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# Credible pretrial negotiation

Barry Nalebuff \*

*Pretrial negotiation provides a structured environment in which to study bargaining with incomplete information. When a plaintiff believes that a defendant owes him damages, he may first attempt to reach a private settlement before resorting to a costly court-imposed judgment. A central issue in their negotiations is whether the plaintiff's threat to litigate is credible. It is possible for the plaintiff to undermine the credibility of his litigation threat by making a settlement demand that is insufficient. As a result, the plaintiff must raise his settlement demand to limit the amount of bad news he can learn if his offer is rejected. When this credibility constraint is binding, traditional comparative static results are reversed. In addition, even though the defendant is being sued, he wants the plaintiff's threat to be credible.*

## 1. Introduction

■ One of the many costs of failure is that it carries a signal. Of course, the stigma or signal associated with failure depends on what was attempted. Failure to achieve the impossible will be much less harmful to one's reputation than failure to achieve the expected level of performance. To avoid being labelled as a "lemon" (Akerlof, 1977), it may be necessary to limit the amount of bad information that failure conveys. In such situations a person must act more ambitiously with the result that failure is more frequent but less consequential. Pretrial negotiation is one of these cases. This article describes how the consequence of rejection can have a profound effect on the pretrial negotiation process.

Pretrial negotiation is an attempt to save the time, costs, and risks involved in obtaining a court-imposed settlement (Gould, 1973).<sup>1</sup> The structured negotiations between plaintiff and defendant offer a stylized example of bargaining. For the plaintiff bargaining power depends on the defendant's believing that he will be taken to court if a settlement is not reached. To maintain a credible litigation threat the plaintiff must limit the amount of bad information conveyed by a failure to settle. The issue of credibility may severely restrict the bargaining opportunities in pretrial negotiation.

When credibility is an issue, there is the possibility of a nuisance suit. The plaintiff initiates legal action even though his case is weak, and he may not choose to litigate if his

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<sup>1</sup> The term pretrial negotiation is somewhat misleading: predisccovery negotiation would have been better. Theoretically, discovery should provide both parties with equal access to all the relevant information. Therefore, the model of bargaining that takes place under incomplete information is more closely related to the predisccovery phase. Discovery also accounts for much of the litigation expenses. That said, I maintain consistency with the literature and use the terminology of pretrial negotiation.

settlement offer is rejected. Rosenberg and Shavell (1984) consider this possibility in their study of the nuisance suit. But their model is one of complete information in which the defendant's decision to accept or reject the settlement demand provides no information to the plaintiff about the strength of his case.

Without perfect information the defendant's decision to reject the plaintiff's settlement demand is an important signal. Rejecting a very large demand conveys little information. But as the settlement demand is reduced, rejection provides greater evidence that the defendant has a strong case. For example, if the defendant rejects a demand for \$1.00, the plaintiff should reevaluate (and revise downwards) what he can expect to win in court. This suggests that low settlement demands expose the plaintiff to the possibility of learning that his case is weak. This can then lead to problems with making his threat to litigate credible. The result is that the plaintiff is forced to demand more than he wishes to limit the defendant's ability to signal the weakness of the plaintiff's case. His large demand has a correspondingly large chance of being rejected, and an excessive number of cases proceed to court.

The model in this article closely follows Bebchuk (1984). The important difference is that he assumes that the plaintiff's threat to litigate is always credible: no matter what settlement demand is rejected, the plaintiff always has a positive expected value of litigation. Here this assumption is relaxed. As a result, the problem of making credible threats has a pronounced effect on the equilibrium outcome.

Section 2 presents the model. The first result shows that the continuation subgame following the plaintiff's settlement demand has a unique equilibrium. Accordingly, each settlement demand can be assigned an expected value and the highest one is the optimal settlement demand. Section 3 describes the comparative static results. How do changes in the court award and court costs affect the settlement demand and the probability of agreement? Surprisingly, when litigation is more profitable, the plaintiff may become less aggressive and settlement more likely. In addition, the defendant actually wants to help the plaintiff make the litigation threat credible. The concluding remarks in Section 4 focus on why credibility is a relevant problem and the effect this may have on the distribution of cases that proceed to trial.

## 2. The model

■ Two risk-neutral parties are involved in a legal conflict. One side, the plaintiff, claims to have been injured by the other, the defendant. The plaintiff suffered an injury of size  $W$ , which is common and public knowledge.<sup>2</sup> The defendant's liability is captured by a parameter  $q$ . This parameter can be interpreted either as the probability that the defendant will be held fully liable or as the fraction of damages for which the defendant will be held liable (possibly greater than one). The defendant knows his true liability. The plaintiff believes that  $q$  is drawn from a nonatomic distribution over the interval  $[0, b]$ , with distribution  $F(q)$  and density  $f(q)$ .

Litigation involves costs (legal fees, discovery costs) for both parties, summarized by  $C_p$  for the plaintiff and  $C_d$  for the defendant. The process of discovery reveals the defendant's true liability,  $q$ . The court then enforces a charge of  $qW$  from the defendant to the plaintiff. Alternatively, with probability  $q$  the defendant is held fully liable and the court awards the plaintiff  $W$ . In both cases the expected payoffs from litigation are  $qW - C_p$  for the plaintiff and  $-qW - C_d$  for the defendant.

As an alternative to litigation, the plaintiff offers to settle for an amount  $S$ . The defendant will respond to this offer only if the plaintiff's threat to litigate is credible: the plaintiff's

<sup>2</sup> Salant (1984), Sobel (1985), and Cho and Nalebuff (1986) offer models of pretrial negotiation with two-sided incomplete information. The possibility that the plaintiff has private information about the magnitude of his injury,  $W$ , is briefly discussed at the end of Section 3.

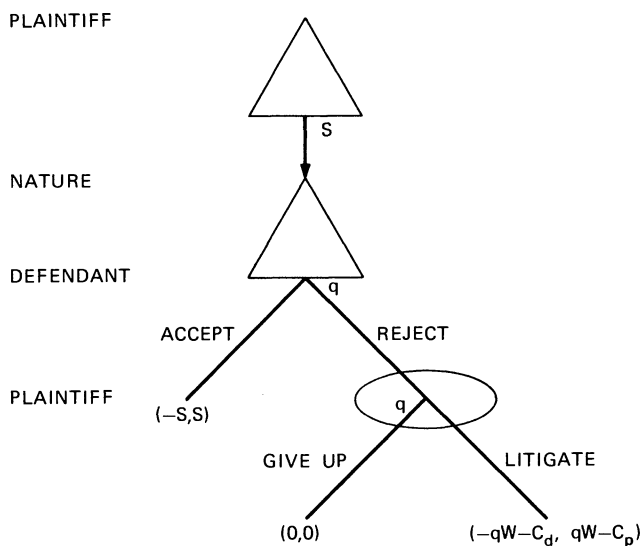
expected court award must cover his court costs. Bebchuk (1984) assumes that there is some minimal liability,  $a > 0$ , and furthermore that litigation is profitable against this minimally liable defendant:  $aW > C_p$ . In the present model the defendant's liability may be zero so that litigation is not a dominant strategy. Bebchuk's assumption is weakened to require only that the plaintiff's case has merit.<sup>3</sup>

*Definition 1.* A case has merit if the plaintiff's expected value of litigation is positive given the prior distribution of defendants.

Even when a case has merit, the plaintiff may not find it in his interest to pursue litigation with certainty. If he threatens certain litigation and the defendant turns down his settlement demand, the information he learns may lower his posterior expectation of  $q$  to the point where  $E[q|S \text{ rejected}]W$  is less than  $C_p$ . In this case his threat to litigate would not be credible.

The game tree illustrated in Figure 1 describes the sequence of events. The plaintiff first makes a demand  $S$  without knowing the defendant's liability. This the defendant either accepts or rejects: no counteroffers are allowed.<sup>4</sup> If the defendant accepts, he pays  $S$  and the plaintiff receives  $S$ . If the defendant rejects, the plaintiff must decide whether to litigate or to give up. In making this decision the plaintiff still does not know the defendant's probability

FIGURE 1  
THE GAME TREE



<sup>3</sup> The use of the word “merit,” while consistent with the literature, has certain connotations that may be misinterpreted. The fact that a case has positive expected value to a plaintiff does not in itself imply that the case should in any normative sense proceed to court; nor do we mean that a case without “merit” should not go to court. The social objective of the legal system is concerned with broader issues ranging from fairness to precedent to deterrence that cannot be fully captured by the plaintiff's expected value of the court judgment.

<sup>4</sup> The plaintiff has an incentive to continue negotiations if the defendant rejects his settlement offer. But if the defendant knows that another offer is forthcoming, rejection is costless and uninformative. The settlement offer analyzed here should therefore be interpreted as the plaintiff's “last” demand. Alternatively, the defendant might be allowed to make counteroffers. When a counteroffer is anticipated, the plaintiff's original settlement demand is irrelevant as it contains no information. (This alternative set-up is similar to Reinganum and Wilde's (1986) model of litigation in which the informed party makes the offer.) In this case, the problem of making a credible litigation threat does not arise. The defendant is unconcerned about undermining his litigation threat through the settlement offer because it is the plaintiff who takes the defendant to court and not *vice versa*.

of being found guilty,  $q$ . His strategy is represented by  $(S, \alpha(S))$ , which indicates the plaintiff's offer and his conditional probability of litigating if  $S$  is rejected.

The defendant with liability  $q$  compares paying  $S$  with his expected court costs,  $\alpha(S)[qW + C_d]$ . Define

$$q(S) = \frac{\frac{S}{\alpha(S)} - C_d}{W}.$$

The defendant with liability  $q(S)$  is just indifferent between accepting or rejecting  $S$  if he believes that the probability of litigation is  $\alpha(S)$ .<sup>5</sup> Since defendants with liability less than  $q(S)$  face a smaller court judgment, all defendants with  $q \leq q(S)$  will reject  $S$ .

If the settlement offer is rejected, the plaintiff's posterior expectation of  $q$  is then

$$E[q|S \text{ is rejected}] = E[q|q \leq q(S)] = \int_0^{q(S)} xf(x)/F(q(S))dx.$$

This is a monotonic function of  $q(S)$ ; when the interval of defendants who reject  $S$  increases, so does their expected liability and correspondingly the expected value of taking them to court. If all defendants reject  $S$ , then  $q(S) = b$ , the posterior expectation of  $q$  equals the prior expectation, and proceeding to court is profitable provided the case has merit. On the other hand, as more defendants accept  $S$ ,  $q(S)$  falls, and litigation becomes less profitable. In the limit, as all defendants accept  $S$ ,  $q(S) = 0$  and the posterior expected value of proceeding to court is negative at  $-C_p$ .

*Definition 2.* Let  $q^*$  be the (unique) cut-off value of  $q(S)$  such that the plaintiff is indifferent between litigating and not litigating:  $q^*$  solves

$$W \int_0^{q^*} xf(x)/F(q^*)dx = C_p. \quad (1)$$

The plaintiff's probability of litigation,  $\alpha(S)$ , must be a best response to the defendant's optimal cut-off strategy given by  $q(S)$ ; that is, (i) if  $q(S) < q^*$ , then the value of litigation is negative so that  $\alpha(S) = 0$ ; (ii) if  $q(S) > q^*$ , then the value of litigation is positive so that  $\alpha(S) = 1$ ; (iii) if  $q(S) = q^*$ , then the value of litigation is zero so that any  $\alpha(S) \in [0, 1]$  is a best response.

To solve for the equilibrium strategies, we use backward induction. Consider the outcome after the plaintiff has made his settlement demand,  $S$ .

*Proposition 1.* In cases with merit, for any plaintiff's demand  $S > C_d$ , the continuation subgame has a unique Nash equilibrium.

*Proof.* See the Appendix.

We can describe the unique equilibrium to the subgame following demand  $S > C_d$  as follows.<sup>6</sup> If  $S > q^*W + C_d$ , then defendants of type  $q > (S - C_d)/W$  accept demand  $S$ ; all others reject it and are brought to court by the plaintiff. If  $S \leq q^*W + C_d$ , then defendants

<sup>5</sup> If  $\alpha(S) = 1$ , then for the defendant with  $q = q(S)$ , accepting  $S$  is a weakly dominated strategy. The plaintiff cannot proceed to court with probability greater than one. Hence, any tremble will be to the defendant's advantage and this makes rejecting  $S$  preferable. The assumption that the density  $f(q)$  is nonatomic makes this an unimportant point. If, however, there are atoms in the density, then there exists some value of  $S$  for which there is no trembling-hand perfect equilibrium in the subgame following the plaintiff's demand.

<sup>6</sup> An identical argument proves that there is a unique sequential equilibrium following each subgame for  $S > C_d$ . Sequential equilibrium implies subgame perfection. If there were more than one sequential equilibrium, there would also be more than one subgame-perfect equilibrium, which would contradict Proposition 1.

of type  $q > q^*$  accept demand  $S$ ; all others reject it and are brought to court with probability  $S/[q^*W + C_d]$  by the plaintiff.

A second subgame equilibrium is possible if the settlement offer is at or below  $C_d$ . Because  $S$  is so low, all defendants will accept it if they believe that the plaintiff will litigate with probability one. In this case rejection of  $S$  is a zero-probability event. The plaintiff, therefore, need not use Bayes' rule in updating his prior distribution; in a sequential equilibrium he is free to assume that the defendant rejecting his offer was drawn from the prior distribution.<sup>7</sup> Since the case has merit, this justifies his threat to litigate with probability one and confirms the defendant's wish to accept  $S$ . In this case the plaintiff's expected payoff equals his settlement demand (as it is always accepted) so that the optimal demand is  $S = C_d$ . Any larger demand will be rejected with some positive probability. This destroys the plaintiff's ability to use optimistic beliefs off the equilibrium path, as there would no longer be any off the equilibrium behavior.

Although this equilibrium is subgame perfect and even satisfies the divinity refinement of Nash equilibrium, it can be ruled out by eliminating never weak best responses or by appealing to stability criteria.<sup>8</sup> But the major objection to this strategy is that the offer of  $S = C_d$  will not be very profitable. The plaintiff will always prefer to make larger offers, which have a risk of being rejected, provided that the expected court award is greater than the total court costs.<sup>9</sup>

*Condition 1.*  $E[q]W > C_p + C_d$ .

The plaintiff's expected profits from demanding  $S = bW + C_d$  are  $E[q]W - C_p$  since this demand will always be rejected. Under Condition 1 this is greater than  $C_d$ . Hence, even if always accepted,  $S = C_d$  cannot be the optimal settlement demand, and henceforth this option will be ignored.

Consider now settlement demands where  $S > C_d$ . The plaintiff can assign an expected value to the subgame following demand  $S$  since from Proposition 1 each subgame has a unique equilibrium. Let  $V(S)$  be the expected value of making settlement demand  $S$ :

$$V(S) = S[1 - F(q(S))] + \alpha(S)F(q(S)) \left[ -C_p + W \int_0^{q(S)} \{xf(x)/F(q(S))\} dx \right]. \quad (2)$$

The plaintiff's strategy is simplified to choosing the  $S$  that maximizes  $V(S)$ . Lemma 1 shows that the plaintiff will always ask for a sufficiently large settlement so that if his offer is rejected, he will proceed to court with probability one.

*Lemma 1.* No offer  $S \in (C_d, q^*W + C_d)$  can be a sequential equilibrium of the pretrial negotiation problem.

*Proof.* Any demand  $S'$  such that  $C_d < S' < q^*W + C_d$  is dominated by the demand  $S^* = q^*W + C_d$ . In both cases  $q(S) = q^*$  so that the expected value of litigation is zero. Inspection of equation (2) reveals that

$$V(S') = S'[1 - F(q^*)] < S^*[1 - F(q^*)] = V(S^*) \quad \text{as} \quad S' < S^*.$$

Note also that any demand greater than  $bW + C_d$  does no better than  $S = bW + C_d$ .

<sup>7</sup> Even if the plaintiff's case lacks merit,  $E[q]W - C_p < 0$ , use of more optimistic beliefs off the equilibrium path can allow the plaintiff to obtain a positive settlement demand. This type of optimistic opportunism might characterize a nuisance suit.

<sup>8</sup> Rejecting  $S = C_d$  is never a weak best response for any defendant except the type with  $q = 0$ , and therefore any stable equilibrium must be supportable by posterior beliefs concentrated on 0. See Cho and Nalebuff (1986).

<sup>9</sup> Condition 1 is stronger than the definition of merit as  $C_p$  in the latter has been increased to  $C_p + C_d$  in Condition 1. This assumption can be weakened to the necessary and sufficient condition that  $q^*W[1 - F(q^*)] > F(q^*)C_d$ .



In both cases the offer will always be rejected, and therefore the expected payoffs are identical.<sup>10</sup> The optimal settlement demand among  $S > C_d$  must lie in  $S \in [S^*, bW + C_d]$ , where  $S^* = q^*W + C_d$ .

It is not necessarily the case that among the  $S \in [S^*, bW + C_d]$  there exists a unique maximizing demand for the plaintiff. If, however, we assume that the hazard rate of the distribution of defendant types is increasing, then the maximization problem has a unique solution.

*Assumption 1.* The hazard rate,  $f(q)/[1 - F(q)]$ , is a strictly increasing function of  $q$ .

*Lemma 2.* Under Assumption 1 and Condition 1  $V(S)$  obtains its maximum value at a unique  $S \in [S^*, bW + C_d]$ , where  $S^* = q^*W + C_d$ .

*Proof.* For  $S > S^*$ ,  $\alpha(S) = 1$ ,  $q(S) = [S - C_d]/W$ , and  $q'(S) = 1/W$ . Differentiating equation (2) yields:<sup>11</sup>

$$V'(S) = [1 - F(q(S))] + f(q(S))q'(S)[q(S)W - C_p - S] \quad (3)$$

$$= [1 - F(q(S))] - f(q(S))[C_p + C_d]/W$$

$$V''(S) = -[f(q(S)) + f'(q(S))[C_p + C_d]/W][1/W]. \quad (4)$$

By Lemma 1 and Condition 1 the argmax of  $V(S) \in [S^*, bW + C_d]$ . Under Assumption 1  $V''(S)$  is negative whenever  $V'(S) = 0$ . Hence, there is a unique solution to the first-order condition, and it must be a maximum.

We see from Lemmas 1 and 2 that there is a kink in the value function at  $S^* = q^*W + C_d$ : the left derivative is  $[1 - F(q^*)]$ , while the right derivative is

$$[1 - F(q^*)] - f(q^*)[C_p + C_d]/W.$$

The reason for the kink is that if the plaintiff were to lower his demand from  $S^*$ , he would no longer be able to threaten litigation with probability one. The necessary fall in  $\alpha(S)$  to maintain credibility more than offsets the gain from offering a lower settlement. The optimal settlement demand is at the kink if  $V'(S^*) < 0$ .

*Condition 2.*  $[1 - F(q^*)] - f(q^*)[C_p + C_d]/W < 0$ .

*Lemma 3.* Under Assumption 1 and Conditions 1 and 2 the plaintiff's optimal demand is  $S^*$ .

*Proof.* By Lemma 2 the argmax of  $V(S)$  occurs at  $S \geq S^*$ . But Condition 2 implies that the right derivative  $V'(S^*) < 0$ . Assumption 1 ensures that  $V'(S)$  remains negative for  $S > S^*$  since the hazard rate is an increasing function of  $q$ . Hence, the maximum must occur at the boundary,  $S = S^*$ .

In this event, we say that the credibility constraint is binding. If the plaintiff could commit to litigation, he would choose to offer less than  $S^*$ . The increased chance of acceptance would more than compensate for the expected loss in litigation if his offer were rejected. The plaintiff's problem when he cannot commit is that an offer lower than  $S^*$  has no greater chance of acceptance than  $S^*$ .

<sup>10</sup> In fact,  $bW + C_d$  cannot be the optimal settlement demand as the plaintiff does better by offering  $bW + C_d - \epsilon$  for some small  $\epsilon > 0$ . In equation (3), which follows, the left derivative at  $S = bW + C_d$  is  $V'(S) = [1 - F(b)] - f(b)[C_p + C_d]/W < 0$  as  $F(b) = 1$ . If  $f(b) > 0$ , then  $V'(S) < 0$  and  $S$  is not a maximum. If  $f(b) = 0$ , so that  $V'(S) = 0$ , then for  $S$  to be a (local) maximum,  $f(x)/[1 - F(x)]$  must be bounded as  $x \uparrow b$ . But repeated application of l'Hôpital's rule requires  $f(b) = f'(b) = f''(b) = \dots = f^{(\infty)}(b) = 0$  so that  $f(x)$  must be identically zero, a contradiction.

<sup>11</sup> At  $S^*$ , the right and left derivatives of  $V(S)$  differ. Since we are concerned with  $S > S^*$ , at  $S^*$  use the right derivative.

### 3. Comparative statics

■ This section focuses on negotiation problems in which the plaintiff's credibility constraint is binding. Propositions 2 and 3 show that traditional standard comparative static results are reversed owing to the distortion created by the plaintiff's need to maintain credibility. The credibility problem hurts both parties. Proposition 4 shows that the defendant will actually want to help the plaintiff make his litigation threat credible.

Consider first the effect of a change in the court award  $W$  and court costs  $C_p$  and  $C_d$ . One might expect that if going to court is more profitable (higher  $W$  or lower court costs), then the plaintiff should act more aggressively and settlement becomes less likely. In fact, the opposite occurs. The standard intuition is reversed because of the credibility constraint. When proceeding to court is more profitable, the credibility constraint is relaxed; the plaintiff is less constrained to be aggressive and the chance of settlement increases.

*Proposition 2.* Under Assumption 1 and Conditions 1 and 2 a small increase in  $W$  leads to an increase in the likelihood of settlement.

*Proposition 3.* Under Assumption 1 and Conditions 1 and 2 a small increase in the plaintiff's court costs leads to a higher settlement demand and a decreased probability of settlement; a small increase in the defendant's court costs leads to a higher settlement demand and exactly the same probability of settlement.

*Proofs.* Assumption 1 and Conditions 1 and 2 are all strict inequality constraints. By continuity, they will continue to hold for small changes in the parameters  $W$ ,  $C_p$ , and  $C_d$ . Lemma 3, therefore, continues to apply and  $S^* = q^*W + C_d$  remains the optimal settlement demand. How do  $S^*$  and  $q^*$  change?

Differentiation of equation (1) shows that  $q^*$  falls as  $W$  increases. The probability of settling out of court is  $[1 - F(q^*)]$ , which increases with a fall in  $q^*$ . Whether  $S^*$  rises or falls is ambiguous and depends on whether  $dq^*/dW > -q^*/W$ . In either case a greater court award allows the plaintiff to learn more bad information and still maintain a credible litigation threat.

Differentiation of equation (1) shows that as  $C_p$  rises,  $q^*$  increases and correspondingly the probability of a settlement falls. Since  $S^* = q^*W + C_d$ ,  $dS^*/dC_p = Wdq^*/dC_p > 0$ . The plaintiff must raise his demand to reduce the amount of bad information he can learn if  $S^*$  is rejected.

Differentiation of equation (1) shows that a change in  $C_d$  has no effect on  $q^*$ . Hence, the probability of acceptance remains constant. But since  $S^* = q^*W + C_d$ ,  $S^*$  rises dollar for dollar to take advantage of the defendant's higher court costs.

*Remark.* These results are the opposite of the conclusions in Bebchuk's (1984) Propositions 2 and 3. He shows that a rise in  $W$  or a fall in litigation costs leads to fewer pretrial settlements.<sup>12</sup> The difference occurs because Bebchuk's comparative static results are based on calculating how an interior solution changes as a function of the parameters.<sup>13</sup> Under Con-

<sup>12</sup> Bebchuk also shows that a fall in  $W$  or an increase in the plaintiff's litigation costs decreases the settlement demand, while an increase in the defendant's litigation costs has an ambiguous effect on  $S^*$ . In our case  $dS^*/dW$  is ambiguous,  $dS^*/dC_p$  is positive, and  $dS^*/dC_d$  is positive.

<sup>13</sup> If the solution for  $S$  is interior, then the first-order condition, equation (3), is used to calculate  $dS/dW$ :

$$dS/dW = -\frac{\partial^2 V / \partial S \partial W}{\partial^2 V / \partial S^2} = q(S) + \frac{f(q(S))[C_p + C_d]}{[Wf(q(S)) + f'(q(S))[C_p + C_d]]} > 0;$$

$$dq(S)/dW = [dS/dW - q(S)]/W = \frac{f(q(S))[C_p + C_d]}{W^2 f(q(S)) + Wf'(q(S))[C_p + C_d]} > 0.$$

The probability of acceptance,  $[1 - F(q(S))]$ , falls with an increase in  $W$ .



dition 2, however, the optimal settlement demand is not at an interior solution. Instead,  $S^*$  is a “corner” solution: it is the minimum demand at which the threat to litigate with probability one is credible. The corner exists because of the plaintiff’s inability to commit credibly to certain litigation if a settlement below  $S^*$  is rejected. When the optimum is at the corner, then the comparative statics depend on how the corner moves.

This difference is illustrated in Figure 2, which shows the plaintiff’s expected payoff from making settlement demand  $S$ . The curve  $V(S)$  unconstrained is based on the assumption that the plaintiff can commit to litigation. In this case the set of defendants who accept  $S$  increases from  $((S/\alpha(S) - C_d)/W, b]$  to  $((S - C_d)/W, b]$ . This raises the plaintiff’s expected payoff for  $S < S^*$ . The constrained value of  $V(S)$  reflects the requirement of subgame perfection that the threat to litigate must be credible.<sup>14</sup> Under Condition 2 the value of the right derivative  $V'(S^*)$  is negative. Hence, the maximum of the unconstrained  $V(S)$  is to the left of  $S^*$ .

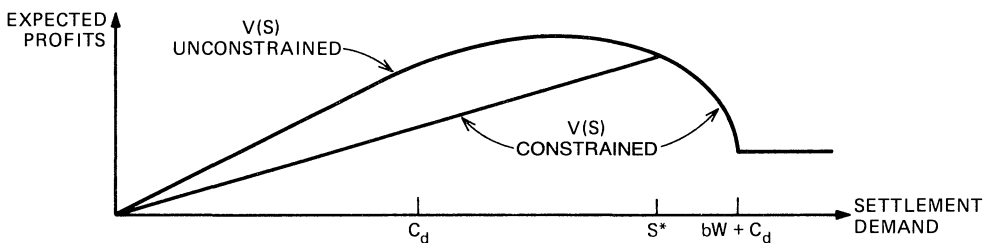
Who benefits when the plaintiff can commit to litigation? Commitment can only raise (or leave unchanged) the plaintiff’s expected utility; the unconstrained  $V(S)$  never lies below the constrained  $V(S)$ . What may be surprising is that the defendant also prefers that the plaintiff be able to commit to take him to court. Why? Because this allows the plaintiff to make a lower settlement demand, which is always to the defendant’s advantage. Note that this result critically depends on the plaintiff’s case having merit (which is implied by Condition 1); otherwise, commitment creates the possibility of a nuisance suit in which the plaintiff extracts at least  $C_p$  from the plaintiff regardless of the strength of his case.

*Proposition 4.* Under Assumption 1 and Conditions 1 and 2 allowing the plaintiff to commit to litigate results in a Pareto improvement. The expected utility of the plaintiff is increased, and each type of defendant prefers that the plaintiff be able to commit to litigation.

*Proof.* Lemma 3 applies, and  $S^*$  is the plaintiff’s optimal settlement demand in the constrained problem. In both the equilibrium without commitment and the one with commitment, at the respective optimal settlement demands the plaintiff proceeds to court with probability one if his offer is rejected. The defendant’s cost of rejecting the settlement, therefore, is  $qW + C_d$  in both cases, and this is independent of the demand  $S$ . If the plaintiff’s ability to commit lowers  $S$ , then (i) more defendants will accept  $S$ , which can only be to their advantage, and (ii) all defendants who accept  $S$  are better off since  $S$  is lower.

For the plaintiff, the ability to commit can only lower his optimal settlement demand. Commitment has no effect on his expected payment for settlement demands above  $S^*$  since by Proposition 1,  $\alpha(S) = 1$  in the subgame-perfect equilibrium without commitment. But the defendant is now more willing to accept demands below  $S^*$  since his chance of being taken to court rises from  $\alpha(S) = S/S^*$  to one. This is better for the plaintiff for whom

FIGURE 2  
THE EXPECTED VALUE OF SETTLEMENT DEMANDS



<sup>14</sup> For  $S < C_d$  two possible subgame equilibria follow  $S$ . The unconstrained value of  $V(S)$  is drawn to reflect the payoff from the subgame equilibrium where  $q(S) = q^*$  as in the second case of Proposition 1.

making settlement demands below  $S^*$  becomes more attractive. Under Assumption 1 and Conditions 1 and 2 the maximum of the unconstrained  $V(S)$  occurs at  $S < S^*$  as  $V'(S^*)$  is negative.<sup>15</sup> With the ability to commit, the plaintiff has a better threat, which has a smaller chance of being executed. He chooses to lower his settlement demand below  $S^*$  and both parties are better off.

Commitment might be achieved if the plaintiff contracts with legal counsel before making the settlement demand. The plaintiff would agree to pay the *expected* legal costs whether or not the case goes to court. In return, counsel would guarantee to pursue litigation if the settlement demand is rejected. In this way the plaintiff's threat to litigate is made credible. This arrangement is similar to hiring a lawyer on retainer. Legal fees become more of a fixed and hence sunk cost, while the marginal cost of litigation is correspondingly reduced. It may also be the case that law firms that can establish a reputation may attain commitment more easily than consumers who try to represent themselves.

□ **Extensions.** Consider briefly how these results may be generalized to include risk-averse litigants and two-sided incomplete information and how the results may be extended to environments outside pretrial negotiation.

Risk aversion would, at first glance, appear to increase the probability that the two parties reach a pretrial settlement (Gould, 1973). Although it is true that a risk-averse plaintiff has a lower reservation settlement and thus a greater incentive to negotiate, the credibility problem works in the other direction. Risk aversion reduces the expected utility for the uncertain outcome of litigation. When the credibility constraint is binding, the introduction of risk aversion leads to an *increase* in the plaintiff's settlement demand, as this is the only way to restore his expected utility of litigation to zero. In contrast, risk aversion does not affect the defendant's willingness to negotiate, since he can exactly predict the court award and therefore does not face any risk.<sup>16</sup> The net effect is that risk aversion exacerbates the difficulty of reaching a settlement when credibility is a binding constraint.

Uncertainty may be two-sided. In addition to the plaintiff's uncertainty about the defendant's liability, the defendant may be uncertain about the magnitude of the plaintiff's injury,  $W$ . In the signalling equilibrium that results when the plaintiff continues to make a take-it-or-leave-it settlement, larger injuries lead to (weakly) larger settlement demands. The defendant's perception that greater demands are associated with larger injuries strengthens the plaintiff's bargaining position and thus further distorts settlement demands upward (Cho and Nalebuff, 1986).

The present results are just one example of a bargaining problem in which the consequences of rejection limit the parties' ability to reach an agreement. In particular, the pretrial negotiation in civil cases is closely related to the plea-bargaining problem that arises in criminal cases (Grossman and Katz, 1983). Outside the courthouse there are parallels for contract negotiations between a union and a firm. Instead of the plaintiff's threatening the defendant with litigation, the union threatens the firm with a costly strike. Consider the analogy more closely. In wage negotiations a firm has better information about its profitability and correspondingly about the wage it can afford to pay. Some of this information will be revealed over the course of a costly strike. Given the firm's information, it can predict that

<sup>15</sup> Note that without Condition 2, the optimal settlement demand in the unconstrained problem occurs at  $S \geq S^*$ , and the ability to commit has no effect on the equilibrium.

<sup>16</sup> This applies when  $q$  represents the fraction of damages for which the defendant will be held liable. Note also that the defendant's certain payoff depends on the plaintiff's proceeding to litigation with probability one. By an argument parallel to Lemma 1, the plaintiff will always want to raise  $S$  until  $\alpha(S) = 1$ , and hence this is not an issue.

a strike will lead to a contract with an expected wage of  $W$ . The cost of going to court becomes the cost of going on strike; the union loses wages represented by costs  $C_u$  and the firm loses profits represented by costs  $C_f$ . If the union offers the firm a take-it-or-leave-it wage settlement  $S$ , the firm will accept if  $S < W + C_f$ . If  $S$  is rejected, then the union must compare its expected gain from striking,  $E[W|W < S - C_f] - C_u$ , with its current wage,  $W_0$ . The mathematical formulation of the problem is identical to the pretrial negotiation problem where the distribution of  $W$  replaces the distribution of  $q$  (multiplied by a known  $W$ ).

Here a credibility problem may lead to an excess occurrence of strikes. The union may wish to make a lower wage demand, but it is restricted by the need to keep its strike threat credible. If the union makes an insufficient wage demand and this is rejected, then it cannot credibly threaten to strike with certainty. Therefore, the union is constrained to make a large demand, the management frequently rejects it, and a costly strike may be needed to reveal the management's reservation wage.<sup>17</sup>

#### 4. Concluding remarks

■ This article has focused on the role of credibility in the pretrial negotiation problem; therefore, it is important to emphasize why credibility should be a central issue. The defendant's willingness to accept any pretrial settlement depends on his belief that the plaintiff will otherwise carry out his threat to litigate. Credibility can be ignored only if litigation is a dominant strategy: litigation must have a positive expected value even against the defendant with the least possible liability,  $aW > C_p$ . This assumption is implausible if court costs are of the same magnitude as the court award or if the plaintiff is uncertain about the defendant's liability and cannot exclude the possibility that  $a = 0$ . The basis for pretrial negotiation, however, rests on the presence of court costs and uncertainty.

Unless court costs are large, pretrial negotiation is doomed to fail: the only reason for settlement is to save court costs. To see this consider the negotiation problem when both parties have zero court costs. The plaintiff's litigation threat is always credible. The defendant's optimal response rule is to accept  $S$  if  $S < qW$ . In this case whenever the defendant accepts the settlement demand, the plaintiff realizes that he would have made more money by going to court; therefore, he will never make a demand that will be accepted. All cases will go to court. The plaintiff has no reason to offer the defendant any discount on what he expects to win in court. It is the existence of court costs that creates the wedge between what the defendant expects to pay and what the plaintiff expects to receive that sometimes allows the parties to reach a pretrial settlement.

Uncertainty plays the second major role in the pretrial negotiation problem. Without uncertainty the plaintiff can predict perfectly the defendant's reservation settlement. He will make an offer the defendant will not refuse. The reason pretrial negotiation might not lead to settlement is the uncertainty about the value of going to court.

Without court costs pretrial negotiation always fails. Without uncertainty it always succeeds. To examine the interesting cases in between court costs and uncertainty must play a central role. Then the issue of credibility cannot be ignored.

Once credibility becomes an issue, the comparative static results of Section 3 suggest caution in making policy recommendations. How do we improve the efficiency of pretrial negotiation? Whether changing the court award  $W$  and court costs  $C_p$  and  $C_d$  helps or hurts

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<sup>17</sup> If the union could commit to striking when  $S$  is rejected, then it could make lower wage demands, and as Proposition 4 demonstrates, both parties could be better off.

the chance of settlement depends on whether the credibility constraint (Condition 2) is binding. For example, an increase in the court award  $W$  raises the probability of settlement when the credibility constraint is binding and decreases the settlement probability otherwise. The reason for the reversal is that a higher court award always makes litigation more profitable. This both relaxes the credibility constraint and increases the desired settlement demand when commitment is possible. Which effect matters depends on whether credibility is a binding constraint. Policy recommendations become much more complicated. In particular, a change in policy will have a different effect on different types of cases; there is no single homogeneous predicted effect of policy.

These observations suggest that in making comparisons across cases, settlement demands may appear unrealistically high, and pretrial agreement may be unlikely in cases in which litigation costs are small and in cases in which the plaintiff's prior expected value of litigation barely exceeds his court costs. The first result is due to the adverse-selection effect. The plaintiff does not want to settle with anyone who is willing to accept his offer.<sup>18</sup> The second is due to the information effect. The plaintiff can only make his threat of certain litigation credible by limiting the amount of bad news he can learn. He does not want to allow the defendant to convey the strength of his defense by rejecting a small  $S$ .

The credibility problem provides one explanation of why the weakest cases may be the hardest to settle out of court. Plaintiffs with weak cases cannot simply resolve the dispute by making a small settlement demand. If they ask for very little, then they give the defendant a chance to prove that their case is weak by rejecting the demand. As a result, they can only credibly threaten to litigate some of the time when their demand is refused. The constraint of subgame perfection may require the plaintiff to make a large demand, even when the expected damage is small. Unless it is possible to commit to litigation, this model predicts that both the plaintiff and the defendant may resort to expensive litigation as the only credible alternative to resolving a small dispute.

This leads to the prediction that among the cases that proceed to trial, we should expect the plaintiffs to win significantly less than 50% of the time. This prediction is the topic of some controversy (Priest, 1985; Wittman, 1985). Priest and Klein (1984) argue that failure to reach an out-of-court settlement is basically due to either overoptimistic beliefs by the plaintiff or overoptimistic beliefs by the defendant. Since each route of failure is equally likely, they predict that plaintiffs will prevail nearly 50% of the time. This prediction is borne out in their study of the nearly fifteen thousand contested civil cases tried by jury in Cook County, Illinois, over 1959–1979: on average plaintiffs won 48.47% of the time. The Priest and Klein prediction rests on two assumptions: (i) neither party acts strategically in making its settlement demand and (ii) both parties have equal uncertainty about their chances of success.

In this article the plaintiff acts strategically in choosing his settlement demand and has much less information about his chance of success than does the defendant. A failure to reach a settlement is more likely when the plaintiff has been forced to inflate his settlement demand to maintain credibility. Hence, conditional on a case proceeding to trial, there will be a disproportionately large representation of weak plaintiff cases. The evidence of Salop and White (1986) shows that among a sample of 1,959 antitrust cases files over 1973–1983, the plaintiff prevailed less than 30% of the time when the case proceeded to trial. It remains an interesting question to examine whether strategic settlement demands on the part of the plaintiff and better information on the part of the defendant are important characteristics of antitrust litigation.

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<sup>18</sup> Before the recent work on betting with common knowledge (Geanakoplos and Sebenius, 1983), this might have been called the Groucho Marx effect.

The stylized example of pretrial negotiation provides insight into the factors that make a negotiation position credible and the problems that creating credibility may cause. It is well known that bargaining strength relies on the ability to make credible threats, but when the threats may be costly to carry out, credibility is not easily achieved. We have seen the danger in bargaining that emerges because one side may discover the weakness of its case. In such situations people may be forced to take extreme positions. A little knowledge may be dangerous; excessive knowledge can destroy credibility.

## Appendix

■ The proof of Proposition 1 follows.

*Proof of Proposition 1.* Fix a subgame following the settlement demand  $S$ . The unique subgame equilibrium is one of two possible types, depending on  $S$ : (i)  $S > q^*W + C_d$ ,  $q(S) = [S - C_d]/W$ ,  $\alpha(S) = 1$ ; or (ii)  $S \leq q^*W + C_d$ ,  $q(S) = q^*$ ,  $\alpha(S) = S/[q^*W + C_d]$ .

First note that the requirement that  $S > C_d$  ensures that  $q(S) > 0$ . There is always some positive probability that  $S$  will be rejected. The plaintiff, therefore, must use Bayes' rule in forming his posterior beliefs if his offer is rejected.

(i) By definition,  $q(S) = [S/\alpha(S) - C_d]/W$ . Since  $\alpha(S) \leq 1$ ,  $q(S) \geq [S - C_d]/W > q^*$  when  $S > q^*W + C_d$ . Recall that the plaintiff's expected value from litigation if  $S$  is rejected is based on a posterior concentrated on  $[0, q(S)]$ . As  $q(S) > q^*$ , this is greater than the expected value when the posterior is concentrated on  $[0, q^*]$ . But by the definition of  $q^*$ , a posterior concentrated on  $[0, q^*]$  leads to a zero expected value of litigation. Hence, since  $q(S) > q^*$ , litigation has a strictly positive expectation, so that  $\alpha(S)$  must be one. Given that  $\alpha(S)$  is one,  $q(S) = [S - C_d]/W$ , and the subgame following  $S$  is uniquely defined.

(ii) Following  $S$ , there are only three possibilities for what  $\alpha(S)$  can be:  $\alpha(S) = 0$ ,  $\alpha(S) \in (0, 1)$ , and  $\alpha(S) = 1$ .

The case of  $\alpha(S) = 0$  is impossible. All defendants would reject any positive  $S$  since they expect the plaintiff to give up with certainty. Thus, upon observing that his demand is rejected, the plaintiff learns nothing. His posterior distribution about the defendant's liability equals his prior distribution. Given the assumption that the plaintiff's case has merit, his desire to proceed to trial contradicts the possibility that  $\alpha(S) = 0$ .

The case of  $\alpha(S) \in (0, 1)$  requires the plaintiff to follow a mixed strategy if his settlement offer is rejected. This requires the plaintiff to be indifferent about litigation. From backward inference it must be the case that  $q(S) = q^*$ . For  $q(S)$  to equal  $q^*$ ,  $\alpha(S)$  is determined by  $S = \alpha(S)[q^*W + C_d]$  or equivalently  $\alpha(S) = S/[q^*W + C_d]$ . Therefore, given  $S < q^*W + C_d$ ,  $\alpha(S)$  is uniquely defined and  $q(S) = q^*$ .

The case of  $\alpha(S) = 1$  is only possible at  $S = q^*W + C_d$ , which is then a special case of  $\alpha(S) \in (0, 1)$  where  $\alpha(S) = [q^*W + C_d]/[q^*W + C_d] = 1$ ,  $q(S) = q^*$ , and the subgame equilibrium is unique. If  $S < q^*W + C_d$  and  $\alpha(S) = 1$ , then  $q(S) = [S - C_d]/W < q^*$  so that if  $S$  is rejected, the plaintiff's conditional expectation from litigation is negative. This contradicts the assumption that  $\alpha(S) = 1$ .

*Remark.* Even if the case does not have merit,  $E[q]W - C_p < 0$ , there is still a unique equilibrium to the subgame following any demand  $S > C_d$ . All defendants reject  $S$ . After  $S$  is rejected, the plaintiff's posterior equals his prior, and therefore he chooses not to litigate. Since he never litigates, the defendant was correct to reject his offer.

## References

- AKERLOF, G. "Market for Lemons: Qualitative Uncertainty and the Market Mechanism." *Quarterly Journal of Economics*, Vol. 84 (1977), pp. 488–500.
- BEBCHUK, L. "Litigation and Settlement under Imperfect Information." *Rand Journal of Economics*, Vol. 15 (1984), pp. 404–415.
- CHO, I.-K. AND NALEBUFF, B. "Refinements of Nash Equilibrium Applied to the Pretrial Negotiation Problem." Mimeo, Princeton University, Department of Economics, 1986.
- GEANAKOPOLOS, J.D. AND SEBENIUS, J.K. "Don't Bet on It: Contingent Agreements with Asymmetric Information." *Journal of the American Statistical Association*, Vol. 78 (1983), pp. 424–426.
- GOULD, J.P. "The Economics of Legal Conflicts." *Journal of Legal Studies*, Vol. 2 (1973), pp. 279–300.
- GROSSMAN, G.M. AND KATZ, M.L. "Plea Bargaining and Social Welfare." *American Economic Review*, Vol. 73 (1983), pp. 749–757.
- PRIEST, G. "Reexamining the Selection Hypothesis: Learning from Wittman's Mistakes." *Journal of Legal Studies*, Vol. 14 (1985), pp. 215–243.
- AND KLEIN, B. "The Selection of Disputes for Litigation." *Journal of Legal Studies*, Vol. 13 (1984), pp. 1–55.

- REINGANUM, J.F. AND WILDE, L.L. "Settlement, Litigation, and the Allocation of Litigation Costs." *Rand Journal of Economics*, Vol. 17 (1986), pp. 557-566.
- ROSENBERG, D. AND SHAVELL, S. "A Model of the Nuisance Suit." H.I.E.R. Discussion Paper No. 1037, Harvard University, 1984.
- ROTHSCHILD, M. AND STIGLITZ, J. "Increasing Risk: A Definition." *Journal of Economic Theory*, Vol. 2 (1970), pp. 225-243.
- SALANT, S. "Litigation of Settlement Demand Questioned by Bayesian Defendants." California Institute of Technology Social Science Discussion Paper No. 516, March 1984.
- SALOP, S.C. AND WHITE, L.J., "Economic Analysis of Private Antitrust Litigation." *Georgetown Law Journal*, Vol. 74 (1986), pp. 1001-1064.
- SOBEL, J. "An Analysis of Discovery Rules." Mimeo, University of California, San Diego, 1985.
- WITTMAN, D. "Is the Selection of Cases for Trial Biased?" *Journal of Legal Studies*, Vol. 14 (1985), pp. 185-214.