Rent Shifting and the Order of Negotiations

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Abstract

When two sellers negotiate terms of trade with a common buyer, the order in which the negotiations occur can affect the buyer’s payoff. This suggests that the buyer may have preferences over which seller to negotiate with first. We find that when the efficient outcome calls for the buyer to purchase from only one seller, the buyer weakly prefers to negotiate first with the inefficient seller, and when the efficient outcome calls for the buyer to purchase from both sellers, the buyer prefers to negotiate first with the seller that has less bargaining power, or offers a smaller stand-alone surplus, all else being equal. These conclusions hold whether or not penalty clauses are feasible.

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1 Introduction

The study of three-party negotiations in which one player negotiates terms of trade with each of two other players is complicated by the fact that when the negotiations occur sequentially, the contract terms agreed to in the first negotiation may affect the outcome of the second negotiation. It is also complicated by the fact that the order in which the negotiations occur may affect the overall division of surplus and, in particular, the common player’s payoff.

Although the externalities involved in three-party negotiations, notably the use of contracts to engage in rent-shifting and/or opportunism, have been widely studied, first by Aghion and Bolton (1987) and then by many others (e.g., Bizer and DeMarzo, 1992; Dobson, 1994; McAfee and Schwartz, 1994; Spier and Whinston, 1995; Hermalin and Weisbach, 1998; Noe and Wang, 2000; Marx and Shaffer, 2002; and Marshall and Merlo, 2004), the order in which the negotiations occur has received little attention. One reason for this may be that the player with the most say in determining the order of negotiations, the common player, will typically be indifferent when the competing players are identical or symmetric, or when it has no bargaining power and hence has no stake in the negotiated outcomes. But in reality there may be asymmetries between competing players, and the common player may have bargaining power (examples of a large buyer negotiating with its various suppliers abound). In these cases, the literature on three-party negotiations, with a few exceptions to be discussed below, is silent as to whom the common player should negotiate with first.

The order in which the negotiations occur is important not only from a business standpoint (how to maximize profit) but also from an economics standpoint in terms of efficiency. Even when contracting is efficient, the player moving first in the case of opportunism or second in the case of rent shifting may be disadvantaged relative to its rival, and this may cause the competing players to engage ex-ante in wasteful rent-seeking activities to ensure a more favorable position with the common player. Competition may also be harmed if the

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induced asymmetries caused by the common player choosing to negotiate in sequence lead to under or over investment in cost-reducing technologies or demand-enhancing innovations.

In this paper, we abstract from these efficiency concerns in order to focus more succinctly on the underlying cause. In particular, we focus on the rent-shifting aspect of three-party negotiations by considering a static environment in which two asymmetric sellers negotiate terms of trade with a common buyer. As one might expect, we find that when the negotiations occur sequentially, the buyer and the first seller can use their contract to extract rents from the second seller. Moreover, we find that the order in which the negotiations occur will in general affect all three players’ payoffs, not just the two sellers’ payoffs. This suggests that the buyer may have strict preferences over the order of negotiations, and it naturally raises the question of which seller the buyer will prefer to negotiate with first. In characterizing the buyer’s preferred order of negotiations, we find that the answer depends on whether the efficient outcome (the outcome that maximizes overall joint payoff) calls for the buyer to purchase from one or both sellers, the strength of the buyer’s bargaining power with respect to each seller, the magnitude of each seller’s stand-alone surplus, and the allowable contracts.

We consider a three-stage game in which the buyer first negotiates in sequence with each seller and then, after its contracts are in place, chooses its quantities. We find that when the efficient outcome calls for the buyer to purchase from only one seller, the buyer will weakly prefer to negotiate first with the inefficient seller. The reason is that the buyer and this seller can then use their contract to engage in rent shifting in order to extract surplus from the efficient seller and reduce its payoff, whereas the ability of the buyer and the first seller to engage in rent-shifting is superfluous if the buyer negotiates with the efficient seller first.

However, when the efficient outcome calls for the buyer to purchase from both sellers, the buyer’s preferences will depend on which seller has more bargaining power in addition to which seller’s offering yields the higher stand-alone surplus. We find that the buyer will prefer to negotiate first with the seller that has less bargaining power, or offers a smaller stand-alone surplus, all else being equal. The reason is that in this case the buyer generally cares about two things in deciding in what order to proceed with negotiations. It wants to maximize its share of the gains from trade in the first-stage negotiation, all else being equal, which is achieved by negotiating first with the seller that has less bargaining power, while at
the same time it wants to minimize the size of these gains from trade, all else being equal, which is achieved by negotiating first with the seller that has the lower stand-alone surplus.

Aghion and Bolton (1987) were the first to consider a three-party sequential-contracting environment. In their model, which consists of two sellers and one buyer, each seller can produce at most one unit of the same good. The buyer is assumed to negotiate first with the high-cost seller (which they call the incumbent) and then with the low-cost seller (which they call the entrant), with both sellers making take-it-or-leave-it offers. They find that the equilibrium is efficient when there is complete information (the buyer purchases from the low-cost seller) and all surplus is extracted by the high-cost seller. This is achieved through the use of a penalty clause in which the buyer is required to pay the high-cost seller a penalty if it purchases from the low-cost seller. By judiciously choosing the size of the penalty, the high-cost seller can ensure that the low-cost seller will offer its product to the buyer at cost, thereby dissipating any rent the low-cost seller would otherwise have obtained. In the case they consider, all surplus is transferred to the incumbent, with the buyer earning zero payoff. The order of negotiations is thus not an issue for the buyer in Aghion and Bolton's model.

More generally, we would expect the buyer to have a preference over the ordering of negotiations if it is able to share in the gains from rent shifting, a case considered by Marx and Shaffer (2002). They extend Aghion and Bolton’s model with complete information to allow for continuous quantities, general cost functions, products that range from imperfect substitutes to perfect complements, and a more even distribution of bargaining power between the sellers and the buyer. They show that the use of below-cost pricing and/or the offering of share-based discounts is a key element of any contract that allows surplus extraction, and that as long as the set of feasible contracts is sufficiently general, surplus can always be fully extracted from the second seller, for any distribution of bargaining power, relation between products, and production technology. They also show that the outcome is always efficient in the sense that the buyer’s choices maximize the overall joint payoff of all three parties.\(^2\)

Whereas Marx and Shaffer (2002) were concerned with the efficiency properties of the

\(^2\)Thus, for example, if the efficient outcome calls for the buyer to purchase from only one seller, then in equilibrium the buyer purchases from only one seller, and if the efficient outcome calls for the buyer to purchase from both sellers, then in equilibrium the buyer purchases from both sellers. In both cases, the buyer purchases the quantities from each seller that maximize the overall joint payoff of all three players.
optimal rent-shifting contracts, and whether and when surplus from the second seller would be fully extracted by the buyer and the first seller, we abstract from these considerations and focus instead on extending their model by making the order of negotiations endogenous.

Our results are in contrast to results in the literature on “pattern bargaining.” In pattern bargaining with one common player negotiating with two competing players, whatever contract is agreed to in the first negotiation is offered by the common player as a take-it-or-leave-it offer in the second negotiation. Marshall and Merlo (2004) show that in pattern bargaining with linear contracts and the common player (the union) trading with both competing players (the firms), the common player prefers to negotiate first with the more productive of the two competing players.\(^3\) However, in their case of (non-pattern) sequential negotiations, the case that more closely resembles our set-up, they find that with linear contracts the common player is indifferent between the order of negotiations. Dobson (1994) also considers the case of (non-pattern) sequential negotiations by a union and finds that the union gains by bargaining with the weaker firm first, since this enables the union to obtain a higher wage rate which then allows it to achieve greater concessions from the stronger firm.

Raskovich (2006) considers the case of a single buyer bargaining in sequence with multiple sellers. He assumes that the buyer is committed to single sourcing, which is similar to our case where the efficient outcome calls for the buyer to purchase from only one seller. Unlike in our model, however, he finds that the buyer prefers to negotiate with the stronger seller first. The difference in the two results is attributable to whether the buyer is allowed to sign contracts with one or both sellers prior to making its quantity choices. In our model, the buyer is allowed to have contracts with both sellers prior to trade (which is essential for any study of rent shifting). In his model, the buyer may have a contract with only one seller.

Noe and Wang (2000) consider the buyer’s preferred order of negotiations in the context of a credit market. In their model, a distressed firm (the buyer) negotiates in sequence with multiple creditors (the sellers). They find that the buyer’s ability to negotiate in sequence is valuable to the buyer because it can play creditors against one another, using its contracts with the smaller creditors to extract concessions from the larger or less well-secured creditors.

\(^3\)The reason is that the more productive competing player gains a relative cost advantage on its rival by agreeing to higher wages, and so is more willing to pay a higher wage to the common player than its rival.
Our results are also related to the literature on multiple-issue bargaining. Within this literature, it has been shown that the agenda (whether issues are bargained all-at-once or one-by-one) can matter to the bargained outcome. For example Busch and Horstmann (1999), Inderst (2000), Lang and Rosenthal (2001), and In and Serrano (2004) consider models of endogenous agendas in complete information settings. In Busch and Horstmann (1999), in equilibrium agents divide the surplus from an endowment stream through a sequence of short-term contracts rather than through a single long-term contract. Inderst (2000) shows that the choice of simultaneous versus sequential agenda for two players considering a set of possible projects, some of which have negative payoff for one of the players, can have both distributional and efficiency effects, and that with an endogenous agenda, agreement is reached first on all mutually beneficial projects. Lang and Rosenthal (2001) model union negotiations with a firm over multiple issues and show that, depending on the parameters of the model, it may be that both parties prefer that the issues be considered jointly, both prefer that they be considered one at a time, or the parties may disagree on whether the negotiations should be over bundles or only over single issues. Finally, In and Serrano (2004) consider a model in which players alternate in proposing offers on multiple issues, where the proposer can choose which issue to raise next. However, they find a multiplicity of equilibria and thus do not provide a clear answer to the question of which issue will be raised first.

We contribute to this literature by providing a simple three-party contracting environment in which one can obtain clear predictions about which negotiation will occur first.

In Section 2, we describe the model and solve for the equilibrium assuming the order of negotiations is fixed. We also work through some examples to illustrate equilibrium contracts. In Section 3, we extend the model to allow the buyer to choose the order of negotiations, and we state our results for the case in which the efficient outcome calls for the buyer to purchase from only one seller and for the case in which the efficient outcome calls for the buyer to purchase from both sellers. In Section 4, we consider two extensions. In the first extension, we restrict the set of contracts to exclude share-based discounts and contracts in which the buyer is offered marginal units at below marginal cost. In the second extension, we restrict the set of contracts to exclude penalty clauses. Section 5 concludes the paper.
2 Model

We consider an environment with complete information involving two sellers, X and Y, and a single buyer. The model consists of three stages. In stage one, the buyer and seller \(i\) negotiate a contract for the purchase of \(i\)'s product. In stage two, the buyer and seller \(j, j \neq i\), negotiate a contract for the purchase of \(j\)'s product. In stage three, the buyer chooses from whom to purchase and all payoffs are realized. We denote the buyer’s willingness-to-pay if it purchases \(x\) units of seller \(X\)'s product and \(y\) units of seller \(Y\)'s product as \(R(x, y)\), seller \(X\)'s cost as \(c_{x}(x)\), and seller \(Y\)'s cost as \(c_{y}(y)\), where \(R(x, y), c_{x}(x),\) and \(c_{y}(y) \geq 0\).

In the event the buyer does not have an agreement with seller \(Y\), we denote the maximized joint payoff of seller \(X\) and the buyer as \(\Pi_{X}\), where \(\Pi_{X} \equiv \max_{x} R(x, 0) - c_{x}(x)\). Similarly, in the event the buyer does not have an agreement with seller \(X\), we denote the maximized joint payoff of seller \(Y\) and the buyer as \(\Pi_{Y}\), where \(\Pi_{Y} \equiv \max_{y} R(0, y) - c_{y}(y)\). In what follows, we will refer to \(\Pi_{X}\) as seller \(X\)'s stand-alone surplus and \(\Pi_{Y}\) as seller \(Y\)'s stand-alone surplus. In the event the buyer has a contract with both sellers, we denote the maximized overall joint payoff of all three players as \(\Pi_{XY}\), where \(\Pi_{XY} \equiv \max_{xy} R(x, y) - c_{x}(x) - c_{y}(y)\).

It follows from these definitions that \(\Pi_{XY} \geq \max\{\Pi_{X}, \Pi_{Y}\}\). If this inequality is strict, we say that the overall joint payoff is maximized when \(x\) and \(y\) are positive, or, equivalently, the efficient outcome calls for the buyer to purchase from both sellers. If the inequality holds with equality, we say that the efficient outcome calls for the buyer to purchase from only one seller. In this case, if \(\Pi_{X} \geq \Pi_{Y}\) then it is efficient for the buyer to purchase from only seller \(X\), and if \(\Pi_{Y} \geq \Pi_{X}\) then it is efficient for the buyer to purchase from only seller \(Y\).

We make minimal assumptions about the bargaining outcomes, assuming only that bargaining between the buyer and seller \(i\) results in the maximization of their joint payoff, and the division of surplus is such that each player receives its disagreement payoff plus a share of the incremental gains from trade (their joint payoff when they trade minus their joint payoff when they do not trade), with proportion \(\lambda_{i} \in [0, 1]\) going to seller \(i\).\(^4\) These assumptions are consistent with all of the commonly used bargaining solutions, which require that players

\(^4\)We combine both non-cooperative and cooperative solution concepts in our model. This is commonly done in the literature, and it allows us to obtain a parsimonious model of negotiations. For a non-cooperative foundation of the asymmetric Nash bargaining solution, see Binmore, Rubinstein, and Wolinsky (1986).
maximize their bilateral joint payoffs and divide the incremental gains from trade.

One can think of $\lambda_i$ as a measure of seller $i$’s bargaining power. At the extremes, if seller $i$ makes a take-it-or-leave-it offer to the buyer, then $\lambda_i = 1$, and if the buyer makes a take-it-or-leave-it offer to seller $i$, then $\lambda_i = 0$. For more even distributions of bargaining power, $0 < \lambda_i < 1$. The Nash bargaining solution, the egalitarian bargaining solution, and the Kalai-Smorodinsky bargaining solution all imply $\lambda_i = \frac{1}{2}$, an equal split of the surplus.$^5$

We assume that the feasible set of contracts is sufficiently general to allow for complete surplus extraction from the seller who moves second. For example, in a manner to be made more precise below, it suffices that each seller’s contract can depend on $x$ and $y$, and that out-of-equilibrium quantities for each seller can be priced incrementally below cost. More generally, we refer the interested reader to Marx and Shaffer (2002) for an in-depth discussion of when full extraction can be achieved with contracts that depend only on a seller’s own quantity, and when it requires that contracts depend on the quantities from both sellers.

2.1 Solving the game

We solve for the equilibrium strategies of the buyer and sellers $X$ and $Y$ by working backwards, taking our assumptions about the feasible set of contracts and the outcomes of the negotiations as given. Our solution concept corresponds to subgame perfection in that equilibrium behavior in early stages is not supported by non-credible threats in later stages.

Stage three – the buyer’s choices

In stage three, the buyer takes its contract with each seller as given (assume for now that it has a contract with each seller) and maximizes its payoff by choosing $x \geq 0$ units from seller $X$ and $y \geq 0$ units from seller $Y$. Let $T_x(x, y)$ be its contract with seller $X$ and $T_y(x, y)$ be its contract with seller $Y$, where each contract specifies how much the buyer must pay to the seller as a function of all possible combinations of quantities $x$ and $y$. Then, given contracts $T_x(x, y)$ and $T_y(x, y)$, the buyer will choose quantities $(x^{**}, y^{**}) \in q_{xy}(T_x, T_y)$, where

\[ q_{xy}(T_x, T_y) \equiv \arg \max_{x,y} R(x, y) - T_x(x, y) - T_y(x, y). \]

$^5$See Nash (1953), Kalai and Smorodinsky (1975), and Mas-Colell, Whinston and Green (1995).
If the buyer only has contract $T_x$ with seller $X$, it will choose quantity $x^* \in q_x(T_x)$, where

$$q_x(T_x) \equiv \arg \max_x R(x, 0) - T_x(x, 0),$$

and if the buyer only has contract $T_y$ with seller $Y$, it will choose quantity $y^* \in q_y(T_y)$, where

$$q_y(T_y) \equiv \arg \max_y R(0, y) - T_y(0, y).$$

**Stage two – negotiations with the second seller**

In stage two, the buyer and the second seller, seller $j$, negotiate $T_j(x, y)$ to maximize their joint payoff subject to dividing the gains from trade so that each receives its disagreement payoff plus a share of the gains, with proportion $\lambda_j$ going to seller $j$. Thus, for example, if seller $Y$ moves second (analogously if seller $X$ moves second), the buyer and seller $Y$ solve

$$\max_{T_y} R(x^{**}, y^{**}) - T_x(x^{**}, y^{**}) - c_y(y^{**}),$$

subject to seller $Y$’s earning a payoff of $\lambda_Y$ times the incremental gains from trade,

$$\pi_Y(x^{**}, y^{**}) = \lambda_Y [R(x^{**}, y^{**}) - T_x(x^{**}, y^{**}) - c_y(y^{**}) - (R(x^*, 0) - T_x(x^*, 0))],$$

where $R(x^*, 0) - T_x(x^*, 0)$ is the buyer’s disagreement payoff with seller $Y$.

Since the buyer and second seller’s choice of contract in the second stage has no effect on the contract chosen in the first stage, the buyer and second seller have no incentive to distort the buyer’s quantity choice for the second seller’s product. It follows that, in any equilibrium, this quantity choice will maximize the buyer and second seller’s joint payoff. Thus, for example, if seller $Y$ moves second (analogously if seller $X$ moves second), we have

$$y^{**}(T_x, T_y) \in \arg \max_y R(x^{**}(T_x, T_y), y) - T_x(x^{**}(T_x, T_y), y) - c_y(y). \quad (1)$$

In the out-of-equilibrium event that the buyer and first seller, say seller $X$, are unable to agree on a contract in stage one, we assume the buyer and second seller, say seller $Y$, will negotiate $T_y(x, y)$ such that seller $Y$ earns payoff $\lambda_Y \Pi_Y$ and the buyer earns payoff $(1-\lambda_Y)\Pi_Y$. 


Stage one – negotiations with the first seller

In stage one, the buyer and the first seller, seller \( i \), take as given the equilibrium strategies in stages two and three and negotiate \( T_i(x, y) \) to maximize their joint payoff subject to dividing the gains from trade according to our assumptions on bargaining. Thus, for example, if seller \( X \) moves first (analogously if seller \( Y \) moves first), the buyer and seller \( X \) solve

\[
\max_{T_x} R(x^{**}, y^{**}) - c_x(x^{**}) - c_y(y^{**}) - \pi_Y(x^{**}, y^{**}),
\]

subject to (1) and seller \( X \)’s earning a payoff of \( \lambda_X \) times the incremental gains from trade,

\[
\pi_X(x^{**}, y^{**}) = \lambda_X [R(x^{**}, y^{**}) - c_x(x^{**}) - c_y(y^{**}) - \pi_Y(x^{**}, y^{**}) - (1 - \lambda_Y)\Pi_Y],
\]

where \((1 - \lambda_Y)\Pi_Y\) is the buyer’s disagreement payoff with seller \( X \) (see stage two).

Since the buyer’s disagreement payoff with seller \( i \), \((1 - \lambda_j)\Pi_j\), affects only the division of surplus between the buyer and seller \( i \) and is unaffected by their choice of \( T_i(x, y) \), it is easy to see from the above maximization problem that, provided the set of feasible contracts is sufficiently general (see Marx and Shaffer, 2002), it is optimal for the buyer and seller \( i \) to negotiate in stage one a contract \( T_i(x, y) \) that induces the buyer to choose the quantities \( x \) and \( y \) in stage three that maximize the overall joint payoff of all three players (i.e., maximize \( R(x, y) - c_x(x) - c_y(y) \)) and extracts all of seller \( j \)’s surplus (i.e., minimizes \( \pi_Y(x, y) \)). In the examples in the next subsection, we illustrate how the buyer and seller \( i \) can achieve this.

2.2 Examples

It is useful to consider some examples to illustrate how the model works. To keep things simple, suppose that each seller can produce at most two units and that the buyer is willing to purchase at most two units. Also, let \( R(x, y) = \sqrt{x + y} \) in each of the examples below.

**Example 1:** \( c_x(x) = 3x^2/8; c_y(y) = y^2/8; \lambda_X = 1/2; \lambda_Y = 1/2. \)

In this case, the stand-alone surplus of seller \( X \) is maximized at \( x = 1 \),

\[
\Pi_X = \max_x \sqrt{x} - \frac{3x^2}{8} = .625,
\]
the stand-alone surplus of seller Y is maximized at \( y = 2 \),
\[
    \Pi_Y = \max_y \sqrt{y} - \frac{y^2}{8} = .914,
\]
and the overall joint payoff is maximized at \((x, y) = (0, 2)\),
\[
    \Pi_{XY} = \max_{x,y} \sqrt{x + y} - \frac{3x^2}{8} - \frac{y^2}{8} = .914.
\]
Thus, in this example, the efficient outcome calls for the buyer to purchase two units from seller Y and no units from seller X. It follows that, in equilibrium, the contract with the first seller will be chosen such that the buyer is induced to purchase \((x^{**}, y^{**}) = (0, 2)\) and the second seller earns a payoff of zero. Assume seller X is the first seller. Then, \( \pi_Y(0, 2) = 0 \) implies that \( T_y(0, 2) = c_y(2) = 1/2 \). In other words, seller Y offers its two units to the buyer at cost. As for seller X’s contract, we know from the division of surplus in stage one that
\[
    T_x(0, 2) = c_x(0) + \lambda_X \lambda_Y \Pi_Y = .2285,
\]
and from setting seller Y’s surplus equal to zero that
\[
    T_x(2, 0) - T_x(0, 2) = R(2, 0) - R(0, 2) + c_y(2) = .5.
\]
Thus, for example, it is an equilibrium for the stage-one negotiations to yield
\[
    T_x(0, \cdot) = .2285, \quad T_x(1, \cdot) = .6035, \quad \text{and} \quad T_x(2, \cdot) = .7285,
\]
and for the stage-two negotiations to yield
\[
    T_y(\cdot, 0) = 0, \quad T_y(\cdot, 1) = .125, \quad \text{and} \quad T_y(\cdot, 2) = .5.
\]
Given these contracts, the buyer is induced in stage three to choose \((x^{**}, y^{**}) = (0, 2)\).

**Example 2:** \( c_x(x) = x^2/4; c_y(y) = y^2/8; \lambda_X = 1/4; \lambda_Y = 1/4. \)
In this case, the stand-alone surplus of seller X is maximized at \( x = 1 \),
\[
    \Pi_X = \max_x \sqrt{x} - \frac{x^2}{4} = .75,
\]
the stand-alone surplus of seller $Y$ is maximized at $y = 2$,

$$\Pi_Y = \max_y \sqrt{y} - \frac{y^2}{8} = .914,$$

and the overall joint payoff is maximized at $(x, y) = (1, 1)$,

$$\Pi_{XY} = \max_{x,y} \sqrt{x} + y - \frac{x^2}{4} - \frac{y^2}{8} = 1.039.$$

Thus, in this example, the efficient outcome calls for the buyer to purchase one unit from seller $Y$ and one unit from seller $X$. It follows that in equilibrium the contract with the first seller will be chosen such that the buyer is induced to purchase $(x^{**}, y^{**}) = (1, 1)$ and the second seller earns a payoff of zero. Assume seller $X$ is the first seller. Then, $\pi_Y(1, 1) = 0$ implies that $T_y(1, 1) = c_y(1) = 1/8$. In other words, seller $Y$ offers its unit to the buyer at cost. As for seller $X$’s contract, we know from the division of surplus in stage one that

$$T_x(1, 1) = c_x(1) + \lambda_X (\Pi_{XY} - (1 - \lambda_Y)\Pi_Y) = .3384,$$

and from setting seller $Y$’s surplus equal to zero that

$$T_x(1, 1) - T_x(1, 0) = R(1, 1) - c_y(1) - R(1, 0) = .2892.$$

Thus, for example, it is an equilibrium for the stage-one negotiations to yield

$$T_x(0, \cdot) = 0, \; T_x(1, 0) = .0492, \; T_x(1, 1) = .3384, \; \text{and} \; T_x(2, \cdot) = 1,$$

and for the stage-two negotiations to yield

$$T_y(\cdot, 0) = 0, \; T_y(\cdot, 1) = .125, \; \text{and} \; T_y(\cdot, 2) = .5.$$

Given these contracts, the buyer is induced in stage three to choose $(x^{**}, y^{**}) = (1, 1)$.

**Example 3:** $c_x(x) = x^2/8; \; c_y(y) = y^2/8; \; \lambda_X = 1/4; \; \lambda_Y = 1/2.$

In this case, the stand-alone surplus of seller $X$ is maximized at $x = 2$,

$$\Pi_X = \max_x \sqrt{x} - \frac{x^2}{8} = .914,$$
the stand-alone surplus of seller $Y$ is maximized at $y = 2$,

$$\Pi_Y = \max_y \sqrt{y} - \frac{y^2}{8} = .914,$$

and the overall joint payoff is maximized at $(x, y) = (1, 1)$,

$$\Pi_{XY} = \max_{x,y} \sqrt{x+y} - \frac{x^2}{8} - \frac{y^2}{8} = 1.164.$$

In this example, the efficient outcome calls for the buyer to purchase one unit from seller $Y$ and one unit from seller $X$ (the sellers are symmetric in their costs and the buyer’s valuation of their products), but notice that unlike Example 2, the buyer’s bargaining power with respect to each seller differs. Assume seller $X$ is the first seller, then $\pi_Y(1, 1) = 0$ implies that $T_y(1, 1) = c_y(1) = 1/8$, and we know from the division of surplus in stage one that

$$T_x(1, 1) = c_x(1) + \lambda_X (\Pi_{XY} - (1 - \lambda_Y)\Pi_Y) = .3018,$$

and from setting seller $Y$’s surplus equal to zero that

$$T_x(1, 1) - T_x(1, 0) = R(1, 1) - c_y(1) - R(1, 0) = .2892.$$

Thus, for example, it is an equilibrium for the stage-one negotiations to yield

$$T_x(0, \cdot) = 0, \ T_x(1, 0) = .0126, \ T_x(1, 1) = .3018, \text{ and } T_x(2, \cdot) = .5,$$

and for the stage-two negotiations to yield

$$T_y(\cdot, 0) = 0, \ T_y(\cdot, 1) = .125, \text{ and } T_y(\cdot, 2) = .5.$$

Given these contracts, the buyer is induced in stage three to choose $(x^{**}, y^{**}) = (1, 1)$.

Each example differs in an important way. In the first example, the efficient outcome calls for the buyer to purchase only from seller $Y$. In the second and third examples, the efficient outcome calls for the buyer to purchase from both sellers. In the second example, seller $X$ is disadvantaged on the cost side relative to seller $Y$, but not with respect to their relative bargaining powers. In the third example, seller $X$ is disadvantaged with respect to its bargaining power relative to seller $Y$, but not with respect to its cost of production.
Nevertheless, the examples also share some important features. First, in each case, we have assumed that the disadvantaged seller, seller $X$, moves first. This ordering maximizes the buyer’s payoff, as we shall see more generally in the next section. Second, in each case, seller $X$ offers its first unit to the buyer at below cost and, in addition, gives a ‘share-based’ discount in which its offered price is lower if the buyer does not purchase from its rival. We will examine these features in more depth in Section 4. It is also the case that in the first example, an important element of the equilibrium is a payment to seller $X$ even if the buyer does not purchase from it. This is referred to in the literature as a ‘penalty clause’ (see Aghion and Bolton, 1987), another feature that we will explore in more depth in Section 4.

3 Order of negotiations

We are now ready to make the order of negotiations endogenous. Suppose there is a stage zero at the beginning of the game in which the buyer can choose the order in which it negotiates. The question we pose is which seller will the buyer want to negotiate with first? There are two cases to consider, the case in which the efficient outcome calls for the buyer to purchase from only one seller (this was the case considered by Aghion and Bolton, 1987), and the case in which the efficient outcome calls for the buyer to purchase from both sellers.

One-seller equilibria

Suppose $\Pi_{XY} = \max\{\Pi_X, \Pi_Y\}$, so that it is efficient for the buyer to purchase from only one seller. Suppose further, without loss of generality, that seller $Y$’s product yields a higher stand-alone surplus than seller $X$’s product, so that $\Pi_Y > \Pi_X$. Then, as we have established, the unique outcome is for the buyer to purchase only from seller $Y$. Whether or not the buyer prefers to negotiate first with seller $Y$ or seller $X$, however, remains to be determined.

If the buyer negotiates with seller $X$ first, its payoff is given by

$$\Pi_Y - \lambda_X (\Pi_Y - (1 - \lambda_Y)\Pi_Y),$$

where $\Pi_Y$ is the overall joint payoff, seller $X$’s payoff is $\lambda_X (\Pi_Y - (1 - \lambda_Y)\Pi_Y)$, and seller
Y’s payoff is zero (because the buyer and seller X have fully extracted all of its surplus).\(^6\)

In contrast, if the buyer negotiates with seller Y first, its payoff is given by

\[
\Pi_Y - \lambda_Y (\Pi_Y - (1 - \lambda_X)\Pi_X),
\]

(3)

where \(\Pi_Y\) continues to be the overall joint payoff (the buyer purchases only from seller Y in stage three), seller Y’s payoff is \(\lambda_Y (\Pi_Y - (1 - \lambda_X)\Pi_X)\), and now seller X’s payoff is zero.

It follows that it is optimal for the buyer to negotiate with seller Y first if and only if

\[
\Pi_Y - \lambda_Y (\Pi_Y - (1 - \lambda_X)\Pi_X) \geq \Pi_Y - \lambda_X (\Pi_Y - (1 - \lambda_Y)\Pi_Y),
\]

or, equivalently, if and only if

\[
\lambda_X \lambda_Y \Pi_Y \geq \lambda_Y (\Pi_Y - (1 - \lambda_X)\Pi_X).\]

(4)

Conversely, it is optimal for the buyer to negotiate with seller X first if and only if

\[
\lambda_Y (\Pi_Y - (1 - \lambda_X)\Pi_X) \geq \lambda_X \lambda_Y \Pi_Y.
\]

(5)

Under the supposition that \(\Pi_Y > \Pi_X\), it is easy to see that (5) always holds, and since (4) holds under the supposition if and only if \(\lambda_Y = 0\) or \(\lambda_X = 1\), we have the following result.

**Proposition 1** When the efficient outcome calls for the buyer to purchase from only one seller, it is always optimal for the buyer to negotiate first with the inefficient seller. The buyer will be indifferent to the order of negotiations in this case if and only if the efficient seller has no bargaining power or the inefficient seller can make a take-it-or-leave-it offer.

**Proof.** The proof follows immediately from consideration of conditions (4) and (5).

Proposition 1 yields a sharp conclusion. It says that the buyer is always weakly better off negotiating with the inefficient seller first. And it will be strictly better off doing so unless

---

\(^6\)The buyer’s payoff is equal to the overall joint payoff of all three players minus the payoffs to seller X and seller Y. Since the quantity choices of the buyer maximize the overall joint payoff of all three players in equilibrium, and since seller Y’s surplus is fully extracted, leaving it with a payoff of zero, it follows that seller X’s payoff is \(\pi_X(0, y^{**}) = \lambda_X [R(0, y^{**}) - c_y(y^{**}) - (1 - \lambda_Y)\Pi_Y] = \lambda_X (\Pi_Y - (1 - \lambda_Y)\Pi_Y)\).
the inefficient seller has all the bargaining power, in which case the buyer earns \((1 - \lambda_Y)\Pi_Y\) regardless of the order (which is what it could earn in the absence of seller \(X\)), or the efficient seller has no bargaining power, in which case the buyer always extracts the full surplus, \(\Pi_Y\).

A comparison here with the set-up in Aghion and Bolton is instructive. In their model, they showed that an incumbent seller with high costs could, by negotiating first with the buyer, use its first-mover advantage to extract all the surplus from a low-cost entrant when there was complete information about costs (as we have assumed here). Aghion and Bolton assumed that the order of negotiations was fixed, and that the incumbent seller and the entrant could make take-it-or-leave-it offers to the buyer, thereby ensuring that the buyer would earn zero surplus regardless of the order of negotiations. What we can now see is that even if Aghion and Bolton had assumed bargaining power were more evenly distributed between the buyer and the incumbent or between the buyer and the entrant, the buyer would still have had no incentive to reverse the order of negotiations and negotiate first with the entrant.

**Two-seller equilibria**

Now suppose that \(\Pi_{XY} > \max\{\Pi_X, \Pi_Y\}\), so that the efficient outcome calls for the buyer to purchase from both sellers. Then, as we previously established, in all equilibria, the buyer will in fact purchase from both sellers, and the overall joint payoff will be maximized at \(\Pi_{XY}\).

In this case, if the buyer negotiates with seller \(X\) first, its payoff is given by
\[
\Pi_{XY} - \lambda_X \left( \Pi_{XY} - (1 - \lambda_Y)\Pi_Y \right),
\]  
where \(\Pi_{XY}\) is the overall joint payoff, seller \(X\)'s payoff is \(\lambda_X \left( \Pi_{XY} - (1 - \lambda_Y)\Pi_Y \right)\), and seller \(Y\)'s payoff is zero (because the buyer and seller \(X\) have fully extracted all of its surplus).

In contrast, if the buyer negotiates with seller \(Y\) first, its payoff is given by
\[
\Pi_{XY} - \lambda_Y \left( \Pi_{XY} - (1 - \lambda_X)\Pi_X \right),
\]  
where \(\Pi_{XY}\) is the overall joint payoff, seller \(Y\)'s payoff is \(\lambda_Y \left( \Pi_{XY} - (1 - \lambda_X)\Pi_X \right)\), and now seller \(X\)'s payoff is zero. Notice the symmetry between (6) and (7), which implies that if \(\Pi_Y = \Pi_X\) and \(\lambda_X = \lambda_Y\), the buyer would be indifferent to the order of the negotiations.

In the absence of symmetry, however, the buyer’s payoff in (6) will in general not equal its payoff in (7). With whom, then, should the buyer negotiate first? Should it negotiate
first with the seller that has more bargaining power or less bargaining power, and what is its ordering preference between a seller whose product generates a higher stand-alone surplus versus a seller whose product generates a lower stand-alone surplus, all else being equal? Fortunately, these questions are straightforward to answer using simple algebra. From (6) and (7), we see that it is optimal for the buyer to negotiate with seller $Y$ first if and only if

$$
\Pi_{XY} - \lambda_Y (\Pi_{XY} - (1 - \lambda_X)\Pi_X) \geq \Pi_{XY} - \lambda_X (\Pi_{XY} - (1 - \lambda_Y)\Pi_Y),
$$
or, equivalently, if and only if

$$
\lambda_X (\Pi_{XY} - (1 - \lambda_Y)\Pi_Y) \geq \lambda_Y (\Pi_{XY} - (1 - \lambda_X)\Pi_X). \quad (8)
$$

And, conversely, it is optimal for the buyer to negotiate with seller $X$ first if and only if

$$
\lambda_Y (\Pi_{XY} - (1 - \lambda_X)\Pi_X) \geq \lambda_X (\Pi_{XY} - (1 - \lambda_Y)\Pi_Y). \quad (9)
$$

To answer the questions we posed above, consider first the relative effect of each seller’s bargaining power on the buyer’s preferences, holding all else equal. Suppose, for example, that $\Pi_X = \Pi_Y$. Then, replacing $\Pi_X$ with $\Pi_Y$ in (8) and (9), we see that it is optimal for the buyer to negotiate with seller $i$ first if and only if $\lambda_j (\Pi_{XY} - \Pi_Y) \geq \lambda_i (\Pi_{XY} - \Pi_Y)$. In other words, when it is efficient for the buyer to purchase from both sellers, the buyer will prefer to negotiate first with the seller that has less bargaining power, all else being equal.

Another way to assess the relative effect of each seller’s bargaining power on the buyer’s preferences, but this time without assuming $\Pi_X = \Pi_Y$, is to rewrite (8) and (9) as

$$
\lambda_X (\Pi_{XY} - (1 - \lambda_Y)\Pi_Y) - \lambda_Y (\Pi_{XY} - (1 - \lambda_X)\Pi_X) \geq 0, \quad (10)
$$

and

$$
\lambda_Y (\Pi_{XY} - (1 - \lambda_X)\Pi_X) - \lambda_X (\Pi_{XY} - (1 - \lambda_Y)\Pi_Y) \geq 0, \quad (11)
$$

respectively, and then to note that the derivative of the left-hand side of (10) with respect to $\lambda_Y$ is negative and the derivative of the left-hand side of (11) with respect to $\lambda_Y$ is positive (the reverse holds if the derivative is taken with respect to $\lambda_X$), which implies that an increase in seller $i$’s bargaining power all else being equal makes it ‘less likely’ that the buyer will
want to negotiate with that seller first. Evaluating the left-hand sides of (10) and (11) at \( \lambda_Y = 1 \) (or \( \lambda_X = 1 \)), we find that it is never optimal for the buyer to negotiate with seller \( i \) first if seller \( i \) can make a take-it-or-leave-it offer and its rival cannot (if both sellers can make take-it-or-leave-it offers, then the buyer is indifferent between the order of negotiations).

We can summarize the relative effect of \( \lambda_X \) and \( \lambda_Y \) on the buyer’s preferences as follows:

**Proposition 2** *When the efficient outcome calls for the buyer to purchase from both sellers, the buyer will prefer to negotiate first with the seller that has less bargaining power, all else being equal. When all else is not equal, for example if \( \Pi_X \neq \Pi_Y \), an increase in a seller’s bargaining power will make it ‘less likely’ that the buyer will want to negotiate with that seller first. It is optimal for the buyer to negotiate first with a seller that can make a take-it-or-leave-it offer if and only if the seller moving second can also make a take-it-or-leave it offer.*

Proof. The proof follows straightforwardly from consideration of conditions (8)–(11).

Given that the buyer will be sharing the overall joint surplus with the first seller (since optimal rent-shifting contracts imply that the second seller’s surplus will be fully extracted), it is perhaps not surprising that Proposition 2 implies that the buyer will prefer to negotiate first with the seller that has less bargaining power, all else being equal. However, it is perhaps surprising that this implication need not hold when all else is not equal, for example, when \( \Pi_X \neq \Pi_Y \). The reason is that in choosing the order of negotiations, the buyer has two considerations that come into play. First, all else being equal, the buyer would like to capture a larger share of the incremental gains from trade in the first stage. By itself, this suggests that the buyer will want to negotiate first with the seller that has less bargaining power. But, second, the buyer would also like to minimize the gains from trade in the first stage, so that regardless of its share it can keep more of the overall surplus for itself. This suggests that the buyer will also care about the relationship between \( \Pi_X \) and \( \Pi_Y \). In the case of \( \Pi_X \neq \Pi_Y \), this latter consideration may sometimes outweigh the former consideration.

We can explore the second consideration in more depth by supposing that \( \lambda_X = \lambda_Y \). Then, replacing \( \lambda_X \) with \( \lambda_Y \) in (8) and (9), we see that as long as the buyer has some bargaining power, it is optimal for it to negotiate with seller \( i \) first if and only if \( \Pi_{XY} - (1 - \)
\( \lambda_i \Pi_i \geq \Pi_{XY} - (1 - \lambda_i) \Pi_j \), or equivalently, if and only if \( (1 - \lambda_i) \Pi_j \geq (1 - \lambda_i) \Pi_i \). In other words, if it is efficient for the buyer to purchase from both sellers, the buyer will negotiate first with the seller whose product offers the lower stand-alone surplus, all else being equal. The reason is that when the two sellers have the same bargaining power, unless they have all the bargaining power, this way of ordering the negotiations reduces the gains from trade available in the first stage, and thus reduces the amount of surplus the first seller can extract.

When \( \lambda_X \neq \lambda_Y \), so that all else is not equal, we can obtain further results by noting that the derivative of the left-hand side of (10) with respect to \( \Pi_Y \) is \(-\lambda_X (1 - \lambda_Y)\) and the derivative of the left-hand side of (11) with respect to \( \Pi_Y \) is \( \lambda_X (1 - \lambda_Y) \), which are negative and positive, respectively, when no player has all the bargaining power (the derivative of the left-hand side of (10) and (11) with respect to \( \Pi_X \) is positive and negative, respectively, under these same conditions), which implies that an increase in the stand-alone surplus from seller \( i \)'s product makes it ‘less likely’ that the buyer will want to negotiate with that seller first.

We can summarize the relative effect of \( \Pi_X \) and \( \Pi_Y \) on the buyer’s preferences as follows:

**Proposition 3** When the efficient outcome calls for the buyer to purchase from both sellers, the buyer will prefer to negotiate first with the seller whose product offers the smaller stand-alone surplus, all else being equal. When all else is not equal, for example if \( \lambda_X \neq \lambda_Y \), and no player has all the bargaining power, an increase in the stand-alone surplus of seller \( i \)'s product will make it ‘less likely’ that the buyer will want to negotiate with that seller first.

Proof. The proof follows straightforwardly from consideration of conditions (8)–(11).

In summary, the buyer cares about two things in deciding in what order to proceed with negotiations. It wants to maximize its share of the incremental gains from trade in the first-stage negotiation, all else being equal, while at the same time it wants to minimize the size of these gains from trade. Propositions 2 and 3 summarize how the buyer can achieve this.
4 Extensions

We have seen that the buyer would prefer to negotiate with the weaker seller first all else being equal when there are no restrictions on the set of feasible contracts. In this section, we consider how our results would change under two alternative scenarios. First, we consider how our results would change if the first seller were unable to offer a share-based discount (so that for all \( x, y', y'' \geq 0, T_x(x, y') = T_x(x, y'') \)) or charge a marginal price for any unit that is below the marginal cost of producing that unit (so that for all \( y \) and all \( x' > x'' \geq 0, T_x(x', y) - T_x(x'', y) \geq c_x(x') - c_x(x'') \)). Second, we consider the role played by penalty clauses.

Share-based discounts are evident in the buyer’s contract with seller \( X \) in Examples 2 and 3, where \( T_x(1, 0) < T_x(1, 1) \). All three examples exhibit below-cost pricing. In Example 1, we have \( T_x(2, \cdot) - T_x(1, \cdot) < c_x(2) - c_x(1) \), and in Examples 2 and 3, we have \( T_x(1, 0) - T_x(0, 0) < c_x(1) \). Finally, in Example 1, we have \( T_x(0, \cdot) > 0 \), which can be interpreted as a penalty clause since the buyer must pay seller \( X \) if it purchases only from seller \( Y \).

In Examples 1–3, the buyer strictly prefers to negotiate first with seller \( X \) when contracts are not restricted; however, as we show below, when share-based discounts and below-cost pricing are not permitted, the buyer is indifferent with regard to the order of negotiation. In contrast, when penalty clauses are not permitted (but share-based discounts and below-cost pricing are permitted), our result continues to hold that the buyer prefers to negotiate first with the seller whose product offers the smaller stand-alone surplus, all else being equal.

4.1 Restrictions on the set of feasible contracts

Seller \( Y \)’s payoff in stage two (assuming it moves second) is given by

\[
\pi_Y(x^{**}, y^{**}) = \lambda_Y [R(x^{**}, y^{**}) - T_x(x^{**}, y^{**}) - c_y(y^{**}) - (R(x^*, 0) - T_x(x^*, 0))],
\]

from which it follows that full surplus extraction is achieved by the buyer and seller \( X \) if the difference between \( T_x(x^*, 0) \) and \( T_x(x^{**}, y^{**}) \) in seller \( X \)’s contract is sufficiently small. Suppose, however, that share-based discounts are not feasible and that seller \( X \) cannot charge a marginal price for any unit that is below the marginal cost of producing that unit. Then
the buyer and seller $X$ would jointly face the following constraint in their negotiation,

$$T_x(x^*, 0) - T_x(x^{**}, y^{**}) \geq c_x(x^*) - c_x(x^{**}),$$  

(12)

for all $x^* \geq x^{**}$. In equilibrium, this constraint will be binding, which implies that

$$\pi_Y(x^{**}, y^{**}) = \lambda_Y [R(x^{**}, y^{**}) - c_x(x^{**}) - c_y(y^{**}) - (R(x^*, 0) - c_x(x^*))].$$  

(13)

Using (13), and recalling that the stage-one problem of the buyer and seller $X$ is to solve

$$\max_{T_x} R(x^{**}, y^{**}) - c_x(x^{**}) - c_y(y^{**}) - \pi_Y(x^{**}, y^{**}),$$

subject to (1) and seller $X$’s earning a payoff of $\lambda_Y$ times the incremental gains from trade,

$$\pi_X(x^{**}, y^{**}) = \lambda_X [R(x^{**}, y^{**}) - c_x(x^{**}) - c_y(y^{**}) - \pi_Y(x^{**}, y^{**}) - (1 - \lambda_Y)\Pi_Y],$$

it follows that in any equilibrium the buyer and seller $X$ will choose $T_x(x, y)$ such that $(x^{**}, y^{**})$ maximizes the overall joint payoff and $x^*$ maximizes seller $X$’s stand-alone surplus.

Thus, under the constraint in (12), seller $Y$’s equilibrium payoff is

$$\pi_Y(x^{**}, y^{**}) = \lambda_Y (\Pi_{XY} - \Pi_X),$$

seller $X$’s equilibrium payoff is

$$\pi_X(x^{**}, y^{**}) = \lambda_X (\Pi_{XY} - \lambda_Y (\Pi_{XY} - \Pi_X)) - (1 - \lambda_Y)\Pi_Y,$$

and the buyer’s equilibrium payoff is $\Pi_{XY} - \pi_X(x^{**}, y^{**}) - \pi_Y(x^{**}, y^{**})$, or in other words,

$$(1 - \lambda_X) (1 - \lambda_Y) \Pi_{XY} + (1 - \lambda_X) \lambda_Y \Pi_X + (1 - \lambda_Y) \lambda_X \Pi_Y.$$  

(14)

Substituting $X$ for $Y$ and $Y$ for $X$ in (14) and comparing (14) with the newly created expression implies that the buyer’s payoff will be independent of the order of negotiations.

We can summarize the effect of (12) on the buyer’s preferences as follows:

**Proposition 4** When share-based discounts are infeasible and the first seller cannot charge a marginal price for any unit that is below the marginal cost of producing that unit (i.e., when (12) and its analogue hold), the buyer is indifferent with regard to the order of negotiation.

Proof. The proof follows straightforwardly from consideration of condition (14).
4.2 Penalty clauses

Sometimes equilibrium contracts call for the first seller to be paid even if the buyer does not purchase from it (e.g., see Example 1). The intent is to penalize the buyer if it purchases exclusively from the second seller. If such payments are infeasible, then a new constraint in the negotiation between the buyer and first seller arises: the joint payoff of the buyer and second seller in any equilibrium must be weakly greater than the second seller’s stand-alone surplus (otherwise, the buyer and second seller could make themselves better off by excluding the first seller). Thus, if the buyer negotiates with seller \( X \) first, then it must be that

\[
\Pi_{XY} - \text{seller } X\text{'s payoff} \geq \Pi_Y. \tag{15}
\]

Since the absence of a penalty clause does not affect the ability of the buyer and first seller to extract all of the second seller’s surplus in equilibrium (full extraction when seller \( X \) moves first depends only on the difference between \( T_x(x^*, 0) \) and \( T_x(x^{**}, y^{**}) \), it follows immediately that the buyer’s equilibrium payoff if it negotiates with seller \( X \) first is

\[
\max\{\Pi_{XY} - \lambda_X (\Pi_{XY} - (1 - \lambda_Y)\Pi_Y), \Pi_Y\}, \tag{16}
\]

where the first argument denotes the buyer’s payoff if (15) does not bind, and the second argument denotes the buyer’s payoff if (15) does bind. Analogously, if the buyer negotiates with seller \( Y \) first then the buyer’s equilibrium payoff when penalty clauses are infeasible is

\[
\max\{\Pi_{XY} - \lambda_Y (\Pi_{XY} - (1 - \lambda_X)\Pi_X), \Pi_X\}. \tag{17}
\]

Comparing (16) and (17), it follows that when the restriction on penalty clauses binds, the buyer will prefer to negotiate with seller \( X \) first if and only \( \Pi_Y \geq \Pi_X \) (and with seller \( Y \) first if and only if \( \Pi_X \geq \Pi_Y \)). This strengthens our results from the previous section, which imply that the buyer will want to negotiate with the weaker seller first, all else being equal.

5 Conclusion

This paper studies three-party negotiations in which one player negotiates sequentially with each of two other players. We consider the case of two sellers and one buyer, but rather than
focusing on the possibilities for rent-shifting that are inherent in these situations, taking as
given the order of negotiations, we take the former as given and instead focus on endogenizing
the latter. In some instances, it may make sense to impose a first-mover advantage on one of
the sellers. However, in other instances, we would expect the common player to have a choice.
Our results apply when the common player can choose the order in which to negotiate.

We find that when the efficient outcome calls for the buyer to purchase from only one
seller, the buyer can earn weakly higher payoff by negotiating first with the inefficient seller.
Only if the efficient seller has no bargaining power, or if the inefficient seller can make a take-
it-or-leave-it offer to the buyer, will the buyer be indifferent between the order of negotiations.
In contrast, when the efficient outcome calls for the buyer to purchase from both sellers, we
find that if each seller’s stand-alone surplus is the same, the buyer will earn higher payoff
by negotiating first with the seller that has less bargaining power. If two sellers have the
same bargaining power, but different stand-alone surpluses, the buyer will earn higher payoff
by negotiating first with the seller that offers a smaller stand-alone surplus. The intuition
is that in choosing the order of negotiations, the buyer wants to maximize its share of the
gains from trade with the first seller, and at the same time minimize the size of these gains.

In our model, the buyer’s quantity choices are efficient given the negotiated contracts
with each seller. This is an artifact of there being a single buyer who can internalize all
quantity decisions in the last stage of the game. It would also be interesting to consider the
opposite case, where the common player is a seller and the competing players are buyers. In
this case, the externalities between buyers potentially adds some additional complications to
the contracting mix, namely seller opportunism, as shown in McAfee and Schwartz (1994).

The articles on pattern bargaining, surveyed earlier, provide a start in this direction,
as does the recent paper by Möller (2006). In each case, however, the authors consider
the order of negotiations in models with restricted contracts, so that the different orderings
induce welfare effects as well as distributional effects. In Möller’s model, a principal contracts

\footnote{Raskovich (2003) also considers the order of negotiations in a model in which a single seller contracts with
two buyers. He finds that the two buyers would prefer to bargain in sequence rather than simultaneously,
with each buyer preferring to bargain first, whereas the seller is better off with simultaneous bargaining.}

\footnote{In the case of the pattern bargaining literature, contracts between the union and the firms are linear
wage contracts, and in the case of Möller (2006), a contract is a single price-quantity pair.}
with two agents, where there are externalities between the agents. For his results on the order of sequential negotiations, Möller assumes that the payoff of agent $i$ depends on the trade between the principal and agent $j$ even if agent $i$ does not trade with the principal. Möller refers to this as the externality at the agents’ outside option. In contrast, in our model, if a seller does not trade with the buyer, then the seller’s payoff is zero, independent of whether the other seller trades with the buyer. In Möller’s model, the principal’s preferred order of negotiations depends on which agent has the larger (in absolute value) externality at its outside option. Depending on whether the externalities at the agents’ outside option are positive or negative and on whether the trades are complements are substitutes, the principal may prefer to negotiate first with either the agent with the larger or smaller (in absolute value) externality at its outside option. When the externality at the agents’ outside option is zero, however, the principal is indifferent with regard to the order of negotiations, a result that is consistent with our findings when the sellers’ contracts are similarly restricted.\(^9\)

Allowing for more general contracts in the case where the common player is a seller is a topic for future research. It may be that if the contracts are sufficiently general, and there is complete information, the incentives for opportunism can be overcome, allowing the seller to choose the order of negotiations based solely on distributional effects, as in our model.

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\(^9\)Because Möller’s (2006) contracts are price-quantity pairs, share-based discounts are not feasible and below-cost pricing does not arise. As shown in Section 4.1, when we restrict contracts to have no share-based discounts and no marginal prices for incremental units that are below the marginal cost of producing those units, then we also find that the common player to the negotiations is indifferent with regard to the order of negotiation.


