A Model of Negotiation, Not Bargaining:Explaining Incomplete Contracts

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Abstract

Bargaining models ask how a surplus is split between two parties in bilateral monopoly. Much of real-world negotiation involves complications to the original split which may or may not increase the welfare of both parties. The parties must decide which complications to propose, how closely to examine the other side's proposals, and when to accept them. Ex ante, this type of negotiation results in Pareto improvement, rather than reducing welfare. I model negotiation as a two-period auditing game, and find a variety of plausible equilibria. Precommitment or optimistic expectations can result in Pareto improvements. Perhaps most important, the model suggests a reason for contract incompleteness: contract-*reading* costs matter much more than contract-*writing*costs. Fine print that is very cheap to write can be very expensive to read carefully enough to detect the absence of booby trap clauses artfully written to benefit the writer.

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1. INTRODUCTION

People without economic training often have difficulty appreciating the idea of gains from trade in a competitive market. If one person sells and the other person buys, they think, it must be that one of them has gained a victory over the other; every transaction has a winner and a loser. One of the central ideas in economics is that this is not true, and in competitive markets, or even monopolized markets, one cannot really speak of a winner and a loser. Both sides benefit.

When it comes to bilateral monopoly or bargaining, however, the emphasis is different, even for professional economists. The standard paradigm is the splitting of a pie, whether the model uses cooperative game theory, as in Nash (1950); noncooperative game theory with complete information, as in Rubinstein (1982); or noncooperative game theory with incomplete information, as in the vast literature surveyed in Kennan & Wilson (1993), of which Cramton (1984) is a typical example. Both bargainers will gain from the split, because if they fail to agree, the entire pie is lost, and in this sense there are gains from trade. Each person's bargaining effort, however, is devoted to trying to increase his own share at the expense of the other, and in this other sense there is a winner and loser. To the extent that agreement is not immediately reached, each side's effort to modify the deal is socially wasteful. Bargaining is redistributive, not productive; a process of rent-seeking, not value creation. The lesson for policy seems to be that institutions should be designed to eliminate bargaining. In this view, salesmen, brokers, and lawyers may be useful to initiate transactions, but time spent on negotiations is time wasted.

One contribution of the incomplete information models of bargaining is to show that bargaining is not quite so useless as this. Without bargaining, it may be unclear whether the pie actually exists. If the seller values an object more than the buyer, then the trade should not take place, something which the bargaining process may usefully reveal. Even if it is common knowledge that the buyer values the object more than the seller, however, costly bargaining will still take place and agreement will sometimes fail to be reached.[1]

Much dealmaking, however, does not fit into even the extended paradigm of splitting a pie of uncertain size, because the process of coming to an agreement is not so much about setting a price as about setting the terms of the agreement. This is especially true about deal- making's most time-consuming aspects, which are not repetitions of "I want a higher price," and "I want a lower price," but complicated suggestions and amendments, preceded and succeeded by careful investigation of their implications. I will call this process *negotiation*, in contrast to *bargaining.*

Examples abound. If I negotiate with a contractor about building a house, we do not just talk about the price, and our talk about the details of the contract is not just redistributive. We could eliminate almost all the negotiation if the government were to require that houses be of a single standard design, but that would not be efficient. I have my particular preferences about the windows, woodwork, floor type, color, and time of completion, and the contractor has his own individual costs for each feature. Much of my concern will not be about whether I can extract a good price at the expense of

[1]See Kennan & Wilson, p. 67 for a numerical example of costly bargaining when both parties know there exist gains from trade.

the contractor, but whether I am agreeing to buy features of the house that I really want. If I ask the contractor to paint the house purple, and I find later I do not like a purple house, it is no consolation that he made no profit on the painting.

Labor contracting is dominated by negotiation. It may be that a union and an employer have agreed upon a wage, but that does not end the collective bargaining. The employer may also, for example, offer an extension to the health insurance benefits, in exchange for a wage concession. Possibly, the benefit to the union is greater than the lost wages, in which case the change would benefit both sides. Or, maybe the workers could do better by not accepting the new insurance. The union negotiator's uncertainty is not over the minimum offer acceptable to the company, but over whether the health insurance helps both sides.

Mergers and acquisitions are notoriously complicated deals. Suppose that company A is selling off a division to company B. They have agreed on a price, but now company A asks that a clause be added to the deal under which it would buy back a certain amount of the output of the division each year at a specified price. The clause might benefit company B, or might hurt it. Again, the uncertainty is not over the minimum that company A would accept, but over whether the contract benefits both sides or not. It may be quite clear that the clause benefits company A by exactly five million dollars, but it may be unclear what the cost of the clause is to company B.

On a less grand level, suppose that Mr. Smith is selling a load of lumber to Mr. Jones. After a deal has been made, Smith says, "Throw in an extra \$50.00 and I'll deliver the lumber to your house. It's no big deal for me, and you'll save a lot of effort." Jones's uncertainty is not over the cost of delivery to Smith, which is of no interest to him. Rather, it is over the cost to himself, which might be either the cost of his own effort or the cost of hiring a deliveryman. This cost might be \$80.00, in which case Smith is right that both parties would benefit from the proposal, or it might be \$30.00, in which case Smith gains but Jones loses, and, furthermore, the proposal is inefficient.

All four of these examples involve the conflict between *creating value* and *claiming value* which is emphasized in the nonformal literature on bargaining.[2] Bargaining theorists in economics think of negotiation as multi-attribute bargaining: the splitting of several pies simultaneously rather than the splitting of just one pie, but essentially the same problem. In incomplete information models, bargaining over several attributes is similar to bargaining over one attribute because the strategic problem is the same: When player A proposes a contract modification to player B, how can B determine the value of that modification to A? It may indeed be that expectations and signalling make it quite significant that the surplus to be split is first separated into two pies instead of one, because, as Bac & Raff (1996) and Busch & Ig (1997) suggest, a bargainer may convey information about himself by which pie he concentrates his efforts upon. But the idea of creating value is different.

This difference has been recognized but not modelled. At the start of their survey of bargaining models, John Kennan and Robert Wilson list three costs of bargaining:

> Costly delays and failures to agree when gains from trade exist

[2] A survey of the nonformal literature can be found in Sebenius (1992). Much attention has been given to bargaining in labor relations; see pp. 290-298 of Fossum (1995) for the terminology and approach used there.

> represent two kinds of inefficiencies; a third is that an agreement is inefficient if its terms fail to realize all the potential gains from trade, as in the case that a firm's contract with a union specifies inefficient work rules or numbers of workers.[3]

Kennan and Wilson go on to survey the bargaining literature at length, but while costly delays and failures to agree receive ample attention in the next fifty-eight pages, failure to realize all the potential gains from trade does not resurface.

This neglect of negotiation can be explained, perhaps, because it requires a different style of model. The approach I will use below is not the standard bargaining approaches of cooperative game theory or incomplete information. Instead, I use an auditing model, in which information is complete but one player takes an action which the other player can either audit or let pass. The two players have completed their basic bargain, and are negotiating on extra clauses. The extra clauses might benefit both players, creating value, or just benefit the proposer, claiming value under the pretence of creating value. The other player must decide whether to trust the offer or inspect it carefully. It will be costly both to propose and to inspect clauses, so this will be a model both of *contract-writing costs* which are already well-known, and *contract-reading costs*, which are not. The strategic problem is quite different from in pie-splitting: When player A proposes a contract modification to player B, how can B determine the value of that modification to B himself?

The auditing literature is completely distinct from the bargaining literature. Early applications were to arms control verification, as in Dresher

[3] Kennan & Wilson (1993, p. 46).

(1962). Avenhaus, von Stengel & Zamir (forthcoming) survey the literature in Volume III of the *The Handbook of Game Theory*, with systematic attention to the variety of auditing situations– only one possible violation but n periods of possible inspection, m possible violations and n possible inspections, etc. One strand of the applied literature, which began with Baiman & Demski (1980), examines the incentives for high effort by a worker whose income is observed and can be used as the basis for an audit investigation. Another strand, which began with Townsend (1979), investigates the mechanism design question of how a provider of capital can elicit truthful reports of the financial condition of the user of capital. Since the problem is one of mechanism design, the players can contract in advance as to penalties for lying and bonuses for telling the truth.[4] Neither of these types of models is quite suitable for negotiation, since negotiation no variable equivalent to income which could be used as the basis for an audit and there is usually no advance contracting about penalties for lying.

The closest model to the one in this paper is Katz (1990). Katz is not concerned with negotiation *per se*, but with the legal rules involving the fine print in contracts. The courts must decide how much fine print to enforce. If they enforce none, they must pecify how the contract binds the parties, since the writing in the contract itself has been abandoned. If they enforce all of it, then each party to the contract must read the terms carefully or abandon writing detailed contracts in favor of short but ambiguous ones which leave much to legal default rules and the courts. Contract-reading costs are important, but the legal rules should be designed to induce the

[4]Townsend (1979) does not consider the use of random auditing strategies, an important omission corrected by Border & Sobel (1987) and Mookherjee & Png (1989).

parties to monitor what each inserts into the contract.

Section 2 of the present paper will construct the model of negotiation without solving for the equilibrium. Sections 3 and 4 will find the equilibria in the simple cases when precommitment is possible— in Section 3, when a player can precommit to honesty; and in Section 4, when he can precommit to inspecting all clauses carefully. Section 5 is the heart of the analysis, setting out four plausible equilibria. Section 6 continues in the same style, but for baroque equilibria with less plausibility. Section 8 returns to the assumptions made in Section 2, and shows how they could be modified to replace the assumption of equal bargaining power with the assumption that one party can make take-it-or- leave-it offers. Section 8 summarizes the results and draws general lessons.

2. THE MODEL

Two parties, the Offeror and the Acceptor, are trying to agree on the details of a contract. They have already agreed to a basic contract, splitting a surplus 50-50. This basic contract will not affect the model, and, indeed, it is included only to emphasize that some parts of the deal may not require negotiation. Let us say that the original deal generates a surplus of $2\overline{\pi}$, where $\overline{\pi}$ could equal zero. Let us also assume that the surplus is split equally between the two players by the bargaining process.[5] We will denote the per-round expected payoffs of the subgame starting with the offer of a new clause by $\pi_{1o}, \pi_{1a}, \pi_{2o}$, and π_{2a} .

[5]An alternative way to set up the model would be to allow one party or the other to make take-ir- or-leave-it offers and capture the entire surplus. Section 7 shows how this can be done. Which assumption is chosen is not important.

A sincere clause yields the Offeror x_s if accepted, and a misleading one yields him x_m. The cost to him of making an offer is $c_s > 0$ or $c_m > 0$, depending on the type of clause, where either of these might be the greater cost, depending on whether it is more costly to discover and propose a mutually beneficial sincere clause or to disguise a one- sided clause. Assume that

$$x_m - c_m > x_s - c_s > 0. \tag{1}$$

The first inequality in (1) says that the Offeror would prefer a misleading clause to a sincere one, given the cost of offering them, if both clauses had equal probabilities of acceptance. The second inequality says that either type of clause helps the Offeror, if accepted.

Let us also assume that

$$x_s + y_s - c_s > x_m - y_m - c_m. \tag{2}$$

This assumption says that the sincere clause is efficient; there is no side payment that the Offeror would be willing to make that would induce the Acceptor to knowingly accept a misleading clause.

The Acceptor's benefit is $y_s > 0$ from a sincere clause and $-y_m < 0$ from a misleading one. He cannot costlessly identify a clause that is offered. Instead, he can accept it outright, reject it, or inspect it at cost c_i to discover whether it is sincere or misleading.

The Offeror has the option of not offering any clause at all, for a payoff of 0.

The order of play is thus

(0) Offeror and Acceptor split the surplus of $2\overline{\pi}$ equally.

(1a) The first round of offers occurs. The Offeror offers a sincere clause at cost c_s, or a misleading clause at cost c_m, or ends the game by making no offer at all.

(1b) The Acceptor inspects the clause at cost c_i, discovering whether it is sincere or misleading, or does not inspect.

(1c) The Acceptor accepts or rejects the clause.

(2a) The second round of offers occurs. The Offeror offers a sincere clause at cost c_s, or a misleading clause at cost c_m, or ends the game by making no offer at all.

(2b) The Acceptor inspects the second clause at cost c_i, discovering whether it is sincere or misleading, or does not inspect.

(2c) The Acceptor accepts or rejects the second clause.

(3) The contract is finalized, payoffs are received, and the effect of the clauses is discovered.

This is a game of complete information. There do not exist different "types" of Offerors, and there is nothing for the Acceptor to learn about the Offeror during the game, although the Acceptor can learn about the Offeror's choice of clause. Because of this , it would make very little difference if the two players switched roles in mid-game, so that one player was the Offeror in the first round and the other was the Offeror in the second round. The properties of the game would be essentially unchanged; each of the possible equilibrium outcomes described below would continue to exist.

3.
THE VALUE OF A REPUTATION FOR HONESTY: WHAT IF THE OFFERER CAN PRECOMMIT?

What happens if the Offeror can precommit to offer only sincere clauses? The Acceptor will then not bother to inspect, and will accept both clauses, so the payoffs in each round are

$$\pi_o = x_s - c_s \tag{3}$$

and

$$\pi_a = y_s, \tag{4}$$

for a total social surplus over the two rounds of

$$\pi_{1o} + \pi_{1a} + \pi_{2o} + \pi_{2a} = 2(x_s + y_s - c_s). \tag{5}$$

The social surpluses in this and the scenarios below are tabulated later in Table 1 for comparison. The social surplus in this scenario is the highest possible, because reading contracts carefully is unnecessary and the sincere clauses are always offered.

It is hard to see how someone could literally commit to offering only sincere clauses, but in some cases plausible ways to reach the same outcome are available. If the Offeror repeatedly negotiates over time, with one or different Acceptors, he may wish to preserve a reputation for sincerity. If he ever offered a misleading contract, it would be accepted, but if he tried to enforce it, he could lose his reputation. Or, it might be possible to include in the contract a provision that if the Acceptor thinks a clause is misleading, a court or an impartial arbitrator with a reputation for honesty can void the contract. In practice, of course, it may be difficult for an outsider to determine whether a clause is misleading.

4. THE VALUE OF A REPUTATION FOR READING CONTRACTS CAREFULLY: WHAT IF THE ACCEPTER CAN PRECOMMIT?

What happens if the Acceptor can precommit to inspect? The Offeror is then willing to offer two sincere clauses, and the payoffs in each round are

$$\pi_o = x_s - c_s \tag{6}$$

and

$$\pi_a = y_s - c_i, \tag{7}$$

for a total social surplus over the two rounds of

$$\pi_{1o} + \pi_{1a} + \pi_{2o} + \pi_{2a} = 2(x_s + y_s - c_s - c_i). \tag{8}$$

The Acceptor is willing to precommit to inspection without any sort of side payment if $y_s - c_i \geq 0$.

The Acceptor may be able to do even better, however.[6] Suppose he can precommit to inspect with auditing probability α; e.g., he precommits to inspect with a probability of 90 percent. This is cheaper in expected value than the probability of 100 percent used above, and might still deter the Offeror from attempting to sneak by a misleading clause. It will deter him if α is chosen so that

$$\pi_o(Sincere) = x_s - c_s \geq \pi_o(Misleading) = (1-\alpha)x_m + \alpha(0) - c_m, \tag{9}$$

[6] I thank Wolfgang Pesendorfer for pointing this out to me.

which requires that

$$\alpha \geq \frac{(x_m - c_m) - (x_s - c_s)}{x_m}. \tag{10}$$

Assumption (1) ensures that the right-hand side of (10) is between zero and one. If α is set at α^*, the cheapest level which makes inequality (10) true, then the payoffs in each round are

$$\pi_o = x_s - c_s \tag{11}$$

and

$$\pi_a = y_s - \left(\frac{x_s - c_s + c_m}{x_m}\right) c_i, \tag{12}$$

for a total social surplus over the two rounds of

$$\pi_{1o} + \pi_{1a} + \pi_{2o} + \pi_{2a} = 2(x_s + y_s - c_s - \left(\frac{x_s - c_s + c_m}{x_m}\right) c_i). \tag{13}$$

The use of a probability α does not imply that the equilibrium is in mixed strategies; something quite different is going on here. Precommitment to an auditing probability is distinct from a mixed strategy, because the Acceptor must inspect with positive probability even though he knows that in equilibrium the Offeror will never offer a misleading clause.[7] Without precommitment, if the Acceptor announced he was following the strategy just described, it would not be an equilibrium. If the Offeror believed the announcement and only offered sincere clauses, the Acceptor would change his mind and reset the inspection probability to zero when the time came to pay the inspection cost.

Precommitment might take the form of paying for contract inspection in advance of the negotiation, by hiring an in-house lawyer, for example, and

[7]For more on the distinction, see Rasmusen (1994), pp. 81- 83.

being careful to not have other uses for his time. An interesting alternative that would reach the same result would be for the Offeror to pay for the lawyer, bundling together the offer of a new clause and the inspecting of the clause. "He who pays the piper calls the tune," however, and such an arrangement might not be trusted by the Acceptor.

The usual substitute for precommitment, reputation, might not work. The reputation here would be a reputation for reading contracts carefully. If the Acceptor can show Offerors that he does read contracts carefully, he can maintain such a reputation, but that may not be possible. Since only sincere clauses are offered in equilibrium, neither the diligent contract-reading Acceptor nor the deviant non-reading Acceptor would ever find a misleading contract. The problem of verifying that the Acceptor is following his equilibrium behavior becomes especially acute when that behavior is to inspect with probability α less than one; in each negotiation round, the Acceptor could fail to inspect, and claim that his failure was a matter of chance.

If the Acceptor can somehow commit to inspect every offer, however, the social surplus is almost as high as when the Offeror can commit to offering sincere clauses. The only difference is the cost of inspection.

5. EQUILIBRIA WITHOUT PRECOMMITMENT: HISTORY INDEPENDENT

Let us now assume that neither player can precommit to any action. The Offeror might offer either kind of clause and the Acceptor might or might not read the fine print of each clause offered.

Any equilibrium must have the following properties:

(a) The Offeror does not offer a misleading clause with probability one. If he did, then the Acceptor would never inspect or accept, and so the Offeror would incur cost c_m for no benefit.

(b) The Offeror does not offer a sincere clause with probability one. If he did, the Acceptor would never inspect the clause, and so the Offeror would prefer to deviate to offering a misleading clause to obtain x_m instead of x_s.

(c) The Acceptor does not have probability one of accepting without inspection. If he did, the Offeror would only offer misleading clauses.

(d) The Acceptor does not have probability one of inspecting. If he did, the Offeror would never offer misleading clauses, making the inspection pointless.

(e) No mixed-strategy equilibrium exists in which the Acceptor mixes only between Accept and Reject. (The Offeror would always choose Misleading in response, which could not be true in equilibrium because of (a).)

(f) No mixed-strategy equilibrium exists in which the Acceptor mixes only between Inspect and Reject. (The Offeror would always choose Sincere in response, which could not be true in equilibrium because of (b).)

These properties still leave a multiplicity of equilibria, depending on the expectations of the two players and the parameters of the model. Since many of the equilibria will be similar, let us define two numbers that will appear in several of them:

$$\theta_s = 1 - \frac{c_i}{y_m} \text{ and } \theta_a = \frac{x_s - c_s + c_m}{x_m}. \tag{14}$$

This section will deal with the four equilibria which are history independent in the sense that beliefs in the second period do not depend on what happened in the first period, though they may depend on the period being second instead of first.

EQUILIBRIUM 1: Mixing Each Round.

Offeror: In each round, offer the sincere clause with probability $p_s^* = \theta_s = 1 - \frac{c_i}{y_m}$ and the misleading clause otherwise.

Acceptor: In each round, accept without inspection with probability $p_a^* = \theta_a = \frac{x_s - c_s + c_m}{x_m}$, and otherwise inspect..

Let the probability with which the Offeror offers the sincere clause be p_s and the probability with which the Acceptor accepts without inspection be p_a. The one-round payoffs to the Offeror are

$$\pi_o(sincere) = -c_s + p_a x_s + (1 - p_a) x_s \tag{15}$$

and

$$\pi_o(misleading) = -c_m + p_a x_m + (1 - p_a) \cdot 0, \tag{16}$$

since the misleading clause will be rejected if the Acceptor chooses to inspect. If there is a mixed strategy equilibrium, the two pure-strategy payoffs must be equated, so

$$-c_s + p_a x_s + (1 - p_a) x_s = -c_m + p_a x_m, \tag{17}$$

and

$$p_a^* = \frac{x_s - c_s + c_m}{x_m}. \tag{18}$$

The one-round payoffs of the Acceptor are

$$\pi_a(accept) = p_s y_s - (1 - p_s) y_m \tag{19}$$

and

$$\pi_a(inspect) = -c_i + p_s y_s - (1 - p_s) \cdot 0 \tag{20}$$

since the misleading clause will be rejected if the Acceptor inspects it. If there is a mixed strategy equilibrium, the two pure-strategy payoffs must be equal, so

$$p_s y_s - (1 - p_s) y_m = -c_i + p_s y_s, \tag{21}$$

and

$$p_s^* = 1 - \frac{c_i}{y_m}. \tag{22}$$

For the probabilities in (18) and (22) to remain between zero and one requires that

$$x_s - c_s + c_m \geq 0, \tag{23}$$

which is guaranteed by assumption (1), and

$$c_i \leq y_m. \tag{24}$$

If assumption (24) is false, Equilibrium 1 does not exist. Only Equilibrium 2 does. If $c_i > y_m$, the Acceptor is not willing to inspect in moves (1b) and (2b), even though such inspection is needed for the Offeror to be willing to offer a sincere clause.

In addition, the Acceptor has the option of rejecting without inspection, for a payoff of 0. Comparing the payoff of 0 with the payoff in (20) from the pure strategy of inspecting $(-c_i + p_s y_s)$, it is apparent that for him to refrain from outright rejection requires that

$$p_s y_s \geq c_i, \tag{25}$$

or, substituting for the equilibrium level of p_s from (22),

$$\left(1 - \frac{c_i}{y_m}\right) y_s \geq c_i \tag{26}$$

If condition (26) is false, then Equilibrium 1 does not exist; only Equilibrium 2. Note that condition (26) requires that $c_i \leq y_s$. Inspection must be cheap enough relative to the value of a sincere clause that the Acceptor is willing to undertake the amount of inspection needed to give the Offeror incentive to sometimes offer the sincere clause.

The equilibrium payoffs for the entire subgame are twice the per-round payoffs using the equilibrium mixing probabilities, so they equal, from (15),

$$\pi^*_{1o} + \pi^*_{2o} = 2(x_s - c_s) \tag{27}$$

and, from (20) and (22),

$$\pi^*_{1a} + \pi^*_{2a} = 2(y_s - c_i \left(1 + \frac{y_s}{y_m}\right)), \tag{28}$$

for a total social surplus of

$$\pi^*_{1o} + \pi^*_{2o} + \pi^*_{1a} + \pi^*_{2a} = 2(x_s + y_s - c_s - c_i - \frac{c_i y_s}{y_m}). \tag{29}$$

The surplus in (29) is less than the surplus when the Acceptor can precommit to inspecting every offer.

EQUILIBRIUM 2: No Offers.

Offeror: Do not offer either clause.

Acceptor: Reject any clause that is offered.

Out-of-equilibrium belief: If the Offeror deviates and offers a clause, the Acceptor believes it is sincere with a probability β of no more than $Max\{\frac{y_m}{y_s+y_m}, \frac{c_i}{y_s}\}$.

Equilibrium 2 is an equilibrium because the Offeror has no incentive to offer clauses if the Acceptor always rejects, and the Acceptor has no incentive to inspect or accept given his beliefs. This dilemma is similar to the situation in some signalling and coordination games, but here unlike in those games (e.g., Cho & Kreps (1987) Van Damme (1989)), the intuitive criterion and forward induction have no bite.[8]

The out-of-equilibrium beliefs needed to sustain Equilibrium 2 are obtained as follows. If β is the Acceptor's subjective probability that the Offeror's out-of-equilibrium offer is sincere, then the Acceptor's single-round subgame payoff is

$$\pi_a(accept) = \beta y_s - (1-\beta) y_m, \tag{30}$$

which yields us $\beta = \frac{y_m}{y_s+y_m}$ for the value of β which makes the Acceptor prefer to reject and receive the payoff of 0.

It must also be true that the Acceptor does not think it worthwhile to

[8]One change to the model which could make a big difference is incomplete information. If even a small number of honest Offerors will never make misleading offers (i.e., $c_m = \infty$ for them), then Equilibrium 2 breaks down, because an offer observed out-of-equilibrium would have to be a sincere clause offered by one of these honest Offerors. Incomplete information, however, brings in other complications; if we also added a number of dishonest Offerors for whom $c_m = 0$, then the out-of-equilibrium offer might come from one of them, and Equilibrium 2 is revived.

inspect. The payoff from inspecting, given the belief β, is

$$\pi_a(inspect) = \beta y_s - (1-\beta)(0) - c_i, \tag{31}$$

which gives us $\beta = \frac{c_i}{y_s}$ for the value of β which makes the Acceptor prefer to reject and receive the payoff of 0.

The equilibrium payoffs are zero in each round in Equilibrium 2. Existence of Equilibrium 2, unlike existence of Equilibrium 1, requires no special assumptions beyond those made setting up the model in Section 2.

EQUILIBRIUM 3: Just One Offer.

<u>Offeror:</u> Offer a sincere clause in the first round with probability $p_s^* = \theta_s = 1 - \frac{c_i}{y_m}$. Do not offer a second clause.

<u>Acceptor:</u> Accept the first clause with probability $p_a^* = \theta_a = \frac{x_s - c_s + c_m}{x_m}$, and otherwise inspect. Reject the second clause if it is offered.

<u>Out-of-equilibrium belief:</u> If the Offeror offers a second clause, the Acceptor believes it is sincere with a probability β of no more than $Max\{\frac{y_m}{y_s+y_m}, \frac{c_i}{y_s}\}$.

Equilibrium 3 is a combination of Equilibria 1 and 2, with different behavior in each round. Equilibrium payoffs are half those in Equilibrium 1. Assumptions (24) and (26) must be true for Equilibrium 3 to exist, for the same reasons as for Equilibrium 1.

EQUILIBRIUM 4: Customary Delay.

Offeror: Offer a sincere clause in the first round with probability of no more than $Max\{\frac{y_m}{y_s+y_m}, \frac{c_i}{y_s}\}$, and otherwise offer a misleading clause. Offer a sincere clause in the second round with probability $p_s^* = \theta_s = 1 - \frac{c_i}{y_m}$, and otherwise offer a misleading clause.

Acceptor: Reject the first clause offered. Accept the second clause with probability $p_a^* = \theta_a = \frac{x_s - c_s + c_m}{x_m}$, and otherwise inspect it.

Equilibrium 4 is also a combination of Equilibria 1 and 2, with different behavior in each round, but here the equilibrium payoffs are less than half those in Equilibrium 1, because a wasteful offer must be made in Round 1. The Offeror is willing to incur the cost of offering a first-round clause which is sure to be rejected because by doing so he prolongs the negotiations until the second round, when his offer may be accepted.

Equilibrium subgame payoffs are

$$\pi_{1o}^* + \pi_{2o}^* = -c_m + (x_s - c_s) \tag{32}$$

and, taking half of Equilibrium 1's payoff, (28),

$$\pi_{1a}^* + \pi_{2a}^* = y_s - c_i - \frac{c_i y_s}{y_m}, \tag{33}$$

for a total of

$$\pi_{1o}^* + \pi_{2o}^* + \pi_{1a}^* + \pi_{2a}^* = x_s + y_s - c_s - c_m - c_i - \frac{c_i y_s}{y_m}. \tag{34}$$

Assumptions (24) and (26) must be true for Equilibrium 4 to exist, for the same reasons as in Equilibrium 1. Since the Offeror must incur the contract-writing cost twice, while only one clause is possibly accepted, for Equilibrium 4 to exist requires that expression (32) be positive, a stronger condition than assumed so far.

Existence of Equilibrium 4 requires one other assumption: that $c_s \geq c_m$. If this is false, then the Offeror would deviate to offer the cheaper sincere clause in Round 1 with probability 1, which condition (b) showed is impossible in any equilibrium.

6. EQUILIBRIA WITHOUT PRECOMMITMENT: HISTORY-DEPENDENT EQUILIBRIA

Let us now examine a variety of equilibria which are history-dependent in the sense that the outcome in the first period affects beliefs for the second period. I will denote these as Equilbria 5a to 5f, since they are all variants on one theme.

EQUILIBRIUM 5a: Inspection and Discovery of a Misleading Clause Ends Negotiation

Offeror: Offer a sincere clause in the first round with probability $p_{1s}^* = \frac{y_m + \frac{c_i y_s}{y_m} - y_s}{y_m + \frac{c_i y_s}{y_m} - Y_s + c_i}$. If the first clause is accepted, offer a sincere clause in the second round with probability $p_{2s}^* = \theta_s = 1 - \frac{c_i}{y_m}$. If the first clause is rejected, do not offer a clause in the second round.

Acceptor: Accept the first clause with probability $p_{1a}^* = \frac{(x_s - c_s + c_m) + (x_s - c_s)}{(x_s - c_s + x_m)}$, and otherwise inspect. If the first clause was inspected and found to be misleading, reject any second-round offer. If the first clause was not inspected or not found to be misleading , accept the second clause with probability $p^*_{2a} = \theta_a = \frac{x_s - c_s + c_m}{x_m}$.

Out-of-equilibrium belief: If the Offeror offers a second clause after the first was rejected, the Acceptor believes the second clause is sincere with a probability β of no more than $Max\{\frac{y_m}{y_s+y_m}, \frac{c_i}{y_s}\}$.

Here, the two rounds are connected in a more complicated way than in Equilibria 1 through 4. If the game reaches the second round without it being revealed that the first clause was misleading, the Offeror's second-round expected payoff will be $x_s - c_s$, as in Equilibrium 1. If the game reaches the second round after it is revealed that the first clause was misleading, the Offeror's second-round expected payoff will be 0, because the Acceptor will stop listening to him. Hence, the overall subgame payoffs from the Offeror's two first-round actions are:

$$(\pi^*_{1o} + \pi^*_{2o})|(Sincere\ in\ the\ first\ round) = -c_s + x_s + (x_s - c_s) \qquad (35)$$

and

$$(\pi^*_{1o}+\pi^*_{2o})|(Misleading\ in\ the\ first\ round) = -c_m+p_a[x_m+(x_s-c_s)]+[1-p_a][0]. \qquad (36)$$

Equating (35) and (36) to solve for the mixed-strategy equilibrium yields

$$-c_s + x_s + (x_s - c_s) = -c_m + p_a[x_m + (x_s - c_s)], \qquad (37)$$

so

$$p^*_{1a} = 1 - \frac{(x_s - c_s)}{(x_s - c_s + x_m)}. \qquad (38)$$

This is greater than the p_a^* found in Equilibrium 1— there is a greater likelihood that the Acceptor will accept the first clause. Because the Acceptor would break off negotiations before the second round after discovering that the first offer was misleading, it is now less tempting for the Offeror to offer a misleading clause.

If the game reaches the second round without it being revealed that the first clause was misleading, the Acceptor's second-round expected payoff will be $y_s - c_i - \frac{c_i y_s}{y_m}$, as in Equilibrium 1. The overall subgame payoffs from the Acceptor's two first-round actions are:

$$(\pi_{1a}^* + \pi_{2a}^*)|(Accept\ in\ the\ first\ round) = p_s y_s - (1-p_s)y_m + \left[y_s - c_i - \frac{c_i y_s}{y_m}\right] \tag{39}$$

and

$$(\pi_{1a}^* + \pi_{2a}^*)|(Inspect\ in\ the\ first\ round) = -c_i + p_s\left(y_s + \left[y_s - c_i - \frac{c_i y_s}{y_m}\right]\right) - (1-p_s)(0+0) \tag{40}$$

Equating (39) and (40) to solve for the mixed-strategy equilibrium yields

$$p_s y_s - (1-p_s)y_m + \left[y_s - c_i - \frac{c_i y_s}{y_m}\right] = -c_i + p_s\left(y_s + \left[y_s - c_i - \frac{c_i y_s}{y_m}\right]\right) \tag{41}$$

so

$$p_{1s}^* = \frac{y_m + \frac{c_i y_s}{y_m} - y_s}{y_m + \frac{c_i y_s}{y_m} - Y_s + c_i} \tag{42}$$

The critical out-of-equilibrium beliefs are the same as in Equilibrium 1 because the same incentives face an Acceptor who knows the offered clause might be misleading.

The payoffs in Equilibrium 5a will be

$$\pi_{1o}^* + \pi_{2o}^* = 2(x_s - c_s) \tag{43}$$

and

$$\pi^*_{1a} + \pi^*_{2a} = (p^*_{1s} y_s - c_i) + p^*_{1s} \left(y_s - c_i - \frac{c_i y_s}{y_m} \right). \tag{44}$$

This payoff is lower than the payoff in Equilibrium 1 because (a) p^*_{1s} is lower in Equilibrium 5a, so the first-round payoff of $p_s y_s - c_i$ is lower, and (b) the second-round payoff is multiplied by $p_s < 1$ in Equilibrium 5. The total is

$$\pi^*_{1o} + \pi^*_{2o} + \pi^*_{1a} + \pi^*_{2a} = 2(x_s - c_s) + (p^*_{1s} y_s - c_i) + p^*_{1s} \left(y_s - c_i - \frac{c_i y_s}{y_m} \right). \tag{45}$$

Since the payoff to the Offeror is the same as in Equilibrium 1, and the payoff to the Acceptor is lower, Equilibrium 5a has a lower social surplus.

Up to this point, each of the equilibria has some intuitive plausibility. This plausibility is deceiving in the case of Equilibrium 5a, though, as will be seen from the variety of other history-dependent equilibria that exist, each determined by a different set of expectations. Consider the various information sets at which Acceptor might arrive after Round 1 is over (assuming that Acceptor has accepted any clause he has inspected and found to be sincere, and rejected any clause he inspected and found to be misleading):

1. No first-round clause was offered, so the game has ended.

2. A clause was offered but not inspected, and was rejected. This could only have occurred in a pure-strategy equilibrium, since we found earlier that no equilibrium exists in which the Acceptor mixes between inspecting and rejecting.

3. A clause was offered, inspected, and found misleading. (Eq. 3, 5a, 5c, 5f)

4. A clause was offered, inspected, and found sincere. (Eq. 3, 5b, 5c, 5e)

5. A clause was offered, not inspected, and accepted. (Eq. 3, 5d,5e, 5f)

We can ignore histories (1) and (2) as far as their influence on out- of-equilibrium beliefs goes. The game has ended in history (1), and history (2) could only have occurred as part of Equilibrium 4, in the hopes that offering a clause sure to be rejected would make the Acceptor's beliefs about sincerity more favorable, not less.

That leaves three other possibilities. A number of equilibria can be constructed in which different combinations of these histories results in the Acceptor becoming pessimistic and deciding to reject any second-round offer. In Equilibrium 3, the Acceptor was always pessimistic, so histories (3), (4), and (5) all led to no offer in the second round. In Equilibrium 5a, history (3) led to no offer. In Equilibrium 5b, to be described below, history (4) ends negotiations; in Equilibrium 5c, both histories (3) and (4) end negotiation; in Equilibrium 5d, history (5) ends negotiation; in Equilibrium 5e, histories (4) and (5) end negotiation; and in Equilibrium 5f, histories (3) and (5) end negotiation. Since expectations are arbitrary, finding equilibria is a matter of combinatorics.

EQUILIBRIUM 5b: Discovery that a Clause is Sincere Ends Negotiations

Offeror: Offer a sincere clause in the first round with probability

$$p_{1s}^* = \frac{\left(y_m - \left[y_s - c_i - \frac{c_i y_s}{y_m}\right]\right) - \left[y_s - c_i - \frac{c_i y_s}{y_m}\right] - c_i}{y_m - \left[y_s - c_i - \frac{c_i y_s}{y_m}\right]}.$$

If the first clause is accepted, offer a sincere clause in the second round with probability $p_{2s}^* = \theta_s = 1 - \frac{c_i}{y_m}$. If the first clause is inspected and found to be sincere, do not offer a clause in the second round.

Acceptor: Accept the first clause with probability $p^*_{1a} = \frac{c_m}{x_m - x_s + c_s}$, and otherwise inspect. If the first clause was inspected and found to be sincere, reject any second-round offer. If the first clause was not inspected or not found to be sincere, accept the second clause with probability $p^*_{2a} = \theta_a = \frac{x_s - c_s + c_m}{x_m}$.

Out-of-equilibrium belief: If the Offeror offers a second clause after the first was found to be sincere, the Acceptor believes the second clause is sincere with a probability β of no more than $Max\{\frac{y_m}{y_s + y_m}, \frac{c_i}{y_s}\}$.

The analysis is parallel to that of Equilibrium 5a. If the game reaches the second round without the first clause having been revealed to be sincere, the Offeror's second-round expected payoff will be $x_s - c_s$, as in Equilibrium 1. If the game reaches the second round after the first clause has been revealed to be sincere, the Offeror's second-round expected payoff will be 0, because the Acceptor will stop listening to him. Hence, the overall subgame payoffs from the Offeror's two first-round actions are:

$$(\pi^*_{1o} + \pi^*_{2o})|(Sincere\ in\ the\ first\ round) = -c_s + x_s + p_a(x_s - c_s) + (1 - p_a)(0) \tag{46}$$

and

$$(\pi^*_{1o} + \pi^*_{2o})|(Misleading\ in\ the\ first\ round) = -c_m + p_a[x_m + (x_s - c_s)] + [1 - p_a][0 + (x_s - c_s)]. \tag{47}$$

Equating (46) and (47) to solve for the mixed-strategy equilibrium yields

$$p^*_{1a} = \frac{c_m}{x_m - x_s + c_s}. \tag{48}$$

If the game reaches the second round without the first clause having been revealed to be sincere, the Acceptor's second-round expected payoff will be $y_s - c_i - \frac{c_i y_s}{y_m}$, as in Equilibrium 1. The overall subgame payoffs from the Acceptor's two first-round actions are:

$$(\pi^*_{1a} + \pi^*_{2a})|(Accept\ in\ the\ first\ round) = p_s y_s - (1-p_s) y_m + \left[y_s - c_i - \frac{c_i y_s}{y_m} \right] \tag{49}$$

and

$$(\pi^*_{1a} + \pi^*_{2a})|(Inspect\ in\ the\ first\ round) = -c_i + p_s(y_s + 0) - (1-p_s)(0 + \left[y_s - c_i - \frac{c_i y_s}{y_m} \right]). \tag{50}$$

Equating (49) and (50) to solve for the mixed-strategy equilibrium yields

$$p^*_{1s} = 1 - \frac{\left[y_s - c_i - \frac{c_i y_s}{y_m} \right] + c_i}{y_m - \left[y_s - c_i - \frac{c_i y_s}{y_m} \right]} \tag{51}$$

This is an even lower probability of a sincere offer than in Equilibrium 5a. The payoffs in Equilibrium 5b can be computed, but since they are lengthy expressions of no great interest they will not be presented here.

EQUILIBRIUM 5c: Inspection Ends Negotiation.

Offeror: Offer a sincere clause in the first round with probability $p^*_{1s} = \frac{-y_s}{y_m} + 1 + \frac{c_i y_s}{y_m^2}$. If the first clause was accepted, offer a sincere clause in the second round with probability $p^*_{2s} = \theta_s = 1 - \frac{c_i}{y_m}$, and otherwise offer a misleading clause. If the first clause was inspected, do not offer a clause in the second round.

Acceptor: Accept the first clause with probability $p^*_{1a} = \theta_a = \frac{x_s - c_s + c_m}{x_m}$, and otherwise inspect. If the first clause was inspected, reject any second-round offer. If the first clause was accepted, accept the second clause with probability $p^*_{2a} = \theta_a = \frac{x_s - c_s + c_m}{x_m}$.

Out-of-equilibrium belief: If the Offeror offers a second clause after the first was inspected, the Acceptor believes the second clause is sincere with a probability β of no more than $Max\{\frac{y_m}{y_s+y_m}, \frac{c_i}{y_s}\}$.

If the game reaches the second round without an inspection having occurred, the Offeror's second-round expected payoff will be $x_s - c_s$, as in Equilibrium 1. If the game reaches the second round after an inspection, the Offeror's second-round expected payoff will be 0, because the Acceptor will stop listening to him. Hence, the overall subgame payoffs from the Offeror's two first-round actions are:

$$(\pi_{1o}^* + \pi_{2o}^*)|(Sincere\ in\ the\ first\ round) = -c_s + x_s + p_a(x_s - c_s) + [1 - p_a][0]. \tag{52}$$

and

$$(\pi_{1o}^* + \pi_{2o}^*)|(Misleading\ in\ the\ first\ round) = -c_m + p_a[x_m + (x_s - c_s)] + [1 - p_a][0]. \tag{53}$$

Equating (52) and (53) to solve for the mixed-strategy equilibrium yields

$$p_{1a}^* = \frac{c_m - c_s + x_s}{x_m}. \tag{54}$$

If the game reaches the second round without inspection, the Acceptor's second-round expected payoff will be $y_s - c_i - \frac{c_i y_s}{y_m}$, as in Equilibrium 1. The overall subgame payoffs from the Acceptor's two first-round actions are:

$$(\pi_{1a}^* + \pi_{2a}^*)|(Accept\ in\ the\ first\ round) = p_s y_s - (1 - p_s)y_m + \left[y_s - c_i - \frac{c_i y_s}{y_m}\right] \tag{55}$$

and

$$(\pi_{1a}^* + \pi_{2a}^*)|(Inspect\ in\ the\ first\ round) = -c_i + p_s(y_s + 0) - (1 - p_s)(0). \tag{56}$$

Equating (55) and (56) to solve for the mixed-strategy equilibrium yields

$$p^*_{1s} = \frac{-y_s}{y_m} + 1 + \frac{c_i y_s}{y_m^2}. \tag{57}$$

EQUILIBRIUM 5d: Acceptance without Inspection Ends Negotiation.

Offeror: Offer a sincere clause in the first round with probability $p^*_{1s} = 1 - \frac{c_i}{y_m} - \frac{c_i y_s}{y_m^2} + \frac{y_s}{y_m}$. If the first clause was accepted without inspection, do not offer a clause in the second round. If it was inspected, offer a sincere clause in the second round with probability $p^*_{2s} = \theta_s = 1 - \frac{c_i}{y_m}$, and otherwise offer a misleading clause.

Acceptor: Accept the first clause with probability $p^*_{1a} = \theta_a = \frac{x_s - c_s + c_m}{x_m}$, and otherwise inspect. If the first clause was not inspected, reject any second-round offer. If the first clause was inspected, accept the second clause with probability $p^*_{2a} = \theta_a = \frac{x_s - c_s + c_m}{x_m}$.

Out-of-equilibrium belief: If the Offeror offers a second clause after the first was accepted without inspection, the Acceptor believes the second clause is sincere with a probability β of no more than $Max\{\frac{y_m}{y_s + y_m}, \frac{c_i}{y_s}\}$.

If the game reaches the second round without an acceptance having occurred, the Offeror's second-round expected payoff will be $x_s - c_s$, as in Equilibrium 1. If the game reaches the second round after an acceptance, the Offeror's second-round expected payoff will be 0, because the Acceptor will stop listening to him. Hence, the overall subgame payoffs from the Offeror's two first-round actions are:

$$(\pi^*_{1o}+\pi^*_{2o})|(Sincere\ in\ the\ first\ round) = -c_s+x_s+p_a(0)+[1-p_a][x_s-c_s]. \tag{58}$$

and

$$(\pi^*_{1o}+\pi^*_{2o})|(Misleading\ in\ the\ first\ round) = -c_m+p_a[x_m+(0)]+[1-p_a][x_s-c_s]. \tag{59}$$

Equating (58) and (59) to solve for the mixed-strategy equilibrium yields

$$p^*_{1a} = \frac{c_m - c_s + x_s}{x_m}. \tag{60}$$

If the game reaches the second round without inspection, the Acceptor's second-round expected payoff will be $y_s - c_i - \frac{c_i y_s}{y_m}$, as in Equilibrium 1. The overall subgame payoffs from the Acceptor's two first-round actions are:

$$(\pi^*_{1a} + \pi^*_{2a})|(Accept\ in\ the\ first\ round) = p_s y_s - (1-p_s)y_m + 0. \tag{61}$$

and

$$(\pi^*_{1a}+\pi^*_{2a})|(Inspect\ in\ the\ first\ round) = -c_i+p_s(y_s+y_s-c_i-\frac{c_i y_s}{y_m})-(1-p_s)(y_s-c_i-\frac{c_i y_s}{y_m}). \tag{62}$$

Equating (61) and (62) to solve for the mixed-strategy equilibrium yields

$$p^*_{1s} = 1 - \frac{c_i}{y_m} - \frac{c_i y_s}{y_m^2} + \frac{y_s}{y_m}. \tag{63}$$

EQUILIBRIUM 5e: Acceptance With or Without Inspection Ends Negotiation.

Offeror: Offer a sincere clause in the first round with probability $p_{1s}^* = \frac{y_s+y_m-2c_i-\frac{c_i y_s}{y_m}}{y_s-y_m-c_i-\frac{c_i y_s}{y_m}}$. If the first clause was accepted, whether with or without inspection, do not offer a clause in the second round. If it was inspected and rejected, offer a sincere clause in the second round with probability $p_{2s}^* = \theta_s = 1 - \frac{c_i}{y_m}$, and otherwise offer a misleading clause.

Acceptor: Accept the first clause with probability $p_{1a}^* = \theta_a = \frac{x_s-c_s+c_m}{x_m}$, and otherwise inspect. If the first clause was accepted, reject any second-round offer. If the first clause was inspected and rejected, accept the second clause with probability $p_{2a}^* = \theta_a = \frac{x_s-c_s+c_m}{x_m}$.

Out-of-equilibrium belief: If the Offeror offers a second clause after the first was accepted, the Acceptor believes the second clause is sincere with a probability β of no more than $Max\{\frac{y_m}{y_s+y_m}, \frac{c_i}{y_s}\}$.

If the game reaches the second round without an acceptance having occurred, the Offeror's second-round expected payoff will be $(x_s - c_s)$, as in Equilibrium 1. If the game reaches the second round after an acceptance, the Offeror's second-round expected payoff will be 0, because the Acceptor will stop listening to him. Hence, the overall subgame payoffs from the Offeror's two first-round actions are:

$$(\pi_{1o}^* + \pi_{2o}^*)|(Sincere\ in\ the\ first\ round) = -c_s + x_s + p_a(0) + [1-p_a][x_s - c_s]. \tag{64}$$

and

$$(\pi_{1o}^* + \pi_{2o}^*)|(Misleading\ in\ the\ first\ round) = -c_m + p_a[x_m + (0)] + [1-p_a][x_s - c_s]. \tag{65}$$

Equating (64) and (65) to solve for the mixed-strategy equilibrium yields

$$p_{1a}^* = \frac{c_m - c_s + x_s}{x_m}. \tag{66}$$

All this is just as in Equilibrium 5d.

If the game reaches the second round without inspection, the Acceptor's second-round expected payoff will be $y_s - c_i - \frac{c_i y_s}{y_m}$, as in Equilibrium 1. The overall subgame payoffs from the Acceptor's two first-round actions are:

$$(\pi_{1a}^* + \pi_{2a}^*)|(Accept\ in\ the\ first\ round) = p_s y_s - (1 - p_s) y_m + 0. \tag{67}$$

and

$$(\pi_{1a}^* + \pi_{2a}^*)|(Inspect\ in\ the\ first\ round) = -c_i + p_s(y_s + 0) - (1 - p_s)(y_s - c_i - \frac{c_i y_s}{y_m}). \tag{68}$$

Equating (67) and (68) to solve for the mixed-strategy equilibrium yields

$$p_{1s}^* = \frac{y_s + y_m - 2c_i - \frac{c_i y_s}{y_m}}{y_s - y_m - c_i - \frac{c_i y_s}{y_m}}. \tag{69}$$

EQUILIBRIUM 5f: Acceptance Without Inspection or Inspection Followed by Rejection Ends Negotiation.

Offeror: Offer a sincere clause in the first round with probability $p_{1s}^* = \theta_s = 1 - \frac{c_i}{y_m}$ If the first clause was either accepted without inspection or rejected after inspection, do not offer a clause in the second round. If it was inspected and accepted, offer a sincere clause in the second round with probability $p_{2s}^* = \theta_s = 1 - \frac{c_i}{y_m}$; otherwise, offer a misleading clause.

Acceptor: Accept the first clause with probability $p_{1a}^* = \theta_a = \frac{x_s - c_s + c_m}{x_m}$; otherwise, inspect. If the first clause was accepted without inspection or rejected, reject any second-round offer. If the first clause was inspected and accepted, accept the second clause with probability $p^*_{2a} = \theta_a = \frac{x_s - c_s + c_m}{x_m}$.

Out-of-equilibrium belief: If the Offeror offers a second clause after the first was accepted without inspection or rejected after inspection, the Acceptor believes the second clause is sincere with a probability β of no more than $Max\{\frac{y_m}{y_s + y_m}, \frac{c_i}{y_s}\}$.

If the game reaches the second round without an acceptance having occurred, the Offeror's second-round expected payoff will be $(x_s - c_s)$, as in Equilibrium 1. If the game reaches the second round after an acceptance, the Offeror's second-round expected payoff will be 0, because the Acceptor will stop listening to him. Hence, the overall subgame payoffs from the Offeror's two first-round actions are:

$$(\pi^*_{1o} + \pi^*_{2o})|(Sincere\ in\ the\ first\ round) = -c_s + x_s + p_a(0) + [1 - p_a][x_s - c_s]. \tag{70}$$

and

$$(\pi^*_{1o} + \pi^*_{2o})|(Misleading\ in\ the\ first\ round) = -c_m + p_a[x_m + (0)] + [1 - p_a][x_s - c_s]. \tag{71}$$

Equating (70) and (71) to solve for the mixed-strategy equilibrium yields

$$p^*_{1a} = \frac{c_m - c_s + x_s}{x_m}. \tag{72}$$

All this is just as in Equilibrium 5d.

If the game reaches the second round without inspection, the Acceptor's second-round expected payoff will be $y_s - c_i - \frac{c_i y_s}{y_m}$, as in Equilibrium 1. The overall subgame payoffs from the Acceptor's two first-round actions are:

$$(\pi^*_{1a} + \pi^*_{2a})|(Accept\ in\ the\ first\ round) = p_s y_s - (1 - p_s) y_m + 0. \quad (73)$$

and

$$(\pi^*_{1a} + \pi^*_{2a})|(Inspect\ in\ the\ first\ round) = -c_i + p_s(y_s + 0) - (1 - p_s)(0). \quad (74)$$

Equating (73) and (74) to solve for the mixed-strategy equilibrium yields

$$p^*_{1s} = 1 - \frac{c_i}{y_m} \quad (75)$$

Equilibrium 5f is the most baroque of all. Oddly enough, the equilibrium probabilities turn out to be identical to Equilibrium 1's. The difference is that in Equilibrium 5f, the game continues to a second round offer only if the Acceptor has inspected the clause in Round 1 and found it to be sincere.

7
AN ALTERNATIVE MODEL WITH TAKE-IT-OR-LEAVE-IT OFFERS

Some people feel uncomfortable with a model in which a bargaining surplus is split 50-50, as was done above to abstract from the pure bargaining aspects of the model. An alternative way to set up the model is to give the Offeror all the bargaining power, and allow him to construct the clauses he offers to capture the entire surplus. I will show how to do that in this section, mainly to show that it makes little difference, but I chose not to do it in the main model because it does add notational complexity and distracts from the main point about negotiation by devoting more attention to bargaining.

To do that, let us break up the clauses into "deal effects" and a "side payment" . The "deal effects", v_s, v_m, z_s and z_m, are hard-to-understand effect of the clause on the Offeror and the Acceptor. The "side payment" , w, is a monetary payment from Offeror to Acceptor, the amount of which is known to both, which is choosen by the Offeror. The payoff from the sincere clause will be specified as $x_s = v_s - w$ for the Offeror and $y_s = z_s + w$ for the Acceptor. The payoff from the misleading clause will be $x_m = v_m - w$ for the Offeror and $y_m = -z_m + w$ for the Acceptor.

One assumption made earlier now must be modified to accord with the new notation. Replace inequality (1) with

$$v_m - c_m > v_s - c_s > 0. \tag{76}$$

The first inequality in (76) implies that the Offeror would prefer a misleading clause to a sincere one, given the cost of offering them. The second inequality says that either type of clause helps the Offeror if the side payment w is small enough.

Inequality (2), which says that the sincere clause is efficient, can be retained, but it can be rewritten as

$$v_s + z_s - c_s > v_m - z_m - c_m. \tag{77}$$

We will assume that $-z_m < 0$, so the deal effect of the misleading clause hurts the Acceptor. We will not assume that $z_s > 0$, so it will be possible that the deal effect of the sincere clause also hurts the Acceptor, in which case he will require a positive side payment w if he is to accept any offer whatsoever. We will allow the side payment w to be either positive or negative, since if the Acceptor's deal effect z_s is positive, he might be willing to accept a negative side payment from the Offeror.

The Offeror's aim is now to set w to be the smallest possible value that still makes the Acceptor willing to seriously negotiate. It still remains true that any equilibrium in which offers are made must be in mixed strategies. The payoffs in such an equilibrium will, as usual, be equal to the payoffs from using pure strategies, so in the second round they will be

$$\pi_o = x_s - c_s = v_s - w - c_s \tag{78}$$

and

$$\pi_a = p_s^* y_s - c_i = p_s^*(z_s + w) - c_i, \tag{79}$$

where p_s^* is the Offeror's equilibrium probability of offering a sincere clause.[9]

First, note from the Offeror's payoff equation that his payoff is decreasing in w. He would like it to be as low as possible, subject to the constraint that the Acceptor's payoff must be nonnegative for the equilibrium to exist. Let us denote this ideal side payment by w^*.

Second, it should be clear that w^* exists, since $p_s^* > 0$, w can be any real number, and in the second round w^* just needs to satisfy

$$w^* = \frac{c_i}{p_s^*} - z_s. \tag{80}$$

What about the first round? Both parties foresee that in the second round the ...

[9]Note that I implicitly assumed that the Offeror will choose w big enough that the Acceptor will accept an offer known to be sincere, since this will be true in equilibrium.

The rest of the analysis goes through, but with the values of $x_s, x_m, y_s,$ and y_m set in each round to

8. INTERPRETATION

This simple model of negotiation generates a surprising number of plausible outcomes supported by simple and reasonable beliefs, which are listed in Table 1.

In Equilibrium 1, each player is uncertain what will happen, and each takes chances. The Offeror takes a chance that the Acceptor may inspect, and the Acceptor takes a chance that the Offeror might have offered a misleading clause. In Equilibrium 2, the players are pessimistic. The Acceptor does not trust the Offeror, and so the Offeror does not attempt to offer extra clauses. In Equilibrium 3, it is customary for the Offeror to offer one good clause, perhaps, but certainly not two. In Equilibrium 4, it is customary for the Offeror to start with a misleading offer, before getting serious with his second offer. The first offer would appear ritualistic, since everybody knows it will be refused, but expectations make it a necessary part of the process.

All four equilibria seem realistic in different contexts, and, as Table 1 shows, they can, together with the precommitment equilibria, be pareto-ranked. The best outcome is when the Offeror can be trusted to always offer only sincere clauses, and the next best is when the Acceptor can be trusted to always inspect the clauses offered to him. These are placed above the line in Table 1 because they are really separate games from the equilibria of Section 5, in which precommitment is impossible. Of the four plausible equilibria in Section 5, the best involved mixed strategies in each round but no grudges following the discovery of attempted deception. Next best is when one offer is made, in the first round, which is better than when one possibly sincere offer is made, but only in the second round. Worst of all is when an atmosphere of mistrust prevents the Acceptor from bothering to even inspect any clauses that might be offered to him, and so none are.

TABLE 1: THE SOCIAL SURPLUS

EQUILIBRIUM	TOTAL SURPLUS
Honest Offeror	$2(x_s + y_s - c_s)$
Careful Acceptor	$2(x_s + y_s - c_s - \alpha^* c_i)$
1: Mixing Each Round	$2(x_s + y_s - c_s - c_i - \frac{c_i y_s}{y_m})$
2. No Offers	0
3. Just One Offer	$x_s + y_s - c_s - c_i - \frac{c_i y_s}{y_m}$
4. Customary Delay	$x_s + y_s - c_s - c_i - \frac{c_i y_s}{y_m} - c_m$

Equilibria 5a to 5f are excluded from Table 1 because the beliefs that support them are rather baroque, like sunspot equilibria but triggered by a public event involving the players' actions. Equilibrium 5a is plausible on its face, and seems to represent the situation where the Acceptor becomes offended on discovering a misleading clause and refuses to negotiate further. That intuition, however, should really be the result of incomplete information, because it relies on the Acceptor learning something about the Offeror's type, which does not happen in this model. The arbitrariness of Equilibrium

5a is shown by the existence of its twin, Equilibrium 5b. In Equilibrium 5b, it is as if the Acceptor becomes offended on discovering that the clause is sincere, and refuses to negotiate further. This is absurd, but no more arbitrary than the belief in Equilibrium 5a.

From the analysis, a number of lessons can be drawn.

1. Contract-reading costs matter as much as contract-writing costs. Although the contract-writing costs c_s and c_m have an influence in this model, it would not be fundamentally changed if they were set to zero. As Table 1 shows, these costs are simply subtracted from the social surplus like any simple transactions cost. The contract-reading cost c_i is much more important. In Table 1, it has an indirect effect, via the subtraction of $\frac{c_i y_s}{y_m}$, as well as a direct effect. This effect is still continuous in c_i, so if contract-reading costs are small, it might seem that their effect on welfare is also low, but c_i has a second impact: it permits a variety of equilibria to exist. The contract-reading cost, in combination with unfortunate expectations, can lead to Equilibria 2,3, or 4, in which the benefit from at least one round of offers is lost. Because of this, the ultimate effect of a contract- reading cost of c_i can be much greater than c_i; in the extreme case of Equilibrium 2, a small contract-reading cost can destroy the entire gains from trade.

The existence of contract-reading costs is, moreover, both realistic and hard to eliminate institutionally. It is relatively easy to write fifty new pages for a contract to provide for extra contingencies, but it is quite difficult for the reader to be sure what those fifty pages contain. Standard "boilerplate" contracts are a good solution to the problem of contract-writing costs, but not to the problem of contract-reading costs. Boilerplate is easy to propose, but the accepting side of the contract still finds it difficult to know what the boilerplate contains and must worry about whether it is pure boilerplate or boilerplate-plus.

There are at least two kinds of businesses that sell legal forms. An example of the first is U.S. Legal Forms, which sells templates to law firms for use in corporate transactions such as director indemnification agreements and corporate restructurings. These do not have the U.S. Legal Forms name on them, though the user could add a statement that they were from that company.[10] These are for use by lawyers, not businessmen, and perhaps the buyers would just as soon not let their clients know that they buy boilerplate rather than writing up contracts from scratch, despite the advantage in both quality and cost. It would be easy to show the other party's lawyers that the forms were from U.S. Legal Forms, however, which would be sufficient. An example of the second is Rediform, which sells forms to ordinary people for transactions such as house sales or contracts. Their forms do have the company name on them, perhaps for assurance to the users that it is pure boilerplate.[11]

2. Legal default rules, or even mandatory rules, can overcome contract-reading costs. Although boilerplate contracts are no solution, unless they can somehow be guaranteed to be pure boilerplate with no additions, court

[10] "U.S. Legal Forms," Www.uslegalforms.com,
August 18, 1999. See, for example, their 19-page "Indemnification Agreement," form 10298 (1993). The company does not like to call its forms boilerplate, since most of them are examples taken from actual transactions rather than forms with blanks for insertion, but the difference is not relevant here.

[11] "Rediform Home Page," Www.rediform.com/Default.com, still largely under construction as of August 18, 1999. See, for example, their 2-page "Quitclaim Deed," form 10298 (1993).

or government-determined default rules can be a solution. If such rules exist, the two parties can refrain from writing anything, leaving the binding clause to be the default clause determined by an unbiased third party. The default rule is important for much more than just saving the costs c_i and c_s; even if the contract-reading and contract-writing costs are small, the default rule is important.[12]

One can go further and use this model to argue for mandatory contract rules, which override whatever may be written in the contract. If it is practical for a court to determine that a clause is misleading, the best solution is for courts to refuse to enforce such clauses. Modern courts try to do this, refusing to enforce suspicious fine print, which is the subject of the Katz (1990) article discussed in the Introduction.

The disadvantage of legal default and mandatory rules is, of course, that they reduce the flexibility of the contract. If different "sincere clauses" are appropriate for different contracts, it is difficult for courts to choose which clause should be used.

3. A reputation for honesty in negotiations is a valuable asset. The contracting parties are best off if the Offeror is inescapably honest. His honesty does not eliminate the contract-writing cost, but it does eliminate the need to inspect the contract and allows efficient clauses to be added. Any player who has established a reputation for honesty will in this context, as in others, be an attractive business partner and will be offered more attractive contracts.

[12]This result has previously been found in models of strategic contracting, but under incomplete information— see Ayres & Gertner (1989, 1992) and Johnston (1990).

4. Negotiation increases social welfare, even if it is costly. Even if the parties cannot trust each other, negotiation still increases welfare. The parties have the option to refuse to negotiate, and if they do so, it is in the hopes of creating surplus. Lengthy dealmaking sessions are not necessarily inefficient: to the extent that they add mutually beneficial details to the deal, they are efficient.

5. A mistrustful attitude in negotiations can be self-enforcing. If a model has multiple equilibria, that means that expectations are important to the outcome. If the Acceptor expects the Offeror to offer only misleading clauses, he will not bother to inspect any clauses that are offered, and so the Offeror will offer none. This is the worst case from the point of view of both parties, and changing the expectations — however that might be done— is an important prerequisite to negotiations.

6. Inefficient work rules can persist indefinitely in union labor contracts, even when both union and management recognize that Pareto improvements are possible. Some socially inefficient union work rules can be explained in terms of redistribution within the union, e.g., "no show" featherbedding jobs which can be used by the union to reward certain members or for miscellaneous purposes such as to give jobs to gangsters who need evidence of a steady job while on parole from prison.[13] Others, however, such as trains being required to carry double the needed crew, typesetters being required to reset existing plates for newspaper advertising, truck drivers being forbidden to help unload trucks, and painters not being allowed to use spray guns of certain widths are harder to explain.[14] A corollary of result (5) of this paper

[13] Pileggi (xxx) has anecdotal evidence of this.

[14] These and other examples can be found in Reynolds (1987) starting at page 107.

is that when labor and management mistrust each other, they may continue to renew a contract known to be inefficient rather than trying to propose improvements which the other side might believe were really attempts to sneak an advantage.

7. Frivolous offers can be part of rational, if inefficient, negotiations. If it is expected that the first clause offered will be misleading, that too can be self-enforcing, if not quite so harmful. The first clause offered will be dismissed without serious consideration, but it is still rational to offer it, because otherwise the negotiations cannot proceed to the second, serious round.

8. Corporate lawyers are worth their salary even if they never discover flaws in contracts. An immediate implication of lesson (6) is that inspection is valuable even if it never reveals anything untoward. The corporate counsel's veto of a contract term is like the atomic bomb, most useful when not used. The purpose of the legal staff is to deter the other side from trying to be sly or dishonest, and if the staff's lawyers are well enough respected, they will never discover any dishonesty. This supplements the socially beneficial uses for corporate lawyers laid out in Gilson (1984), which in the context of this paper amount to finding Pareto-improving clauses and inspecting clauses by verifying the value of what is being traded.

9. Forcing the parties to come to the bargaining table can help them. A common feature of labor laws is a requirement that labor and management come to the bargaining table and negotiate in good faith.[15] This does not

[15] Section 8(d), 29 U.S.C. @ 158(d) (1988) defines the duty to bargain as "the mutual obligation of the employer and the representative of the employees to meet at reasonable times and confer in good faith with respect to wages, hours, and other terms and conditions

mean that they must make offers acceptable to each other, only that they must talk, so it seems a peculiar and useless requirement. The negotiation model suggests that it is not, because it may serve as a requirement that the parties read each other's offers, which can raise welfare by overcoming pessimistic out-of- equilibrium beliefs.

10. It is better to deal with someone who is on guard against you: good fences make good neighbors. Even if the Offeror cannot be trusted to be honest in the absence of external influences, if the Acceptor can commit to always inspecting the offers, welfare is almost as high. Somewhat counterintuitively, the Offeror actually prefers to deal with an Acceptor who always inspects the clauses. The Offeror need not worry about unfortunate expectations which would cause the Acceptor to dismiss his offers without serious consideration.

The model may also have something to say about two other subjects: contractual default rules and product quality.

The issue of contractual default rules arises when a contract fails to specify certain details of the agreement or when it is claimed that the part of the contract which does specify them is invalid for one reason or another. The 1990 article of A. Katz mentioned in the introduction examined the question of when a contractual party has duty to read the fine print provided by the

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of employment . . . but such obligation does not compel either party to agree to a proposal or require the making of a concession." A representative lawsuit provoked by this is NLRB v. Billion Motors, Inc., 700 F.2d 454, 456 (8th Cir. 1983, in which a union complained that the company's negotiator was unprepared, failed to show up to meetings, made sham proposals, and announced impasse prematurely. For a legal discussion by an economist that discusses the usefulness of the duty to bargain in generating information, see Hylton (1994).

other party and came to no definite conclusion except that circumstances exist when such a duty should not exist or when mandatory terms should replace the contractual terms. In another information-based model, Spier (1992) shows that contractual terms can be used by one of the parties to signal his hidden characteristics. Inefficient equilibria are commonly found in signalling games, and such remains the case when the signal is a contractual term or its absence. If, for example, some companies are of a type that will carry out an agreement and some are not, a company of the desirable type might choose not to offer a clause specifying damages for breach, even though such a clause might otherwise be desirable. Or, it might be that the necessary signal is to offer to strike such a clause from a standard-form contract, even though it is an efficient clause. Thus, it might be efficient for a default rule to specify damages for breach, or even to have a mandatory rule that the parties cannot waive.

The present model of negotiation also has multiple equilibria, which can be pareto-ranked. In the worst equilibrium (equilibrium 2), no offers are made. It thus becomes quite important what the default rules are. They will be preferred precisely because they are default rules, rather than rules tailored by the offeror to the particular situation. The negotiation model is not a signalling model. There is only one type of offeror, and the acceptor's inferior information is only about the clause offered, not about the offeror. This means that unlike in the models of Katz or Spier, no argument can be made for mandatory contract rules, only for default rules. At the same time, since the combination of contract- reading costs and pessimistic expectations can create high transactions costs, the default rules can be very important.[16]

[16]For a somewhat contrary view, see A. Schwartz (1993), the main point of which is

Product quality is an area of economic analysis to which the negotiation model could also be applied. In the classic paper of Klein & Leffler (1981), the basic problem is how a seller can, in the absence of warranties, persuade the buyer that the product is of high quality. Their solution is for the seller to charge a premium over cost, which creates a stream of profits over time that the seller would be unwilling to jeopardize by deviating to low quality for one period of extraordinary profit. The negotiation model could be adapted to a different set of circumstances, where repeat purchases are not made but the buyer can inspect the product at low cost. Such inspection might even simply take the form of reading promotional materials provided by the seller, if the law provided penalties for sellers who lie. The model suggests that expectations will determine the outcome, and that the equilibrium may be in mixed strategies or involve some rejection of inferior products before good products are produced. It may also result in no information being provided because the buyer, being pessimistic, would not go to the effort of reading it anyway. In such a case, the seller would have to provide incentives for the buyer to incur the costs of inspection.[17]

Product quality itself is perhaps not so serious a problem as contract terms, because if the quality were the only problem, warranties could be provided. If it is the warranty itself whose quality is in question because of what the fine print may say, the warranty solution fails. Thus, the negotiation model's main contribution to the product quality literature may be to suggest

that contracts cover so many different situations that no single set of sensible default rules can be found, and that a better approach is for defaults to established in specialized areas of the law, e.g. computer law or securities law.

[17]We are beginning to see advertisers paying consumers to read advertisements on the Internet. See "Are Advertisers Ready to Pay Their Viewers?" *Wall Street Journal*, Bart Ziegler, November 14, 1996, p. xxx.

why warranties will not work.

The present model is only a first step in the analysis of negotiation, and it is simple enough that it can be extended in a number of directions. I will comment briefly on these extensions and speculate as to what they might show.

A first extension is to more than two rounds of offers. It should be clear that the two-round model can easily be extended to many rounds, and that the same sorts of equilibria would continue to exist in the N-round game. The same mixing probabilities could be used in each round (equilibrium 1), there might be no offers made (equilibrium 2), only a limited numbers of offers might be made (equilibrium 3), no offers might be accepted until late in the game (equilibrium 4), or strange patterns of offers depending on history might comprise an equilibrium (equilibria 5 and 6). The results seem robust in this direction, and this extension is unlikely to yield anything by itself, though it might yield more when combined with incomplete information.

A second extension is to repetition of the game. Two repetitions of a two-round game are different from one repetition of a 100-round game because even with the two repetitions, the acceptor discovers the nature of the clauses costlessly after the first repetition, whereas in the 100- round game this is not discovered until it is too late to take action.[18] Repetition introduces the possibility of reputation, as in the Klein & Leffler (1981) model mentioned above, and may reach the same results as the commitment equilibria.[19]

[18]Note, however, that if a clause is rejected, its nature is never discovered by the acceptor. Thus, repetition is no solution to the pessimistic expectations that underlie the No Offers equilibrium 2.

[19]A caveat: the fine print in contracts often concerns rare or end-game events— liability for toxic waste spills, or who pays for arbitration expenses. These, in fact, are the kinds

A third extension is to incomplete information. Suppose the offeror and the acceptor do not know each other's costs of offering or reading each type of clause. If, for example, a certain proportion of upright offerors have infinite moral costs of offering misleading clauses, then learning may occur during the negotiation process, since the discovery of a misleading clause in the first round would reveal to the acceptor that he was not dealing with one of the upright offerors. Or, the model might specify situations where the set of available clauses is restricted. In the present model, the offeror is free to offer either kind of clause in either round, but one can also imagine that he might, for example, have only one welfare-improving clause available, so the issue becomes whether he offers it in the first, the second, or neither round. Incomplete information or restricted availability of welfare-improving clauses is unlikely to invalidate the lessons of this paper, but they may add new effects or equilibrium refinements that could not arise in the complete information game that was analyzed here.

of clauses for which inspection costs would be highest, since the rarity of their application would make them less familiar to the acceptor. In such cases, the nature of the clause may ordinarily not be discovered even after the deal is closed, or may be discovered only when the relationship is terminated, so repetition may not be useful.

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