Exclusive Contracts, Loss to Delay and Incentives to Invest

Christian Groh* and Giancarlo Spagnolo†

February 2003 - COMMENTS WELCOME

Abstract

We take the view that alternative trading opportunities may influence the loss to delay in a bargaining situation, and show that contractual exclusivity may then be relevant even for 'internal' investments, contradicting a recent finding by Segal and Whinston (2000). When a buyer is an ongoing concern, exclusivity in supply increases his cost of haggling/bargaining with the supplier by preventing him to buy substitute inputs, produce and cover running costs during renegotiations. This may imply a larger bargaining share for the seller and increase his investment incentives. We model this effect using Rubinstein's (1982) bargaining model with constant but endogenous time cost.

*Department of Economics, University of Bonn, Konrad-Adenauerallee 24-42, D-53113 Bonn, Germany; telephone: +49-(0)228-73-9241; fax: e-mail correspondence: *groh@wiwi.uni-bonn.de*

†Department of Economics, University of Mannheim, and CEPR. e-mail correspondence: *gianca@uni-mannheim.de*

1 Introduction

Exclusive contracts – agreements prohibiting a contracting party to deal with third parties – have drawn considerable attention in the recent economic literature because of their potential anticompetitive effects.[1] These contracts are quite common in reality. 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)). In a celebrated paper, 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.[23]

A recent paper by Segal and Whinston (2000) (henceforth SW) elegantly addresses this issue within a formal, incomplete contracting model. Little support is found for the above motivation for exclusive dealing. In their framework, an exclusivity provision requiring a buyer B to buy only from an incumbent seller S, cannot induce the seller to invest more if the specific investment is purely "internal", in the sense that it affects only gains from trade between B and S. This "irrelevance result" breaks down – so that exclusivity affects S's incentive to invest – only when the investment is "external", when it increases the value of trade with some third party E.

In this paper we argue instead that exclusivity terms can be relevant even for internal investments when they directly affect the parties' costs from delayed agreement in renegotiations. Our idea is simple: without contractual

[1] In terms of entry deterrence. The formal debate was opened by Aghion and Bolton (1987), and continued with Rasmusen, Ramseyer and Wiley (1991), Bernheim and Whinston (1998), and Segal and Whinston (2000a,b).

[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.

[3] 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 by GM (locating close to its plants). The contract then became a burden for GM, who eventually decided to integrate vertically by acquiring Fisher Body.

exclusivity, the buyer may buy inputs from another seller, produce, and cover some of the running costs he may face while bargaining. This is not possible with contractual exclusivity. The seller's bargaining power is then larger when there is exclusivity, which may increase his incentives to invest. Endogenizing bargaining cost in Rubinstein's (1982) bargaining model with constant time cost, we find that when running costs are substantial, first-best investment obtains with contractual exclusivity, no investment is undertaken without.

As SW note, their irrelevance result is surprising. We were also puzzled when reading it, as our intuition was the standard one that by signing an exclusive contract a buyer becomes a weaker bargaining opponent, which increases the seller's bargaining power, his *share* of the surplus, and incentive to invest. The crucial ingredient of Segal and Whinston's irrelevance result is that in their model "...the role of exclusivity is to establish the disagreement point for renegotiation" (p. 604). This implies that exclusivity does increase the amount of surplus obtained by the seller, but only by reducing the buyer's disagreement payoff. The *share* of the surplus going to S, the determinant of S's (marginal) incentive to invest, remains constant and equal to $\frac{1}{2}$ by the assumption that – independent of the exclusive contract – parties have equal bargaining power and split surplus according to the symmetric Nash bargaining solution.

The questions we ask here are the following. Is it really always the case that exclusivity only establishes the disagreement point for renegotiation? Aren't there situations in which exclusivity also affects a party's cost of haggling over terms of trade, his cost of bargaining, making him relatively less willing to refuse an offer in order to make a counteroffer? In these cases, shouldn't exclusivity increase the seller's bargaining power, his *share* of the surplus, besides reducing the buyer's disagreement payoff?

We have in mind the following, natural kind of situation. A manufacturer regularly buys a specific intermediate product from a high quality dedicated supplier, although other potential input suppliers exist (perhaps of lower quality). In the middle of the production process, the supplier may interrupt supply and claim that the costs are higher than expected so that a price adjustment is needed, even though everybody knows that nothing has changed. Absent an exclusive contract, while bargaining with the usual supplier the manufacturer can go on producing and selling (perhaps at reduced price) by temporarily acquiring lower quality intermediate goods from alternative sources. With an exclusive contract, while bargaining with the usual supplier the manufacturer cannot buy intermediate goods elsewhere, hence he cannot produce and sell, while he still has to pay the fixed per period costs of any ongoing concern, wages, rents, etc. Clearly, with an exclusive contract the manufacturer will face (besides a lower disagreement payoff) higher costs of spending time haggling than without the exclusivity provision. Shouldn't this translate into a larger *share* of the surplus and improved incentives to invest for the seller?[4] We hence go back to Rubinstein's (1982) classical paper and use the model with *constant time cost* to illustrate this point. In that framework *costs* of haggling are the central issue, and the effects of exclusivity on internal investment emerge simply and naturally.

The reminder of the paper is organized as follows. In section 2 we sketch Segal and Whinston's irrelevance result and frame our idea using the asymmetric Nash Bargaining solution. In section 3 we present a simple model where parties renegotiate according to Rubinstein's model with constant cost of bargaining, endogenize the cost of bargaining and obtain a result consistent with our intuition. In section 4 we discuss alternative models and additional reasons why exclusivity may affect internal investment. In that section we also show that we can obtain our intuition in an inside options model without constant time cost and discounting. Section 5 briefly concludes.

2 Internal investment and bargaining power

To understand SW's irrelevance result, consider the example in section 2 of their paper.[5] 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.

[4] Some exclusive suppliers appear to think so. According to Walton (1997), after Ford started relying exclusively on Lear for the supply of the Ford Taunus seats and to face repeated requests to renegotiate the seats' price, "There were people at Lear who couldn't believe Ford had gotten itself in this position. One Lear executive [...] told her that Ford was crazy - Lear had them by the short hairs. They can't keep saying they need more money and more money, and Ford has nowhere to go" (p. 196).

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

In the presence of E, the three parties renegotiate to an ex post efficient outcome. If E is the more efficient supply, 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 (nonexclusive) contract while 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 of an amount $\frac{1}{2}\max\{v - c_E, 0\}$ independent of S's investment. Thus, 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 much more general settings (Proposition 1 in their paper) and show that exclusivity does 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 shares with and without exclusivity. But

SW show that with outside option bargaining, as in Binmore at al. (1986), exclusivity may even decrease investment. However, if one changes the extensive form of that bargaining game allowing the buyer to opt out after any of his proposals was rejected, as seems natural, one would find that exclusivity increases incentives to invest (see Shaked (1994)).

While a change in the extensive form of the bargaining game is one way to see that exclusuivity may be relevant we propose a different approach which concentrates on the costs of bargaining. To frame better the following discussion, 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

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

SW assume $\lambda = 1/2$. The mathematical structure of the Nash bargaining solution thus introduces a *separation* between the share of the pie a player receives, λ, and the value of the disagreement point. More precisely: any change in the disagreement point does not have any effect on the share of the pie λ which a player receives. Of course, 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 the equilibrium share of a player – his bargaining power – is increasing in his patience (see e.g. Muthoo (1999), p. 51). By the same fundamental logic, other factors affecting parties' relative losses to delay *should* also affect bargaining power and the equilibrium *shares* of the pie. [6] According to *our* story, this separation should not occur: when exclusivity substantially increases haggling costs, λ should be a function of e, where $\lambda(e = 0) < \lambda(e = 1)$ because of B's higher costs of waiting for a counter offer if there is an exclusive contract: without an exclusive contract

[6] Accepting the conventional symmetric Nash bargaining solution approach implies accepting that the *only* determinant of internal cost-reducing investments in supply relations are agents' exogenous, innate, subjective intertemporal preferences; and that economic evolution should select patient people as parties that have to invest much (sellers in the model) and impatient people as parties whose investment is not too important (buyers), which seems rather odd.

the buyer would be able to cover some of his running costs while bargaining with the seller, with exclusivity, this is not possible.

In the next section, we adopt *Rubinstein's model with constant bargaining cost* (constant loss to delay) that fits perfectly the running costs/ongoing concern story, and show that this effect emerges simply and naturally in that environment.

3 A simple model where exclusivity matters

A seller 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 $\phi_S(\overline{c}_S) = 0$.

A buyer B wishes to buy one unit of the specific input good to produce one unit of a final good valued at v. He cannot make any cost reducing investments and further units of the final good are valueless. The buyer B is an ongoing concern (think of a car manufacturer) facing fixed per-period costs $c_B > 0$ (wages, rents, opportunity costs of immobilized capital, etc.). There is a competitive spot market for input goods where imperfect, low quality (non-specific) substitutes of S's product are sold. Using this input goods B produces a low value good worth just enough to cover ongoing costs.[7]

In this framework, the effect of an exclusive contract restricting B to buy from S is to increase B's cost in a period in which S does not deliver the good. Suppose first that there is no exclusive contract between B and S. Then if for one period S does not deliver the input, B can in that period buy a substitute input from the spot market, produce and sell the lower value product, thereby covering his running costs c_B. Suppose B awards contractual exclusivity to S. Then, for each period in which S does not deliver the input, B cannot produce but has to face the full ongoing costs c_B. Hence we write B's per-period cost while waiting for S's input as $e \cdot c_B$, where $e = 0$ means that B and S have a non-exclusive contract while $e = 1$ means that B and S have an exclusive contract.

The precise timing of the game is then as follows.

[7] This simplifies exposition. The result continues to hold if the firm makes positive profits when producing with the low quality input, or when only a fraction of the running costs can be covered.

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). Before the input is delivered so that production can takes place, B and S renegotiate. We assume that bargaining takes place according to the alternating offer bargaining game à la Rubinstein (1982) with constant time cost (see also Osborne and Rubinstein (1990, section 3.3.3). Time runs from 0 to (possibly) ∞. The period in the bargaining game may differ from a production period: we let θ denote the ratio between a production period and a bargaining period. The per-period bargaining cost for S is $k_S > 0$ independent from the sort of contract S and B have. The per-period bargaining cost for B is $k_B > 0$, to which must be added the ongoing cost $e \cdot \frac{c_B}{\theta}$ when an exclusivity provision has been signed. We further adopt all of the assumptions (A1) to (A5) in Osborne and Rubinstein, ch.3.3.1., (which are also listed in the next section).

Stage 4: After renegotiations are terminated, production takes place, the final good is sold, and the exclusivity provision - if signed at stage 1 - expires.

If Stage-3 renegotiations go on for t periods, B has to pay $k_B + e \cdot \frac{c_B}{\theta}$ t times, and c_B in the period of production. This implies that the total available ex-post surplus over which B and S bargain, once the firm has been established and renegotiations have terminated immediately, is given by $TS(c_S) = v - c_B - c_S$. Let c_S^* denote the efficient cost level, i.e. the cost level which maximizes $TS(c_S) - \phi(c_S)$.

Proposition 1 *When $k_B + \frac{c_B}{\theta} > k_S > k_B$ 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 Osborne and Rubinstein (1990, Theorem 3.4) we know that equilibrium shares and equilibrium strategies look as follows.

- If $k_S < k_B + \frac{c_B}{\theta} \cdot e$, 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 $k_S > k_B + \frac{c_B}{\theta} \cdot e$, then S gets $k_B + \frac{c_B}{\theta} \cdot e$ and B gets $TS(c_S) - k_B - \frac{c_B}{\theta} \cdot e$. Seller S offers $(k_B + \frac{c_B}{\theta} \cdot e, TS(c_S) - k_B - c_B \cdot e)$ and B offers $(0, TS(c_S))$.

Suppose that $k_B < k_S < k_B + \frac{c_B}{\theta}$. Then, with $e = 0$, we have that S's bargaining cost is higher than B's, that is, $k_S > k_B + \frac{c_B}{\theta} \cdot e = k_B$ and there is no investment at all; S chooses $\overline{c}_S$. If $e = 1$, we have $k_S < k_B + \frac{c_B}{\theta} \cdot e = k_B + c_B$. 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 (1990, Theorem 3.4) 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^*. ■

The Proposition states that exclusivity matters when it is 'relevant enough': without exclusivity, $B's$ cost from bargaining is less than S's cost whereas with exclusivity B's cost exceeds S's cost. If B's bargaining cost is less than S's even with contractual exclusivity, a contract without exclusivity would not alter the results of the bargaining game.

4 Inside Options and Endogenizing Patience

We believe that the model with constant time cost captures Frasco's and Klein's intuition in a direct and straightforward way. Though, the predictions of the model (one player might obtain all the surplus while the other player obtains nothing) might appear quite extreme, there is not discounting and one could think about other formulations and renegotiation models which capture our idea that exclusivity affects a player's cost of bargaining while renegotiating with the seller.[8]

In our economic story, costs of an ongoing concern play the crucial role. There actually does exist a class of bargaining models which seems to capture the intuition that the flow of payoffs obtained while negotiating is relevant, namely the so-called inside option models (see Muthoo (1999), ch. 6, for an overview). In an inside option model, players bargaining according to the rules of a standard Rubinstein model with discounting. A player's payoff is the discounted equilibirium share of the pie the two players agree on plus a sum of discounted payoffs that each player receives while negotiations take place (the inside option). 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. In our story, this discounted flow of payoffs is the sum of the costs for the buyer while renegotiations take place. However, this cost cannot be changed by any decision of any player while renegotiations take place since it is determined by exclusivity terms. In other words: we assume the buyer's action (buy inputs on a spot market or not while renegotiations take place) to be completely determined by contractual exclusivity.

In such an inside option model the renegotiation payoff u_i for player $i = B, S$ would be

$$u_S = -\sum_{t=1}^{T} \delta_S^{t-1} k_S + \delta_S^T x_S(c_S) \tag{6}$$

[8]Moreover, if the constant time cost are equal for both players, there is a multiplicity of subgame perfect equilibria.

and

$$u_B = -\sum_{t=1}^{T} \delta_B^{t-1}(k_B + \frac{c_B}{\theta} \cdot e) + \delta_B^T x_S(c_S) \tag{7}$$

where δ_i denotes the discount factor and $x_i(c_S)$ denotes the share of the whole cake $TS(c_S)$ which player i obtains when bargaining lasts for T periods. The first part in the players' payoff functions contains the so-called inside option, that is, a flow of payoffs (here: costs) which the players obtain while negotiations take place. The absolute value of the inside option for the buyer, that is, the discounted sum of bargaining costs, increases with contractual exclusivity. Note also that, for $\delta_B = \delta_S = 1$, these payoffs are formally equivalent to the payoffs in the model with constant time cost of the previous section.[9]

Using standard arguments (which we lay out in the Appendix) one can show that this bargaining game has a unique equilibrium[10] and that the seller's investment is

$$\max_{c_S} \qquad U_S(c_S, e) = \frac{(k_B + \frac{c_B}{\theta} \cdot e) - \delta_B k_S}{1 - \delta_B \delta_S} + \frac{1 - \delta_B}{1 - \delta_B \delta_S} TS(c_S) - \phi(c_S) \tag{8}$$

Proposition 2 *In the standard inside options model where player's payoffs are given by (6) and (7), the seller's investment problem is given by maximization of (8). Thus, marginal incentives to invest do not depend on e and exclusivity is irrelevant.*

Proof. Follows straightforward from the seller's investment problem, equation (8). See the Appendix for a derivation of the equilibrium of the renegotiation game leading to (8). ■ The Proposition states that within a standard inside option model one obtains again an irrelevance result à la Segal and Whinston. To see why note that the inside option model is equivalent to the standard Rubinstein model with discounting with the difference that the inside option model has an impasse point (payoffs which players obtain while bargaining) which is positive while the impasse point in the Rubinstein model with discounting is zero. Also the limiting payoff (as the time interval between periods of negotiation becomes small) of a standard inside

[9] We also assume that $TS(c_S)$ is sufficiently large for all c_S so that players cannot have negative equilibrium payoffs.

[10] In contrast to the above mentioned literature on inside options our agents do not take any actions while bargaining takes place, hence there is a unique equilibrium.

options model is identical to the asymmetric Nash bargaining solution (see Mutho, ch. 6, (1999)), where a player's disagreement payoff is given by the discounted value of his inside option. Hence, in an inside option model each player obtains the value of his (discounted) inside option plus a share of the surplus of the pie over the sum of the (discounted) inside options of the two players. From this analogy with the Nash bargaining solution it must be that the share in turn depends only on players' discount factors and not on the value of the inside option since this value only affects (i.e. is equal to) the disagreement payoffs. If contractual exclusivity were to affect the value of the buyer's inside option (i.e. his costs of haggling/bargaining), there can be no effect on the seller's incentive to invest in the surplus of the relation.

Remark 1 *As mentioned, for $\delta_B = \delta_S = 1$, this inside options model corresponds to the Rubinstein model with constant time cost. As is well know, this model has quite drastic predictions: one player might obtain everything and there is a multiplicity of equilibria if costs are equal. Our analysis here shows that a model with constant time cost and discounting yields much less drastic predictions and that there is a unique equilibrium even if time costs are equal. Hence Rubinstein's idea of constant time cost of bargaining actually yields quite reasonable results for a wide range of discount factors smaller than one.*

We must conclude that a standard inside options model reflects our economic story but that contractual exclusivity is not relevant for investment: we obtain again a seperation between the share a bargaining player obtains and the value of the inside option. And again we think that this separation is not necessarily a property of real world bargaining and that using it to evaluate the effects of exclusivity on investment may not be appropriate.
Suppose, however, that contractual exclusivity not only decreases the payoff a buyer can obtain while sitting in renegotiations with a seller but that contractual exclusivity may also lower his time preference. After all, if renegotiation is modeled as an inside option bargaining game, the *loss to delay* consists not only on the value of the inside option but also on time preference, i.e. the discount rate. Thus, even if one accepts the logic of the inside options model, one could still argue that discount rates in such a model could or should not be taken as pure preferences but rather as costs of waiting. If contractual exclusivity has an effect on these costs of waiting, then this should be modelled as an effect which contractual exclusivity has on patience

and one should endogenize the cost of waiting. The idea that time preference is endogenous is not new.[11] One example is the work by Becker and Mulligan (1997). These authors assume that a consumer may take some effort to increase his appreciation on future utility. More precisely, a consumer's discount factor is increasing in spending resources on imagining possible future events. In particular, they show that rich people should have the greatest incentive to invest in time preference and that an increase in life expectancy should also people induce to put more weight on the future and to spend more on appreciating future pleasures. Moreover, they find and collect some empirical evidence for the claim that wealth increases patience.

Becker's and Mulligan's findings are supportive in sketching a model in which the effects of wealth on an inside option *and* the effects of wealth and mortality on patience play a role. We are then able to show that contractual exclusivity is relevant even in an inside options model. Thus our economic story can not only be modelled in a model with constant time cost and without discounting. We believe that this makes our economic intuition about the role of exclusivity for bargaining costs - which we emphasize as the main message of this paper - more robust.

Suppose, that, in each period, there may be an exogenous shock attacking the buyer's firm whose per-period fixed cost and bargaining cost are again given by $k_B + c_B \cdot e$ (wlog, we assume $\theta = 1$). The firm's per-period profits are now $\widetilde{\mu}\pi$, where $\widetilde{\mu}$ denotes a random variable which is distributed according to some distribution function $F(\widetilde{\mu})$ and where π denotes the "normal" profit level for the firm during the renegotiations.[12] Hence, the firm's profits are now a random variable as well and are given by $\widetilde{\pi} = \widetilde{\mu}\pi - (k_B + c_B e)$ for each period. The firm survives if and only if it has positive profits, which happens with probability $1 - F(\frac{k_B + c_B e}{\pi})$. Let hence $p(e) \equiv 1 - F(\frac{k_B + c_B e}{\pi})$. Note that $p(1) < p(0)$. The firm survives then only with probability $p(e)$, that is, with probability $1 - p(e)$ the firm goes bankrupt (or the manager of the firm conducting the renegotuations gets fired). An exclusive contract reduces these profits since nothing can be sold while renegotiations take place since the buyer may not use an external source (spot market) to buy inputs: $p(1) < p(0)$. Hence we adopt here the (realistic) assumption that an increase in the cost of bargaining does not only worsen the buyer's position in the

[11] However, to the best of our knowledge, this idea has not been merged with the mainstream-theory of bargaining which relies on time preference.

[12] For example, the random variables $\widetilde{\mu}$ could be distributed according to $\widetilde{\mu} \overset{\text{iid}}{\sim} N(1, \sigma^2)$.

renegotiation game but that it may even imply that the buyer goes bankrupt. This is consistent with this paper's central claim that contractual exclusivity should affect the loss to delay in the renegotiation game: in an inside option model, the loss to delay has two parts, the value of the inside option and time preference. Hence we find it plausible that exclusivity terms should affect both the inside option *and* the time preference. Together with the buyer's subjective and exogenously given discount factor d_B, we write $\delta_B(e) \equiv d_B \cdot p(e)$ for the buyer's time preference $\delta_B(e)$. That is, for given d_B, the buyer takes the future in account "sufficiently" if and only the if probability of surviving to the next period is "sufficiently high". This reflects the plausible intuition that wealth increases the buyer's survival probability which in turn increases the buyer's appreciation of the future. Recall that this effect is supported through Becker's and Mulligan's empirical findings.
In such a model the renegotiation payoff u_i for player $i = B, S$ would be

$$u_S = -\sum_{t=1}^{T} \delta_S^{t-1} k_S + \delta_S^T x_S(c_S) \tag{9}$$

and

$$u_B = -\sum_{t=1}^{T} \delta_B^{t-1}(e)(k_B + \frac{c_B}{\theta} \cdot e) + \delta_B^T(e) x_S(c_S). \tag{10}$$

With the same arguments as before, we obtain that the seller's investment decision in such a model is

$$\max_{c_S} \qquad U_S(c_S, e) = \frac{(k_B + \frac{c_B}{\theta} \cdot e) - \delta_B(e) k_S}{1 - \delta_B(e)\delta_S} + \frac{1 - \delta_B(e)}{1 - \delta_B(e)\delta_S} TS(c_S) - \phi(c_S) \tag{11}$$

Proposition 3 *In a model where player's payoffs are given by (9) and (10), the seller's investment level increases with contractual exclusivity.*

Proof. Follows from observation of (11). ■ In a framework in which exclusivity plays a role for both the value of the inside option and for time preference (which both capture the loss to delay in that renegotiation model) we obtain that an exclusive contract increases the seller's incentive to invest.

5 Concluding Remarks

We argued that if an exclusive provision increases a party's cost of bargaining, for example preventing it from covering its running cost while bargaining by trading with a third party, then it should influence investment even when this is 'internal'. We then showed that a theoretical result confirming this intuition emerges naturally using Rubinstein's (1982) fixed bargaining costs model. More generally, our point is that an exclusivity provision may affect the loss of delay in bargaining situation and hence exclusivity is relevant since the relative loss of delay of the players determine their bargaining shares.

In many circumstances parties face repeated trading opportunities, so that business relationships last for more than one period. It is worth noting that little changes when there are repeated trading opportunities between B and S, so that the situation modeled in the previous section is repeated. Since we have a unique equilibrium, when our game is repeated a finite number of periods the same outcome occurs in each period: B and S agree on an exclusive contract and S chooses to invest efficiently. If the situation is repeated infinitely, the set of equilibria expands but the static equilibrium survives.

We conjecture that the point made in this paper could also be made maintaining (generalized) Nash bargaining but endogenizing players' discount factors. In our view, players' discount factors in the generalized Nash bargaining solution should be regarded as indexes of how costly it is for each player to reject an offer, not just as the innate, subjective intertemporal preferences of the players. An increase in bargaining costs should then be reflected in players' discount factors and in the relative shares of the pie, so that 'internal' investments would not be exclusively determined by players' innate, subjective preferences. The validation of this conjecture, however, must be left to future work.

Last, we note that the problem identified in this paper is inherent to other situations as well. 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' disagreemtn 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 (2000). 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 (2000) ownership is completely irrelevant for incentives to invest! Again, our idea may be employed: suppose that ownership of the firm helps a player to cover some of his running cost while renegotiations take place. This assumption seems reasonable, because ownership of the firm may imply that a player might produce and sell other products or obtain some other revenue simply from the fact that he owns the firm, while the other player does not. With our model, this increases the share that player obtains in renegotiations and hence increases his incentives to invest. Then, ownership does play a role and increases incentives to invest although the investment is purely internal.
Let us also mention that simple experiments could shed a light on the question if investment decisions are affected by exclusive dealing or not. In particular, such experiments could reveal if real life actors actually separate effects of alternative trading options on the disagreement payoff/outside option and on the share of the pie bargainned over. After all, it is this separation which we find in so many bargaining models and which seems not to natural.

6 Appendix

Proof of Proposition 2

Given are the renegotiation payoffs for player $i = B, S$

$$u_S = -\sum_{t=1}^{T} \delta_S^{t-1} k_S + \delta_S^T x_S(c_S) \tag{12}$$

and

$$u_B = -\sum_{t=1}^{T} \delta_B^{t-1} (k_B + \frac{c_B}{\theta} \cdot e) + \delta_B^T x_S(c_S). \tag{13}$$

By standard arguments, both players must be indifferent between accepting and rejecting an offer and the following two equations must hold

$$TS(c_S) - x_B^*(c_S) = -k_S + \delta_S x_S^*(c_S) \tag{14}$$

$$TS(c_S) - x_S^*(c_S) = -(k_B + c_B \cdot e) + \delta_B x_B^*(c_S) \tag{15}$$

where x_i^* denotes the equilibrium share for player $i = B, S$. Solving these equations for the equilibrium shares yields

$$x_S^*(c_S) = \frac{k_B + c_B - \delta_B k_S}{1 - \delta_B \delta_S} + \frac{1 - \delta_B}{1 - \delta_B \delta_S} TS(c_S) \tag{16}$$

$$x^*_B(c_S) \quad = \quad \frac{k_S - \delta_S(k_B + c_B)}{1 - \delta_B\delta_S} + \frac{1-\delta_S}{1-\delta_B\delta_S} TS(c_S). \tag{17}$$

if $e = 1$ (exclusive contract) and

$$x^*_S(c_S) \quad = \quad \frac{k_B - \delta_B k_S}{1 - \delta_B\delta_S} + \frac{1-\delta_B}{1-\delta_B\delta_S} TS(c_S) \tag{18}$$

$$x^*_B(c_S) \quad = \quad \frac{k_S - \delta_S k_B}{1 - \delta_B\delta_S} + \frac{1-\delta_S}{1-\delta_B\delta_S} TS(c_S). \tag{19}$$

if $e = 0$ (nonexclusive contract). The overall payoff for S is hence

$$U_S(c_S, e) = \frac{(k_B + c_B \cdot e) - \delta_B k_S}{1 - \delta_B\delta_S} + \frac{1-\delta_B}{1-\delta_B\delta_S} TS(c_S) - \phi(c_S). \tag{20}$$

References

[1] Aghion, P., and P. Bolton (1987), "Contracts as a Barrier to Entry", *American Economic Review* 77: 388-401.

[2] Becker, G., and C. Mulligan (1997), "The Endogenous Determination of Time Preference", *Quarterly Journal of Economics* 106: 729-758.

[3] Bernheim, D., and M. Whinston (1998), "Exclusive Dealing", *Journal of Political Economy* 106: 64-103.

[4] Binmore, K., A. Rubinstein and A. Wolinsky (1986), "The Nash Bargaining Solution in Economic Modelling", *Rand Journal of Economics* 17: 176-188.

[5] Busch, L., and Q. Wen (1995), "Perfect Equilibria in a Negotiation Model", *Econometrica* 63: 545-565.

[6] Fernandez, R. and Glazer, J. (1991), "Striking for a Bargain between two Completely Informed Agents", *American Economic Review*, 81:240-252.

[7] Frasco, G. (1991), *Exclusive Dealing: A Comprehensive Case Study.* University of America.

[8] Grossman, S. and O. Hart (1986), "The Costs and Benefits of Ownership: A Theory of Vertical and Lateral Integration ", *Journal of Political Economy* 94: 176-188.

[9] Haller, H. and Holden, S. (1990), " A Letter to the Editor on Wage Bargaining", *Journal of Economic Theory*, 52:232-236.

[10] Klein, B. (1988), "Vertical Integration as Organizational Ownership: The Fisher Body - General Motors Relationship Revisited", *Journal of Law, Economics, and Organization (4)*, reprinted in S. Masten, ed. (1996), *Case Studies in Contracting and Organization,* Oxford University Press.

[11] Muthoo, A. (1999), *Bargaining Theory with Applications*, Cambridge University Press.

[12] Osborne, M. and A. Rubinstein (1990), *Bargaining and Markets*, Academic Press.

[13] Rasmusen, E., Ramseyer, M., and J. Wiley, Jr. (1991), "Naked Exclusion", *American Economic Review* 81:1137-45.

[14] Rubinstein, A. (1982), "Perfect Equilibrium in a Bargaining Model", *Econometrica* 50:97-110.

[15] Shaked, A. (1994), "Opting Out: Bazars versus 'High Tech' Markets", *Investigaciones Economicas* 18: 421-432.

[16] Segal, I. and M. Whinston (2000a), "Naked Exclusion: Comment", *American Economic Review* 90(1): 296-309.

[17] Segal, I. and M. Whinston (2000b), "Exclusive Contracts and Protection of Investments", *Rand Journal of Economics* 31(4): 603-33.

[18] Walton, M. (1997), *Car, A Drama of American Workplace*, W.W. Norton & Company.