

Noncooperative Bargaining

Modeling the Division of Gains from Trade

In the first six chapters of this book we have seen how legal rules provide parties with a backdrop against which all their bargaining takes place. We have concerned ourselves primarily with the way in which different legal rules affect the substantive bargains themselves—such as whether goods were sold with a warranty or whether a carrier was liable for delays in transporting goods. In this chapter, we explore the way in which formal models can help us understand both how parties reach agreement and, if they do, how they divide the gains from trade between themselves.

An owner values possessing a book at \$10. A buyer will spend as much as \$15 to acquire the same book. The different values that the buyer and the seller place on the book make a mutually beneficial trade possible, and legal rules should ensure that parties who want to make this trade are able to do so. After all, such a trade can leave both parties better off. Legal rules, however, do more than simply facilitate trade. They also may affect the way the parties divide the potential gains from any trade (in this case the \$5 difference between \$10 and \$15). Two labor laws might be equally efficient, but one might create a bargaining environment that leaves the workers with higher wages than the other.

Much bargaining takes place between parties who have an established relationship. Workers who bargain over a new contract may have worked at the same firm for many years and may have developed substantial firm-specific skills. These workers have valuable skills that the employer cannot find in new employees, but which have no value to the workers in any other job. The rules governing the contract negoti-

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ations determine how the extra value that the workers bring to the firm is divided. These rules in turn affect the incentives of the parties during the period of the original contract. If the bargaining environment is one in which the firm enjoys the entire surplus, the workers will have no incentive to develop firm-specific skills. If, however, the workers enjoy the entire surplus, the firm will have no incentive to spend resources training its workers and giving them firm-specific skills. As we first saw in our discussion of renegotiations in Chapter 3, the rules governing such negotiations matter because they affect how people behave before the negotiations take place.

The need to ensure that the rules governing bargaining give parties the right set of incentives throughout their relationship permeates the law. As we have seen, parties to a contract may be able to structure the environment in which future bargaining takes place at the time of their initial contract. The law, however, must still supply a set of default rules. In addition, there may be other environments, such as bankruptcy, in which bargaining affects the rights of third parties, and the rules cannot be left entirely to the parties themselves. There are still other contexts, such as labor negotiations, in which lawmakers want to affect the way gains from trade are divided quite apart from what the parties would agree upon in a bargain before the fact.

In any particular case, much will turn on the specific facts and the reputations and other characteristics of the parties. One party, for example, may be willing to forgo any benefit from reaching a deal in order to establish a reputation as a tough negotiator. The two individuals may live in a culture in which there are strong norms about how such divisions are to be made. The fear of ostracism may drive them toward a particular division. Our focus, however, is on how laws, as a general matter, affect negotiations; or, to put the point more precisely, we want to know how a change in the legal rules is going to change the bargaining environment in which parties operate.

When we capture the interactions between the players in the simplest way, many bargaining problems we confront are variations on the following game. Two players are seated at a table. In the center of the table is a dollar bill. The players must negotiate with each other and agree on a way of dividing the dollar. One makes an offer that the other can accept or reject. Once a player rejects an offer, that player can make a counteroffer that the first player can in turn accept or reject. When they reach some agreement on how to divide the dollar, they will each receive their respective share of the dollar. Unless and until they reach agreement, however, they receive nothing. Delay, of course,

matters because of the discounting of value over time.

These game-theoretic models were explored in a paper called *Rubinstein's model of bargaining*. It is a model in which they want the dollar but because of the discounting, a dollar in the future is worth less than a dollar now. Its basic idea is that the dollar even though it is about how people value it, is a substantive legal rule.

A legal rule can cut short the game by specifying a payoff. An alternative prediction is that people will assume autonomy in the way they solve the problem and problems.

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later time.

These games—ones with alternating offers and infinite horizons—were explored by Ariel Rubinstein in the early 1980s and are often called *Rubinstein bargaining games*. There are, of course, other ways to model bargaining. Indeed, Rubinstein himself offered an alternative model in which the parties are driven toward agreement, not because they want the benefits of reaching agreement sooner rather than later, but because each round of bargaining is costly. The game of splitting a dollar in which each party wants to reach agreement sooner rather than later, however, has advantages over other models that we might use. Its basic solution—one in which similarly situated players divide the dollar evenly between themselves—comports with our intuitions about how people behave. In addition, it is easy to introduce changes in substantive legal rules into the bargaining environment in this model. A legal rule can be seen as an *exit option*, the right of one party to cut short the give-and-take of bargaining and receive some alternative payoff. An alternating offer game with exit options generates many predictions about how changes in legal rules affect bargains. We cannot assume automatically that these predictions are in fact consistent with the way the world works, but, as elsewhere, they do reveal tensions and problems in legal rules that are not otherwise immediately evident. Before we introduce exit options, we need to identify the solution to the simple game in which the two players must split a dollar. There are several approaches to solving this game. One is to begin by asking whether there is any equilibrium in which the first player's strategy is to make an offer, to refuse all counteroffers for any lesser amount, and to keep repeating the initial offer until it is accepted. (It seems logical to ask if such a strategy exists because this game is one of full information and a player does not learn anything during the course of the game. When the first player makes an offer on any move, the player is in the same position the player was in at the start of the game, except for the passage of time.)

Such a strategy can be part of a subgame perfect equilibrium only if the second player cannot respond with a counteroffer that the first player is better off taking rather than repeating the initial offer. If the second player can make such an offer, then the first player's strategy of repeating the initial offer cannot be part of a subgame perfect equilibrium. Such an equilibrium can exist only if the first player chooses a best response in the subgame that exists after the second player makes the counteroffer. The strategy of not accepting any counteroffer is a

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best response only if the first player is better off repeating the initial offer than taking the counteroffer. If the offer of the first player leaves the second player with too little, the second player is able to make a counteroffer that the first player would prefer to repeating the initial offer. It turns out that the first player's desire to take as large a share as possible and the second player's ability to make an attractive counteroffer enable us to identify a unique solution to this game.

Let us start by asking whether an equilibrium can exist in which the first player's strategy is to offer the second player a share of the \$1 equal to s on every move. To assess this strategy, we must determine how much the value of s shrinks if the players wait a period before agreeing on a division. As in Chapter 5, we can use δ to represent the amount that the value of the dollar decreases for a party during each period. (For example, if δ is 0.5, then that party values receiving money in the first period twice as much as receiving the same amount of money in the next period. A party is indifferent between receiving \$0.50 in the first period and \$1 in the second.) To keep things simple, we assume at the outset that both players have equal discount rates.

When a player repeats an offer rather than accepting a counteroffer, the first player must wait at least an additional period before receiving a payoff. Hence, the first player's best response is to accept a counteroffer, even if it is less than the initial offer, if it gives the first player more than the initial offer would give when accepted one period later. By offering s , the first player retains a share of the dollar equal to $1 - s$. Because the first player must wait an additional period by repeating the offer, however, a counteroffer from the second player is more attractive if it gives the first player more than $(1 - s)\delta$.

It will be a best response for the second player to make such a counteroffer, however, only if making it leaves the second player better off than taking the first player's initial offer. Because the second player must wait an additional period, the counteroffer must leave the second player with an amount larger than s . More precisely, it must leave the second player with an amount that is greater than s/δ . Therefore, the second player can never offer the first player more than $1 - s/\delta$, but it is in the second player's interest to make a counteroffer of $(1 - s)\delta$. The first player is better off taking such a counteroffer rather than repeating the initial offer.

An equilibrium in which the first player repeats the initial offer and never accepts a counteroffer cannot exist if (1) the second player is able to make a counteroffer of $(1 - s)\delta$, and (2) this amount is greater than

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$1 - s/\delta$. The first player can ensure that the second player cannot make such a counteroffer by making an initial offer such that:

$$1 - \frac{s}{\delta} = (1 - s)\delta.$$

This equation is straightforward. When the first player chooses a value of s that satisfies this equation, the second player has nothing to gain from making a counteroffer. The only counteroffer that the first player would be better off accepting rather than playing the equilibrium strategy leaves the second player with no more than the second player would receive by taking the first player's offer. When we do the algebra to find out the share that the first player offers the second player at the outset, we find that:

$$s = \frac{1 + \delta}{\delta}$$

We subtract this amount from \$1 to find out what share the first player would keep.

At this point, we have discovered a subgame perfect equilibrium to this game. The first player offers the second player $\delta / (1 + \delta)$ and does not accept any counteroffer. The second player accepts any offer equal to or greater than $\delta / (1 + \delta)$ and otherwise makes a counteroffer of $(1 - s)\delta$. The first player receives $1 - s$ or $1 / (1 + \delta)$, which is the most that the first player can receive, given the strategy of the second player. Never accepting a counteroffer is a best response to the strategy of the second player, given that the second player does not make a counteroffer larger than $(1 - s)\delta$. The strategy of the second player is also a best response. Given the strategy of the first player, the second player's best response is to take the initial offer.

There is no other combination of strategies in which the first player makes an initial offer and never changes it that is also a subgame perfect equilibrium. The ability of the second player to make a counteroffer that the first player would be better off taking drives this result. The first player makes an offer that is just large enough so that the second player is not able to make a counteroffer that would prevent the strategy of repeating the same offer from being a best response. Indeed,

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this combination of strategies turns out to be the only subgame perfect equilibrium to this game.¹

An only slightly more complicated version of the Rubinstein bargaining model posits different discount rates for the parties (δ_1 and δ_2 respectively). When the time period between offers becomes arbitrarily short, the share that the second player enjoys is:

$$\frac{\ln \delta_1}{\ln \delta_1 + \ln \delta_2}.$$

If the two discount rates are the same, the share that the first player offers the second in the first round approaches $\frac{1}{2}$ as bargaining periods become arbitrarily short.² This comports with the intuition that, when everything else is equal, parties who bargain with each other will tend to split the difference.

Legal Rules as Exit Options

In this section, we use the alternating offers model to examine different legal rules and the way they affect the kinds of bargains parties strike. In the simple Rubinstein bargaining game, the parties do not have any alternative to striking a deal with each other; the players receive nothing unless they reach an agreement with each other. In most actual bargains, however, what matters is the alternatives that each of the parties enjoy. Many legal rules do not affect the actual bargaining process itself, but rather the alternatives that each party has to continuing the negotiations. The bargaining problem in *Peevyhouse v. Garland Coal and Mining Co.* provides a good illustration of how legal rules can affect the negotiations between the parties.³

As we saw when we first discussed the case in Chapter 4, Garland broke its promise to restore the land to its original condition when it finished strip mining. To highlight the bargaining problem, we make a number of simplifying assumptions. We assume that the land in its current condition is worthless, but that it would cost Garland \$1 million to restore the land. We begin by assuming that the value that the Peevyhouses attach to their land is \$800,000 and that this value is observable but not verifiable. It is plausible to think that the information is nonverifiable. A farm is not a fungible commodity like wheat or corn. It may not have a readily ascertainable market value. The farm may be worth more to the Peevyhouses than to anyone else, and a court may have

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no way of knowing how much more. The value that the Peevyhouses attach to the land, however, may be known to Garland because of its earlier negotiations with the Peevyhouses.

One of the goals of contract law is to give the party in the position of Garland the right set of incentives throughout the course of the contract. Garland should make its decisions taking full account of the loss that the Peevyhouses suffer if the land is not restored. When transaction costs prevent the parties from opting out of any default rule, we want the default rule governing the Peevyhouses' remedy against Garland to be such that Garland has to pay the Peevyhouses an amount equal to the harm that the Peevyhouses suffer from the breach. No other amount ensures that Garland takes account of the Peevyhouses' interests while it is performing the contract. Creating such a default rule, however, is hard when the amount of harm that the Peevyhouses suffer is observable but not verifiable information.

One possibility is to give the Peevyhouses a right to specific performance. If Garland is forced to restore the land, there will be economic waste. By assumption, the land is worth less to the Peevyhouses than the cost of restoring it. Both the Peevyhouses and Garland are better off if the land is not restored. By ordering Garland to restore the land, the court may bring about an inefficient outcome if renegotiations are not possible. Garland and the Peevyhouses, however, may be able to bargain with each other before the Peevyhouses actually invoke their right to specific performance. We need to take account of the dynamics of these negotiations before we can properly assess the merits of a specific performance remedy in this case. We need to consider whether the bargaining between the parties proceeds in such a way that the land is not actually restored, but Garland offers and the Peevyhouses accept an amount of money equal to the subjective value that the Peevyhouses place on the land.

We know that Garland must offer an amount that is at least as large as the value that the Peevyhouses attach to having the land restored. (If it made an offer for any less, the Peevyhouses would reject it and insist upon specific performance.) If the parties settle on an amount larger than \$800,000, however, Garland has the wrong set of incentives. It may spend money during the course of the contract as if the harm the Peevyhouses suffer from breach is greater than it is. But it is possible that the parties will in fact settle on an amount that is equal to \$800,000. We can see this by extending the alternating offers model we set out in the last section.

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has already been entered against Garland and it has had to post a bond of \$1 million, the amount equal to the cost of restoring the land. The bond will remain in effect until the Peevyhouses insist on specific performance and Garland is forced to restore the land or until the Peevyhouses and Garland reach a settlement. The Peevyhouses, of course, would like to have their land restored or their cash settlement sooner rather than later. Garland, for its part, would like to reach an agreement and be able to enjoy some part of the money that is now tied up in the bond. The Peevyhouses can make an offer or cease negotiations and demand specific performance. Garland can either accept the offer or make a counteroffer. The Peevyhouses can then either accept the counteroffer, make another offer, or abandon the negotiations and demand specific performance.

We shall assume that once the Peevyhouses demand specific performance, the bargaining cannot begin again. These negotiations are a Rubinstein bargaining game, except that one of the players (the Peevyhouses) has the right to walk away from the bargaining table. This right to walk away—this exit option—is something we must take into account in solving the game.

We begin by positing that a stationary equilibrium exists similar to the one we saw in the original game. There are two possibilities to consider—the value of the exit option may be greater than the offer the Peevyhouses would make if they were playing a simple Rubinstein bargaining game (an amount we shall call their *bargained-for share*) or it may be less. Let us assume first that the subjective value that the Peevyhouses place on the land once restored is only \$200,000. In this event, having the exit option, having the ability to force Garland to restore the land, may do the Peevyhouses no good. They are better off playing the Rubinstein bargaining game, ignoring their exit option, and receiving what they would receive in that game.

We know from our solution to the original game that, if the Peevyhouses and Garland had the same discount rate and if the time between offers were short, the Peevyhouses could ask for \$500,000 at the start of negotiations and Garland would give it to them, even if the Peevyhouses had no exit option. If the value of the exit option is sufficiently low, the exit option itself does not affect the play of the game. The exit option does not give the Peevyhouses a way to get more than what they could get without it. The threat to exercise the exit option is not credible, because the Peevyhouses are better off playing the Rubinstein bargaining game than exercising their exit option.

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performance in such a case gives Garland the wrong set of incentives during the course of performing the contract. Garland would make investments to avoid breach in order not to pay the Feevyhouses \$500,000. Some of these precautions would be wasteful, however, because the Feevyhouses would suffer only \$200,000 in damages in the event of breach.

The subjective value that the Feevyhouses place on the land, however, may be high relative to the cost of restoring the land. Let us assume it is \$800,000. In this case, the problem is more complicated. The Feevyhouses will never settle for less than the value to them of having the land restored, for the Feevyhouses can receive the equivalent of this amount by exiting from the bargaining and demanding specific performance. Hence, if the Feevyhouses made an offer of \$800,000, an amount equal to their exit option, Garland would accept it because it could never hope to do better. By accepting the offer, Garland would leave itself with the most it could ever receive. The question therefore is whether Garland would ever accept an offer that was any higher than the \$800,000 subjective value the Feevyhouses put on the land. (We should bear in mind that, under our assumptions here, Garland knows this value.)

To answer this question, consider a proposed equilibrium in which the Feevyhouses choose a strategy where they insist on a given amount greater than their exit option and repeat this offer every period. Would Garland ever accept such an offer, rather than make a counteroffer? In this proposed equilibrium, the offer the Feevyhouses make in their first move is the same as the one they make in all subsequent rounds of the game. In this proposed equilibrium, however, Garland will always be able to make a counteroffer that is more attractive to the Feevyhouses than repeating their initial offer. Garland, in other words, can make a counteroffer that leaves it with more than the Feevyhouses offered initially, taking into account the delay. We can also show that this counteroffer is better for the Feevyhouses than their original offer would be to them if it were repeated and then accepted. The proposed strategy of repeating the initial offer is not a best response and is therefore not part of an equilibrium.

In the absence of exit options, the Feevyhouses would receive their bargained-for share. The value of the exit option (\$800,000) is higher than the amount of the bargained-for share (\$500,000 in this example). Any offer that is higher than the exit option must be higher than the bargained-for share as well. Let us assume that the Feevyhouses demand \$900,000. In the face of any such demand, Garland will always

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be able to make an attractive counteroffer. Garland can offer less than \$900,000 and the Peevyhouses will be better off taking it than repeating the offer of \$900,000. The Peevyhouses are better off taking the counteroffer once the effects of discounting are taken into account. As we saw in the previous section, whenever the Peevyhouses demand to keep more than \$500,000, Garland can make a counteroffer that would leave the Peevyhouses better off than they would be if they repeated the same offer again.

Because Garland always has the ability to make an attractive counteroffer, it cannot be an equilibrium for the Peevyhouses to adopt a strategy of repeating a demand greater than the value of the exit option at every move. Nor can they demand some amount greater than the value of the exit option in one period by threatening to demand even more in a subsequent period. Such a threat is not credible. The alternating offer game with an exit option is different only in that the player with the exit option has the ability to exit the bargaining and this ability puts a floor on what that player receives in any bargain. As the time intervals become sufficiently short, the only subgame perfect equilibrium is one in which the Peevyhouses offer an amount that is equal to the value of their exit option in every period and Garland accepts the offer in the first period.⁴

When the game is one of observable, nonverifiable information, the players do one of two things. When the value of the exit option is below the bargained-for share, each player receives the bargained-for share of what is at stake—the amount that Garland will spend on restoring the land. When the Peevyhouses' exit option is high enough, however, the shares are no longer driven by the dynamics of bargaining but instead by exactly the thing that we want to matter, the subjective damages the Peevyhouses have suffered as a result of Garland's failure to keep its promises.

This model suggests that giving the Peevyhouses a specific performance remedy might give Garland a better set of incentives during the course of the contract than requiring a court to award damages. The postbreach negotiations between the parties prevent specific performance from ever taking place, and the amount on which the parties settle may be exactly equal to the subjective value that the Peevyhouses place upon the land. By threatening to order specific performance, in other words, a court might induce a bargaining process that would lead to a payment from Garland to Peevyhouse that was exactly equal to what the court would award in damages if it possessed the relevant information.

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Up to this point, we have assumed that the subjective value that the Feevyhouses place on the land is observable information. It may be the case, however, that Garland, like the court, may not know this information. We can again consider the two cases. If the value of the exit option is less than the share that the Feevyhouses would receive from bargaining, the Feevyhouses would be content with their bargained-for share, except to the extent that they can make Garland believe that their subjective value is in fact high. If the Feevyhouses have a subjective value that is higher than the bargained-for share, however, they would seek a way of credibly communicating their higher value to Garland.

Let us begin with a model in which the Feevyhouses place a value of either \$200,000 or \$800,000 on the land. The Feevyhouses can either exit the bargaining and have the land restored or make an offer. If Garland rejects the offer, a period of time passes before Garland makes a counteroffer. The Feevyhouses can either accept the counteroffer or wait a period of time and then either exit or make another offer. Garland does not know whether the Feevyhouses have an \$800,000 or a \$200,000 valuation, but it believes that each is equally likely.

Let us assume first that the Feevyhouses place a value of \$800,000 on having the land restored. The Feevyhouses should never be able to recover more than \$800,000. We know from the previous section that Garland would never agree to pay more even if it knew that the Feevyhouses' exit option was worth \$800,000. Garland should therefore never agree to pay more when it knows only that the value cannot exceed \$800,000, but might be much less.

The next possibility is that the Feevyhouses can make an offer that reserves \$800,000 for themselves when they have the high valuation. Would Garland accept such an offer? There are two possibilities. The first is a separating equilibrium in which the Feevyhouses with the low valuation make a low offer, the Feevyhouses with a high valuation make a high offer, and Garland believes that those who make high offers are high-value and that those who make low offers are low-value. We can eliminate this equilibrium. Given Garland's beliefs, the Feevyhouses' best response when they have a low valuation is to make a high offer. In this proposed equilibrium, Garland believes that the Feevyhouses that reserve \$800,000 for themselves have a valuation of \$800,000. The Feevyhouses with a valuation of \$200,000 could therefore mimic the actions of those with the higher valuation if Garland has this belief. Hence, the combination of actions and beliefs in which the different types separate themselves cannot be an equilibrium.

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The second possibility is a pooling equilibrium in which both high- and low-value Peevyhouses make offers in which they reserve \$800,000 and Garland accepts. This proposed equilibrium is also one in which actions and beliefs are not consistent with each other. Garland is not choosing a best response given the actions of the Peevyhouses. If Garland accepts the offer, it recovers \$200,000. By turning down the offer and making a counteroffer of \$500,000, it stands to do better. The high-value Peevyhouses would reject such an offer because they can get something (their land restored) that they value at the equivalent of \$800,000 by exiting. Thus, they prefer to exit rather than to make another offer. Once they exit, however, only the low-value Peevyhouses are left. Garland can infer their type, and the game becomes one that is identical to that in which the information is observable. In such a game, both parties will settle for their bargained-for shares of \$500,000 each. By making this counteroffer, Garland expects to recover \$250,000 of the million dollar bond it posted.⁵ This is better than recovering only \$200,000, as it would if it accepted the Peevyhouses' offer at the outset. Because Garland is better off by making a counteroffer, there cannot be an equilibrium in which Garland accepts offers from both that leave it with \$200,000.

We have eliminated all the potential equilibria in which the Peevyhouses with the high valuation make an offer of \$800,000 and that offer is accepted. Hence, the Peevyhouses with the high valuation must decide at their first move whether to make an offer of less than \$800,000 or to exercise their right to exit. Given that no offer will be accepted that will give them as much as exiting immediately, they will exit. Because they exit, Garland infers the type of the remaining players and the game becomes the same as one of observable information. The Peevyhouses with the low valuation simply receive their bargained-for share.

Versions of this game in which the Peevyhouses might have many different valuations are harder to solve, but the solutions to these games have the same general features as the one to this game. Peevyhouses with high valuations exercise their exit option. They have nothing to gain from bargaining in a world in which they cannot readily distinguish themselves from those with lower valuations. If they never receive more than the value of the exit option by continuing in the game, they exit.

This analysis suggests that some unraveling may take place. The Peevyhouses may invoke their right to specific performance when their subjective values are high enough. The same force that makes specific performance attractive when the information is observable—the inabil-

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ity of the first player to obtain more than the value of the exit option—leads to a bargaining breakdown when the subjective value of having the farm restored is nonobservable, nonverifiable information. The first player will not incur the costs of bargaining if nothing can be gained by it.

The possibility of bargaining failure compounds another difficulty that exists if the subjective value of the farm to the Peevyhouses is private, nonverifiable information. The purpose of awarding the Peevyhouses these damages is to induce Garland to internalize the costs that it imposes on the Peevyhouses if it fails to restore the land. Even if this bargaining led to an outcome in which the Peevyhouses were given the subjective value, it would fail to give Garland the correct set of incentives. Garland needs to know the subjective value that the Peevyhouses place on the farm at the outset. If it does not possess this information, it will take too many precautions to prevent default in some situations and not enough in others. The possibility of bargaining failure, coupled with the need to provide information to Garland at the outset, reinforces the need to consider default rules that induce parties to bargain about such matters at the outset.

We do not know how accurately the Rubinstein bargaining model captures the dynamics of real world bargaining. It sheds light, however, on the crucial question: To what extent does an exit option, an ability to leave the bargaining table unilaterally, affect the dynamics of bargaining itself? The model suggests that much turns on whether the subjective value that the Peevyhouses place on having their land restored is private information. If the value is known to both Garland and the court, there is nothing to be gained from having a specific performance award. If the value is known to Garland, but not to the court, there is at least the possibility that bargaining between the parties will lead to their settling on an amount that is in fact equal to the subjective value that the Peevyhouses place on the land. When the value is information that is private to the Peevyhouses, however, there is a possibility that bargaining will regularly break down and that the land will be restored even when it is in no one's interest.

This analysis suggests that one can incorporate legal rules into a bargaining environment by modeling them as exit options, as rights available to a player when no consensual bargain is reached. There are many rules in contract law whose principal effect may be to create a context in which parties negotiate. A buyer, for example, has a right to *perfect tender*. A buyer may reject goods and force a seller to take them back if they do not conform to the contract. When reshipping the goods is

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costly or when they are suited to a buyer's special needs, the buyer may be the person who should end up with the goods even though they are nonconforming. In such a case, the buyer's right to perfect tender affects not whether the buyer ends up with the goods, but rather how much of a discount the seller must offer to persuade the buyer to keep them.

As in *Peevyhouse*, the effect of the perfect tender rule is two-fold; it changes the incentives of one of the parties before the fact (in this case, the incentive of the seller to ensure that goods are conforming in the first instance), and it sets the initial conditions for bargaining between the parties. Here again, a Rubinstein bargaining model can shed light on such questions as how the bargaining between the parties will change when the value that the buyer attaches to the goods is observable by the other party, but not by the court, or when the value is known only to the buyer.

The model we have developed in this section might also be used to explore the parallel question of *substantial performance* in contract law. A builder finishes a building but installs the wrong kind of pipe. The pipe has little or no effect on the value of the building, but it would cost a great deal to take out the pipe and install the correct kind. Can the builder still sue for the balance of what it is owed or does the builder's breach give the owner the right to withhold payment? Again, if it makes little economic sense to replace the pipe, the legal rule will only determine the nature of the negotiations between the builder and the owner. The traditional legal rule, one that gives the builder the right to sue in the event that its performance is *substantial* can again be subject to scrutiny using this model. Rather than pursue this or other bargaining problems that arise in contract law, however, we apply the model to a completely different body of law in the next section and explore the light it can shed on the law of corporate reorganizations.

Bargaining and Corporate Reorganizations

When a firm that is worth keeping intact as a *going concern* finds itself unable to pay its debts, it must enter into negotiations with its creditors and restructure its debt. Even if the firm never files a bankruptcy petition, the course that the negotiations take will be shaped by the rights that parties have in bankruptcy. We can use the Rubinstein bargaining model with exit options to understand how different bankruptcy rules affect the rights of the parties.

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finds itself in Chapter 11 and is a good candidate for a successful reorganization. Firm made an effort to expand its operations and borrowed heavily from Creditor in the process. Creditor took a security interest in all the assets of Firm, and therefore has a priority claim on those assets. The effort to expand proved a disaster, as the economy took a turn for the worse at just the wrong time. In the end, Firm had to re-trench. The heart of the business may be basically sound, but the amount owed Creditor alone may exceed the value of Firm. Firm is worth more if it is kept intact as a going concern, but only if Manager continues to run it. Manager's skills, contacts with customers, and ability to improve Firm's patented products may make Firm worth much more than if anyone else ran it. Manager's skills are not fungible, and, to have the proper incentives, Manager, like the managers of most closely held firms, must retain an equity interest in Firm.

Bankruptcy law creates a bargaining environment in which Creditor and Manager negotiate with each other. At the time of the loan, Creditor and Manager can anticipate the bargaining environment in which they will find themselves in the event that Firm needs to be reorganized, as well as the division of assets that such a bargaining environment will produce. If Creditor can predict that it is likely to receive a small share in the event of a reorganization, it will demand a correspondingly high interest rate at the time of the initial loan. Full compensation for these risks, however, does not make the division of Firm in a reorganization irrelevant. Firm will be more likely to default if it must pay a higher rate of interest to Creditor (assuming that the debt level is fixed and the probability distribution of Firm's returns remains unchanged). If there are social costs associated with default—and there almost surely are—giving a smaller share of Firm to Creditor in the event of a reorganization may cause welfare losses. There are other effects that also need to be taken into account, including the need to give Manager the right set of incentives in good times as well as in bad.

When a bankruptcy petition is filed, an *automatic stay* goes into effect.⁶ This stay prevents any creditor from exercising rights against the debtor on default. These rights typically include the right to go to court and obtain an order allowing the creditor to seize the debtor's assets. While the automatic stay is in effect, the creditors and the old equity-holders try to agree upon a plan of reorganization. Creditor has no right to reach any of the assets if Firm has value as a going concern. We can examine the rules of United States bankruptcy law and some alternatives to them by returning to the Rubinstein bargaining model

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and treating the rights that Creditor and Manager have as exit options. The effect of the automatic stay, in terms of our model, is to deny Creditor an exit option whenever, as in the example with Firm, the liquidation value of the assets is less than the value of Firm as a going concern. Because no exit option exists, the liquidation value of the assets that Creditor would be able to enjoy outside of bankruptcy is irrelevant. Because Creditor has no ability to lift the automatic stay, Manager need not pay attention to the liquidation value of the assets during the bargaining. The Bankruptcy Code gives Creditor the right to prevent the confirmation of a plan that does not give it the liquidation value of Firm's assets, but this right does it no good in any negotiations with Manager. With or without this right, Creditor has no way to force Manager to pay it the liquidation value of the assets and no way to extricate itself from the bargaining process.

Manager, however, is most likely in a different position. In the terms of our model, Manager enjoys at least one exit option and may in fact enjoy a second. In the kind of case that we are considering, Manager has rarely signed a long-term employment contract with Firm. Even if Manager has signed such a contract, courts will not specifically enforce it and may refuse to enforce a covenant not to compete if it sweeps too broadly. Hence, during negotiations with Creditor, Manager can threaten to leave Firm and find work elsewhere. The amount that Manager can command in some alternative line of work puts a floor on what Creditor will have to give Manager to continue to manage Firm. In bargaining with Creditor, Manager will therefore insist upon receiving at least this amount.

When the assets remain in Firm and Manager continues to work there, a bargain between Creditor and Manager increases the joint welfare of the two parties. Because of Manager's exit option, Creditor can never receive more than the difference between the value of Firm as a going concern with Manager and the value of Manager's alternative wage. The Rubinstein bargaining model would also suggest, however, that Manager's exit option will play a role only when the amount that Manager can earn elsewhere exceeds the bargained-for share, the amount that Manager would receive if it bargained over Firm and had no ability to work elsewhere. In many cases, the value of Manager's alternative wage may be less than the bargained-for share and hence will not figure in the bargaining.

We can also use the idea of incorporating exit options into a Rubinstein bargaining game to examine the current dispute over what is called the *new value exception* to the absolute priority rule. Cases such

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as *Case v. Los Angeles Lumber Products* suggest that Manager may be able to force a plan of reorganization upon Creditor in which Firm continues as a going concern in Manager's hands. Under such a plan, Creditor receives a bundle of rights worth only the liquidation value of the assets. Manager keeps the residual.⁷ The new value exception enables Manager to force Creditor to take a share of Firm equal to the liquidation value of Firm's assets. Manager can capture the difference, the entire going-concern surplus, without reaching a consensual bargain. The model also suggests, however, that the ability to exit the bargaining and receive this amount does not enable Manager to strike a bargain for any more than this difference. Whether such a right exists and what its exact contours are if it does remain unclear.

Those who have argued against the new value exception have focused primarily on the valuation difficulties that necessarily enter the picture. Creditor may not receive even the liquidation value of the assets if it must rely on a bankruptcy court to determine whether its new interest in the reorganized firm is worth what Manager claims. By using a Rubinstein bargaining model with exit options, however, we can focus on an antecedent question: Does Manager's ability to invoke the exception change the way Firm is divided, even if there are no valuation problems?

The new value exception gives Manager a second exit option because, with it, Manager has another way of truncating bargaining with Creditor. Like the ability to leave the firm and earn a wage elsewhere, the new value exception gives Manager an alternative to reaching a deal with Creditor. The new value exception provides Manager with another threat. Manager will never offer Creditor more in the course of negotiations than it would cost to force Creditor out unilaterally under the new value exception. In this case, of course, Creditor is the one who literally "exits" from Firm. Nevertheless, the new value is best modeled as an additional exit option for Manager. What matters is how a legal rule gives one party or the other a credible threat. In this sense, any ability to cut the bargaining short is an exit option, because it puts a floor on what a party will insist upon in any bargaining.

When Manager has a new value exit option and when Firm has value as a going concern, this exit option—this way of threatening to terminate the bargaining—dominates the ability to earn a wage elsewhere. If the liquidation value is low relative to the bargained-for share, Manager will exercise the new value right. As the liquidation value increases relative to the bargained-for share, increases in the liquidation value directly increase the payments to Creditor and reduce those to

as exit options. is to deny Creditor, the liquidation value of the assets that is irrelevant. Manager need during the bargaining to prevent the liquidation value of negotiations with Manager to force Manager way to extricate on. In the terms and may in fact Manager Even if the Firm. Even if Manager can amount that Manager puts a floor on to manage Firm. ist upon receiving continues to work es the joint well- in, Creditor can value of Firm as a alternative, however, he amount that for share, the r Firm and had e of Manager's are and hence s into a Rubine e over what is ile. Cases such

Manager. Once the liquidation value exceeds the bargained-for share, however, Manager is better off threatening to continue to bargain with Creditor than threatening to pay it the liquidation value of the assets. Both Creditor and Manager will receive their bargained-for share. Further increases in the liquidation value relative to the value of Firm as a going concern have no effect on the distributions. Note that in either case, Manager will always receive at least the entire going-concern surplus.

We can contrast bargaining in this environment with that which would take place if Creditor did have the power to declare a default and seize the assets. Canadian law gives Creditor such a right several months after the filing of the petition. We would again have the basic Rubinstein bargaining model, but, in this case, both parties would enjoy exit options. When Creditor and Manager both assess their exit options, they will compare them with the value of their bargained-for shares.

As we have seen, the exit options do not themselves affect the size of the bargained-for share. For example, when Manager will do better by insisting on a bargained-for share than by exiting (by capturing the going-concern surplus or by taking another job), the threat to exit is not credible and will not be a factor in the bargaining. If Manager's alternative wage is less than Manager's bargained-for share and Firm enjoys a going-concern surplus, two factors will determine the division of Firm in a reorganization: (1) whether Manager has a new value exit option; and (2) the relationship between the liquidation value of the assets and Creditor's bargained-for share of Firm as a going concern.

By contrast, if Creditor did have an exit option (that is, if it were able to reach its collateral and sell it), the division of Firm would be quite different. The going-concern surplus that Manager can capture using the new value exception and the value of Manager's alternative wage may often be less than Manager's bargained-for share. In such cases, giving Creditor an exit option has a dramatic effect on the bargaining. When Creditor has an exit option, Creditor's share of Firm rises dollar for dollar as the asset's liquidation value rises. Creditor receives the liquidation value, and Manager gets the entire going-concern surplus.

If Creditor actually exercised its exit option, the value of Firm as a going concern would be lost. As long as the risk of bargaining failure is small, however, Creditor's ability to lift the automatic stay or confirm a liquidating plan affects only how large a share Creditor receives in the bargain struck with Manager. This model helps us identify exactly

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how denying Creditor the ability to reach assets affects the outcome of the negotiations between Creditor and Manager. When Creditor has no exit option and Manager's exit option is less than the bargained-for share, Creditor's share of Firm remains constant as long as Firm has value as a going concern. No matter how much the liquidation value of the assets increases relative to the value of Firm as a going concern, Creditor continues to receive only its bargained-for share, rather than the liquidation value of the assets. As soon as the liquidation value of the assets equals the value of Firm as a going concern, however, Creditor will be able under existing law to lift the automatic stay and thus reach the collateral.⁸ The payoff to Creditor suddenly jumps from its bargained-for share to the liquidation value of the assets.

It is hard to find a normative justification for a bargaining regime in which the liquidation value of Creditor's collateral is irrelevant until the extra value that Firm has as a going concern shrinks to nothing. By contrast, when Creditor does have an exit option and the liquidation value exceeds the value of Creditor's bargained-for share, Creditor's share increases as the liquidation value of the assets increases. When legal rules give parties exit options instead of imposing on them a vaguely defined duty to negotiate, the outcome is more likely to turn on things that might plausibly be part of the *ex ante* bargain, rather than on the relative patience of the parties, which does not seem related to any concern the parties would have at the time of their original loan.

Collective Bargaining and Exit Options

The National Labor Relations Act (NLRA), unlike its European counterparts, has not changed the substantive rights that managers and workers had under preexisting law. Rather, it aims to provide a structure in which collective bargaining can take place. Its ambitions are two-fold. First, it tries to create a bargaining environment in which strikes and labor unrest (and the costs that come with them) can be avoided. Second, and more elusively, it tries to ensure that both parties "bargain in good faith." To the extent that the law dictates bargaining rules that govern the course of subsequent negotiations, parties may adjust other terms of their initial contract to take this into account. In the end, these rules may not benefit one side or the other, even if they work to the advantage of one side during the subsequent bargaining. In this section, however, our focus is more narrow. We look only at how legal rules can affect the dynamics of the bargaining itself.

To understand collective bargaining, we need to identify what the

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parties are bargaining over and what alternatives each has to reaching an agreement with the other. The simplest case to imagine is one in which the firm has no hard assets and its entire value as a going concern consists of the firm-specific skills of its workers. For their part, the workers have no alternative wage, or at least no alternative wage remotely similar to what they are making by working for the firm. All of this is common knowledge. One can imagine the stakes in this game being the discounted present value of the income stream that the firm earns over time. One can also model the bargaining that takes place as a simple Rubinstein bargaining game in which the firm and the workers' union exchange offers. We would expect that the two would reach agreement in the first period and that each would receive a share of the earnings that turned on their relative levels of patience. In the simplest case, one would expect that they would divide the revenues equally between them.

We shall focus first on the exit options that are available to the employer. The most extreme option lies in the ability of the employer to sell off the assets of the firm. *NLRB v. Burns International Security Services, Inc.*, however, held that a buyer of a firm's assets has the same duty to bargain with the union as the previous employer if the buyer "acquired substantial assets of its predecessor and continued, without interruption or substantial change, the predecessor's business operations."⁹ A new buyer can put the assets to a different use or completely change the way the firm is organized. The new buyer can also hire new workers. But the buyer cannot rid itself of a union and the collective bargaining agreement if it wants to take advantage of the skills the existing employees have developed in their current jobs.

A decision that freed any new buyer from a duty to bargain with the union would change the exit option of the employer dramatically. If a new buyer can reach a much better deal with the workers, the existing employer has a threat that should improve its position in the bargaining. The question, of course, is whether this threat is credible. If the managers who bargain with the union would lose their jobs in any sale of the firm, the threat to sell the assets may not ever be carried out. As long as the union knows this, the threat would not matter much in the bargaining.

The effect of *Burns* on the dynamics of bargaining is likely to change as business conditions change. The exit option it offers the employer turns on whether the employees have firm-specific skills doing their current jobs. The more volatile the economic environment and the more a firm's operations can be restructured, the more likely it will be that

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a buyer will acquire the firm free of the obligation to bargain with the union, and hence the more potent the employer's threat to use this exit option. In the basic Rubinstein bargaining model, an exit option is irrelevant if it provides the player with less than the player's bargained-for share. The ability to sell assets is not likely to loom large whenever employees have substantial firm-specific skills. The greater the workers' skills, the less attractive it becomes for an employer to exit the bargaining by selling the assets. When workers have these skills, new buyers would want to keep them. The threat to sell the assets to someone who would replace the existing workers under these conditions is not credible.

When there is an economic strike—a strike over wages or other terms of employment—and the employer has not committed an unfair labor practice, the employer's most important exit option may be the ability to hire permanent replacement workers. The NLRB does prevent an employer from retaliating against its workers for going on strike, but the Supreme Court interpreted this mandate narrowly in *NLRB v. Mackay Radio and Telegraph*.¹⁰ In this case, the Court took the view that the National Labor Relations Act does not deprive the employer of the right to "replace the striking employees with others in an effort to carry on the business"; moreover, the employer "is not bound to discharge those hired to fill the place of the strikers" after the strike is over.

A simple model shows how this exit option may affect the bargaining. Let us assume that the employees have developed firm-specific skills. The employer's ability to hire replacement workers puts a floor on how much it will receive in any negotiations. The firm is worth \$1.5 million if it does not have the benefit of its current work force, but \$2.5 million if it does. The employer has no ability to sell the assets to a third party. If the workers have the power to strike and shut the firm down and if the employer has no viable exit option, the outcome of the bargaining will be a division of the \$2.5 million between them, with the share of each turning on their relative levels of patience. The employer and the workers will divide the firm evenly if they have equal levels of patience.¹¹ If the employer has the ability to hire replacement workers, it will determine the value of the firm with these workers (\$1.5 million). This amount is larger than its bargained-for share if both the firm and the employees have equal levels of patience. If this is the case, the employer will receive this value and the workers will capture the difference.

Under this bargaining model, the workers capture all the surplus

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value they bring to the firm even in a regime in which the employer has the right to hire replacement workers. When the value of the firm without the existing employees is less than the bargained-for share (as it might well be in cases in which the value that the workers brought to the firm was unusually large), the ability to hire replacements is irrelevant because the employer's threat to replace the workers is not credible.

The Rubinstein bargaining model confirms the obvious intuition that the right to hire replacement workers improves the bargaining position of the employer relative to that of the union. The additional insight it provides lies in the way it forces us to examine the relationship between the dynamics of the bargaining and the legal rules. When a legal rule gives a party the ability to exit the bargaining process, the importance of the legal rule is determined by the value of the exit option relative to what a party would receive without it. For example, the right to hire replacement workers may not matter when the value of the firm to the employer without the existing workers is so low that the threat to hire replacements is not credible.

To justify giving or denying an employer the right to hire replacement workers, one needs to understand the bargaining process. One might, for example, want to ensure that employers could not take advantage of the workers' inability to transfer their skills to another employer. The right to hire replacement workers, however, may not enhance the employer's ability to do this. In the model we have set out, for example, the right to hire replacement workers does not itself allow the employer to capture the difference between the value of the workers' skills in this job and their value in any other.

One must, however, be even more cautious than usual in drawing conclusions from a simple model. One of the central predictions of the model is that the exit option itself does not affect the dynamics of the bargaining, but only puts a ceiling or a floor on what a player receives. This prediction is not an obvious one, and we cannot be sure that other models would generate the same prediction or that this prediction would be borne out in practice. Many have the intuition that a player should be able to use an exit option to push the bargained-for share to an amount that is even higher than the exit option itself. As with any other model, its predictions should be tested before we act on them.

A more realistic model may give the union the additional option of continuing to work at the old wage for the next period of bargaining. The ability of the workers to obtain their Rubinstein bargaining share turns crucially on the credibility of their commitment to strike. The

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game in which the workers have the option to work for an additional period does not have an obvious course of play. There are several subgame perfect equilibria, including one in which the workers accept a contract at the old rate and others in which there is no agreement during the first period, but in which the workers actually go on strike.¹² These models make one less certain about the nature of the division between the employer and the workers. A richer model would also take into account another kind of legal regime—one in which the firm could hire temporary workers and run its plant during a strike, but could not keep the workers after the strike was over.

Summary

In this chapter, we looked at another way in which legal rules matter, even though their direct effects cannot be seen in equilibrium. A right to specific performance in *Peevyhouse* might matter, not because the Peevyhouses would ever invoke their right to specific performance, but rather because their ability to demand specific performance affects the outcome of negotiations between the parties. Many legal rules, ranging from the perfect tender rule in contract law to the intricate rules in the Bankruptcy Code on confirming a plan of reorganization over the objection of creditors, matter not because courts are asked to apply them often, but because they establish the contours of the negotiations that take place between the parties. They and many other legal rules give one party or the other an exit option, a power to walk away from the bargaining table and still receive something by invoking a legal right. Models such as the one we developed in this chapter show how legal rules affect the bargains that people strike. In the next chapter, we explore the dynamics of bargaining further and focus in particular on the way in which nonverifiable information must be taken into account.

Bibliographic Notes

Game theory and bargaining. There is a vast literature on bargaining theory in economics, only a small fraction of which is touched upon in this book. A radically different alternative to the Rubinstein alternating offers model is known as the *axiomatic approach*. Instead of looking at the dynamics of the bargaining process between two self-interested parties, it begins by positing the characteristics that an agreement be-

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tween the parties should have. The next step is to examine all the agreements that are possible in a particular case. (In our example with the book, the possible agreements are all the sale prices from \$10 to \$15.) One also notes the consequences if no agreement is reached. (The seller keeps a book that the seller values at only \$10 and the buyer keeps cash that would otherwise have gone to the sale.) The next step is to identify outcomes that are consistent with the characteristics we determined an agreement should have.

John Nash, whose equilibrium solution concept has been a recurring theme in the first six chapters, was a pioneer in this area as well. He set out a series of characteristics, or *axioms*, all of which seem plausible, and then showed that, in any bargaining situation, only one outcome could satisfy all of his axioms; see Nash (1950a). This way of examining bargaining is known as *cooperative bargaining* and has recently attracted growing attention. One of the great challenges in modern game theory is carrying out what is called the *Nash program*, which is to connect the principles of cooperative bargaining with those of noncooperative bargaining.

Rubinstein (1982) is the origin of the basic Rubinstein bargaining model. As a general guide, Osborne and Rubinstein (1990) is a good rigorous examination of the foundations of the basic bargaining model of this chapter, and it provides many extensions and elaborations thereon. A clear exposition and easily accessible proof is in Kreps (1990b).

There is a vast experimental literature on bargaining which indicates that negotiating behavior does not always conform to the economic model. Irrational behavior, social norms, and cognition problems have been documented. Good places to become familiar with this work are Raiffa (1982) and Neale and Bazerman (1991).

Legal rules as exit options. Sutton (1986) modifies the Rubinstein model by using exit options. Baird and Picker (1991) shows how legal rules can be modeled as exit options. *Peevyhouse* is discussed in Posner (1992). Cooter, Marks, and Mnookin (1982) models bargaining in the shadow of legal rules by positing that those engaged in bargaining have different characteristics, only some of which are observable.

Private information and exit options. The field of literature on private and asymmetric information is large. For variations on the Rubinstein model, see Rubinstein (1985), or Ausubel and Deneckere (1989) on bargaining with incomplete information. Many of the results in this chap-

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ter rely upon the Rubinstein bargaining model. Other potential lines of research into bargaining with private information would include *cheap talk* (statements by parties that are costless, nonverifiable, and nonbinding, but that nevertheless convey information) and other refinements. See Farrell and Gibbons (1989), Palfrey and Rosenthal (1991), Rabin (1990), Seidmann (1990), or Matsui (1991). In addition, there is an entire literature on optimal mechanism design that tackles issues similar to those involved in designing a legal system around an information structure; see, for example, Myerson (1979) or Myerson (1981).

Bargaining and corporate reorganizations. For a discussion of the general bargaining problem that arises in the context of bankruptcy, see Mnookin and Wilson (1989). Baird and Picker (1991) incorporate exit options into the Rubinstein bargaining model to examine the law of corporate reorganizations. Bergman and Callen (1991) and Bebchuk and Chang (1992) use the Rubinstein model to examine corporate reorganizations, but they do not use exit options. Bergström, Högfeldt, and Lilthell (1993) examines bargaining among creditors and a common debtor using a Nash bargaining model.

Collective bargaining and exit options. The literature using strategic bargaining models is large and growing. We make specific use of Fernandez and Glazer (1991).

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