject: it is B's expected profit during renegotiation, $R_B(e) - k_B$, plus the discounted value of B's equilibrium payoff if B stays in charge which happens with probability $1 - p_B(e)$. Similarly for the second equation.

Solving the equations for the equilibrium shares yields, with $\delta_B(e) = (1 - p_B(e))d_B$ and $\delta_S = (1 - p_S)d_S$,

$$x_S^*(c_S) = \frac{\delta_B R_S - R_B(e)}{1 - \delta_B(e)\delta_S} + \frac{1 - \delta_B(e)}{1 - \delta_B(e)\delta_S} TS(c_S) \tag{11}$$

$$x_B^*(c_S) = \frac{\delta_S R_B(e) - R_S}{1 - \delta_B(e)\delta_S} + \frac{1 - \delta_S}{1 - \delta_B(e)\delta_S} TS(c_S). \tag{12}$$

In stage 2 of the game, the seller's investment decision solves

$$\max_{c_S} \qquad U_S(c_S, e) = \frac{\delta_S R_S - R_B(e)}{1 - \delta_B(e)\delta_S} + \frac{1 - \delta_B(e)}{1 - \delta_B(e)\delta_S} TS(c_S) - \phi(c_S). \tag{13}$$

Proposition 1 *The seller's investment level increases, that is, c_S decreases with contractual exclusivity.*

Proof. With $TS(c_S) = v - c_S$ and $\alpha(e) \equiv \frac{1-\delta_B(e)}{1-\delta_B(e)\delta_S}$, the first order condition of the problem in (13) reads as

$$-\alpha(e) = \phi'(c_S^*) \tag{14}$$

at an optimal investment(=cost) level c_S^*. Then,

$$\left.\frac{dc_S}{de}\right|_{c_S=c_s^*} = -\frac{\alpha'(e)}{\phi''(c_S)} < 0, \tag{15}$$

since $\alpha' > 0$ and $\phi'' > 0$. ■Proposition 1 is the main result of our paper. If an exclusivity provision increases the manufacturer's cost of haggling during the renegotiation, the seller's bargaining share and hence his incentives to invest increase. We think that this line of reasoning captures the intuition of real world practitioners as described by Frasco (1991) and Klein (1988) (see the Introduction).

It should also be noted that the two examples illustrated with our model reinforce each other: we can easily think of a situation where firms are run by managers and subject to the risk of bankrupcty at the same time; our argument follows then the same logic: contractual exclusivity increases the loss to delay for the manufacturer, makes him less patient and increases the seller's incentives to invest.

4 Extensions

The Nash bargaining solution and its strategic foundations suggest that there is a separation between the level of the threat points and the relative bargaining power of a player, which is usually determined by patience considerations. Our model suggests that a general application of these bargaining models might be problematic. People, when faced with real world decisions, might not behave according to that separation. In particular, players in a bargaining situation may view any increase in the level of a threat point for one player as an increase in that player's relative bargaining power as well. A recent experiment by Sonnemans, Oosterbeek and Sloof (2001) supports this

view. These authors test investment incentives in a model of optimal ownership and *specific* investments. The theory predicts that the level of investment should not be affected by the level of the no-trade payoffs (the level of disagreement points in the Nash bargaining solution). However, the experimental findings contradict that prediction. Investment levels increase (rather than remain constant) when the investor's no-trade payoff goes up. While Sonnemans, Oosterbeck and Sloof give no explanation why this happens, our paper offers and models an economic explanation for such a result and thus develops a theory of relative bargaining power. Hence, our paper can also be viewed as a first potential solution to the puzzle of these experimental findings.

4.1 Constant Time Cost

We shall now present an alternative model which illustrates our point. Again, exclusivity shall affect players' relative bargaining powers. While the two parties negotiate they face the costs of an ongoing concern (such as wages and rents) and make losses since the renegotiation stops them from producing and covering these costs. For the manufacturer, these losses vary with contractual exclusivity: with exclusivity, the manufacturer has nowhere to go and cannot cover these costs while without contractual exclusivity he could buy alternative inputs from another supplier, produce and sell a lower quality good and at least cover these fixed per-period costs. We shall illustrate *this* situation with a simple model based on the Rubinstein (1982) bargaining model with constant time cost.

Suppose that, during renegotiations, both firms face per-period costs k_S and $k_B \cdot e$. Without contractual exclusivity ($e = 0$) the manufacturer has the opportunity to cover its losses as described above. Suppose also that there is no discounting. If the manufacturer receives a share $x_B(c_S)$ after t periods of renegotiation, his payoff is $x_B(c_S) - t \cdot k_B \cdot e$ and similarly for the seller. Hence our model is a simple generalization of Rubinstein's (1982) classical model with constant time cost, where we endogenize these cost for one party, the buyer, through the exclusivity provision. In Rubinstein's (1982) model, the constant time costs per period are exogenously given for both parties. From Rubinstein (1982), the subgame perfect Nash equilibrium looks roughly as follows: the party with

the lower cost receives all surplus and the other party nothing *or* the party with the higher cost receives the value of it's per-period cost and the other party the total surplus minus this cost. Which of the two equilibria is played depends on who makes the first offer.

Proposition 2 *When $k_B > k_S > 0$, exclusivity affects 'internal' investment: the first-best investment is achieved with an exclusive contract, no investment is undertaken without.*

Proof. Suppose that S makes the first proposal in the renegotiation bargaining game. From Rubinstein (1982) we know that equilibrium shares and equilibrium strategies look as follows.

- If $k_S < k_B \cdot e$, then S gets all the surplus while B gets nothing. The (stationary) equilibrium strategies are: S offers $(TS(c_S), 0)$ and B offers $(TS(c_S) - k_S, k_S)$ (Share for S, share for B).

- If $k_S > k_B \cdot e$, then S gets $k_B \cdot e$ and B gets $TS(c_S) - k_B \cdot e$. Seller S offers $(k_B \cdot e, TS(c_S) - k_B \cdot e)$ and B offers $(0, TS(c_S))$.

Suppose that $0 < k_S < k_B$. Then, with $e = 0$, we have that S's bargaining cost is higher than B's, that is, $k_S > k_B \cdot e = 0$ and there is no investment at all; S chooses $\overline{c}_S$. If $e = 1$, we have $k_S < k_B \cdot e$. Then S gets all the surplus and chooses the efficient level of investment c_S^*.

Suppose that B makes the first proposal in the bargaining with S. Again, from Osborne and Rubinstein (1982) we find that with a nonexclusive contract B gets all the surplus and S chooses $\overline{c}_S$. With an exclusive contract, B obtains k_S, while S obtains $TS(c_S) - k_S$. This implies again that S chooses efficient level of investment, c_S^*. ■While the alternating offer model with constant time cost is problematic from a theoretical pont of view (extreme predictions, multiple equilibria if $k_S = k_B$), it has some appeal due to its simplicity and ability to directly capture our argument and the intuitive ones in Frasco (1991) and Klein (1988).

4.2 Inside Option Models

In our economic stories (and in both models), the payoffs that players obtain during bargaining play a crucial role. There is a class of bargaining models capturing the intuition that the flow of payoffs during negotiations is relevant, namely the so-called inside option models.[14] In inside option models, players bargain according to the rules of a standard Rubinstein alternating offers-model with discounting. A player's payoff is the discounted equilibrium share of the pie the two players agree on, plus the discounted sum of payoffs for each player suring renegotiations (the inside option). Indeed, equations (9) and (10) are the standard ones when solving for equilibrium shares in an inside options model. In a pure inside options model, however, δ_B would not be a function of e.

Then the seller's investment solves[15]

$$\max_{c_S} \qquad U_S(c_S, e) = \frac{\delta_B R_S - R_B(e)}{1 - \delta_B \delta_S} + \frac{1 - \delta_B}{1 - \delta_B \delta_S} TS(c_S) - \phi(c_S). \tag{16}$$

Note that exclusivity *does* influence the first term in that equation which is dermined by the player's inside option payoffs. But it does not influence the share which the seller gets from the bargaining. From this we obtain the following Proposition.

Proposition 3 *In a standard inside options model, exclusivity is irrelevant for investment incentives*

While the result follows formally from observation of equation (16), it is also instructive to note that inside option payoffs are to be identified with disagreement payoffs in the accordingly defined Nash bargainig solution (see, for example, Muthoo (1999), ch. 6). Hence, if exclusivity affects inside option payoffs(=disagreement payoffs only), then we know from Segal and Whinston (2000b) that exclusivity has no effects on investment incentives.

[14] Haller and Holden (1990) and Fernandez and Glazer (1991) model wage bargaining between a union and a firm where in each period the union may go on strike (which yields an inside option payoff of zero for that period) or not (which implies payment of the some fixed pre-negotiation wage). In Busch and Wen (1995) the inside option payoffs are determined by a strategic game which is played between the two bargainers while they disagree. See Muthoo (1999), ch. 6, for an overview.

[15] Assume $\Pi_B(e) + \Pi_S \leq TS(c_S)$ so that agreement is always efficient.

Note also that a model with inside options is formally equivalent to a constant time cost model in which players discount their costs while bargaining and discount also the share of the pie in an agreement. The only difference is that, in our formulations, the constant time costs per period would be negative inside option payoffs.

5 Concluding Remarks

The problem identified in this paper is inherent to other situations than exclusive supply relations. Consider, for example, the property rights theory as developed by Grossmann and Hart (1986). In that model, an investment variable and a variable modelling ownership enters players' disagreement points. The investment variable also enters the surplus over which players (re)negotiate. The main point of this literature is the finding that ownership for a player increases that players' incentives to invest. Suppose that the disagreement point in such a model does *not* depend on investments taken by the parties. That is, investments are purely internal in the sense of Segal and Whinston (2000b). This assumption may be justified if investments are purely relation-specific or investments in purely human capital. In both scenarios, the assumption that the investment variable *does* enter a player's disagreement payoff does not seem the appropriate one. But then, as in Segal and Whinston (2000b) ownership is completely irrelevant for incentives to invest. According to our idea suppose that ownership of the firm helps a player to cover some of his running cost while renegotiations take place. This assumption seems reasonable for many situations, because ownership of the firm may imply that a player might produce and sell other products or obtain some other revenue simply because he owns the firm. This tends to increase the share that this player obtains in renegotiations and his incentives to invest. Then ownership does play a role, increasing incentives to invest even though the investment is purely internal.

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