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THE EFFECT OF REPUTATION ON THE LITIGATION-SETTLEMENT DECISION

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Abstract

The litigation-settlement decision has been the subject of careful study by the law and economics community, but the reputation of repeat litigants has not significantly entered into this analysis. Reputation, however, may have significant effects on the litigation-settlement decision: reputation may give repeat litigants serious advantages over those litigants with only a single suit. This paper considers the effects of reputation on the litigation-settlement decision. The main result is that reputation can influence the litigation-settlement decision, but the ability of repeat litigants to use reputation largely depends on the information available to their opponents.

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David Weisbach*

The litigation-settlement decison has been the subject of careful study by the law and economics community.[1] Yet the reputation of repeat litigants has not significantly entered into this analysis.[2] Reputation, however, may have significant effects on the litigation-settlement decision: reputation may give repeat-litigants serious advantages over those litigants with only a single suit. This paper will attempt to contribute to the study of the litigation-settlement decision by modeling the effects of reputation on the litigation-settlement decision through the use of a game-theoretic model.[3] The basic result of this study is that reputation can significantly affect the litigation-settlement decision, but the ability of repeat litigants to use reputation largely depends on the information available to their opponents.

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[1] The early literature developing this subject includes Landes; Goul; Posner; Shavell. More recently, commentators have attempted to explicitly model the bargaining process. These authors include Ivan P'ng; Bebchuk (1984) Reinganum and Wilde; and Bebchuk (1988).

[2] The effect of reputation has been informally noted by Galanter.

[3] Game theorists have formally modeled reputation in the context of predation. Selten; Kreps and Wilson; Milgrom and Roberts; and Fudenberg and Maskin.

Section I of the paper provides background, sets forth the basic model to be considered, and discusses some of the limitations of this model: specifically, the model will be limited to reputations for "toughness"[4] and will examine them only insofar as the settlement value is affected. Section II will show that in this model, when there is perfect information and a finite, known number of suits, reputation has no effect on the litigation-settlement decision. Sections III and IV will then examine this model under varying assumptions about information. Section III will consider the case where the number of suits is not known in advance and Section IV will consider the case with asymmetric information where the settlement range of the repeat player is not known with certainty by the single-suit litigant. In both cases, repeat litigants can use reputation to extract a more beneficial settlement than they could achieve without reputation and the value of the settlement is dependent on the information available to the single-suit litigants. Formal presentation of the model is contained in the Appendix.

I. Background

Virtually any behavior that hinges settlement of a suit on behavior in past suits or the existence of future suits can fall under the rubric of reputation. Litigants may establish

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[4] A reputation for toughness will be carefully defined. In essence, it is a reputation for settling suits on terms favorable to the repeat litigant and on terms not necessarily related to the expected value of the suit. A typical behavior under this reputation is a threat to litigate if a certain settlement demand is not met.

reputations based on different behaviors, such as honesty, cooperation, fairness, or "toughness," with each type of reputation having different properties. A reputation for toughness, for example, will involve threats to litigate if certain settlement demands favorable to the repeat litigant are not met. A reputation for cooperation on the other hand, may involve settlement except when the opponent fails to offer reasonable terms, in which case litigation is in order.[5] Reputations for fairness or honesty may have yet different properties.

In addition to basing reputation on different behaviors, litigants may have various reasons for establishing a reputation. A repeat litigant may wish to establish a reputation in order to improve the expected settlement values of future suits. Additionally a defendant who is a repeat-litigant may attempt to deter future suits by lowering the expected value of a suit for potential plaintiffs.[6] Alternatively, law firms may wish to establish certain reputations in order to reduce search costs for litigants seeking attorneys with particular attributes. Each of

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[5] A frequently cited example of the reputation for cooperation is the "tit-for-tat" strategy in repeated prisoners' dilemma games. See Kreps, Wilson, Milgrom and Roberts.

[6] To deter future suits, it is necessary that some of the potential suits be strike suits or nuisances suits. That is, the suits must have a "negative expected value" to the plaintiff in that the expected value of the suit to a plaintiff if the suit were actually tried, is less than zero. If a case does not have negative expected value, then a plaintiff will not fail to sue because of a threat of litigation. Bebchuk (1988) discusses the effect of such suits on the likelihood of settlement.

these reasons for establishing reputations may have different attributes with respect to different types of reputation.

This paper will only study reputations for toughness by repeat litigants and only insofar as it affects settlement values (and some note will be made on the effect of reputation on the likelihood of settlement). A reputation for toughness is characterized by the making of threats to litigate if certain settlement demands are not met, in the hope that either the threats will be effective or, on the other hand, if the threats are not heeded, that carrying out the threats in the current suit will establish a reputation that will cause future threats to be effective. The value of such a reputation is that it may allow the repeat litigant to obtain more favorable settlements.

An additional characteristic of a reputation for toughness is that threats made while establishing or maintaining a reputation for toughness must be credible. It is possible to build models without this requirement, but these models will generally fail to accurately model the bargaining process. For example, a Nash equilibrium requires that each party follow a strategy that is optimal <u>given</u> that the other side will follow its stated strategy. Neither side can question the other's credibility. To build a model based on Nash equilibrium, suppose that there are a finite number of suits, that the defendant is a repeat player, that all the plaintiffs are identical, with the same litigation costs and damages, and that all litigation costs and damages are known to all parties. Then, it is a Nash equilibrium for the defendant to reject all demands above some arbitrarily low number, say x, (but above the plaintiffs minimum settlement value which is the value of the suit minus the plaintiffs' litigation costs), accept otherwise, and for the plaintiffs to demand x. It is easy to see that these strategies represent a Nash equilibrium. Given that the defendant will reject all demands above x, it is optimal for the plaintiffs to demand x, so long as it is above the return from going to trial, which it is required to be. Given that the plaintiffs will demand only x, it is optimal for the defendant always to accept x.

This equilibrium is, however, unsatisfactory. It requires the plaintiffs to assume that the defendant would actually reject a demand above x when faced with such a demand merely because it is the defendant's stated strategy. This is unrealistic because a plaintiff who knows with certainty that it is rational for the defendant to accept a demand above x will make such a demand regardless of the defendant's stated strategies. In bargaining towards a settlement, threats are effective only to the extent that there is a chance that they may be fulfilled - if a threat is known to be a bluff, then it will be ignored. In a Nash equilibrium, the credibility of the defendant's bluffs is never an issue and this creates models based on implausible behavior. Credibility, therefore, may have significant effects on the ability to establish a reputation and therefore, as a further limitation, this paper will only consider models based on credible threats.

Given these definitions and limitations on the problem, the model is designed to isolate the effect of reputation on the litigation-settlement decision. The repeat player, in this model, will always be the defendant.[7] The defendant and its attorney will be considered one unit--the attorney will not have a separate reputation from the defendant. In order to prevent changes in settlement values based on variations in the parties, each plaintiff will be identical, have the same litigation costs and face the defendant only once. In addition, each suit will be worth the same amount and there will be no dispute as to liability or damages.

When a plaintiff sues, he knows the results of all prior suits. Before trial, the plaintiff makes a "take it or leave it" demand:[8] the defendant can pay the amount demanded, or reject

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[7] The examples and models in this paper apply where either the plaintiff or the defendant is a repeat player. It will be assumed, for simplicity, that it is the defendant who is the repeat player. There are many situations where the plaintiff is the repeat player. One case is where a plaintiff's lawyer establishes a reputation aside from the clients he represents. Other examples include a prosecutor and a credit collector.

[8] While neither party is likely to be able to make a take it or leave it demand in actuality, studying such demands reveals information about actual behavior. Regardless of how long and complex a negotiation is, there will come a point, at the end of the negotiation, where the parties must decide to accept or reject whatever is on the table, a situation resembling the take it or leave it demand. Also, when a party makes a take it or leave it demand, he is likely to make the demand most favorable to himself. (Strictly speaking, he will maximize his expected outcome.) By studying the take it or leave it demand, we find the extremes of the bargaining range and can assume that the actual settlement will be somewhere within the range. If the defendant is to establish
(continued...)

the demand. If the demand is rejected, a trial results and both parties incur the full litigation costs while the defendant pays the damages.[9]

Within this scenario, it is up to the defendant to devise litigation strategies that minimize his costs, given that each plaintiff will make a demand that maximizes his expected return. (They are risk neutral.) The effect of reputation on the litigation-settlement decision is measured in this model by the demands made by the plaintiffs. An effective strategy by the defendant should lower the demands made by the plaintiffs. In addition, reputation may affect the litigation-settlement decision by changing the amount of litigation predicted by the model. Therefore, an additional measurement of effect of reputation is the amount of litigation.

II. The Case with Perfect Information and a Known Number of Suits: The Impossibility of Establishing a Reputation

Intuition teaches us that reputation is constantly a factor in decision-making. In fact, the precedential effect of a settlement sometimes appears to be more important than the value of the settlement itself. Yet, in this model, contrary to intuition, where there is perfect information and a finite, known

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[8](...continued) a reputation, we can expect to observe a lower maximum settlement value and therefore a lower demand by the plaintiff.

[9] Note that the lowest amount for which a plaintiff would ever settle is the value of the suit minus his litigation costs. The highest amount for which the defendant would settle is the value of the suit plus his litigation costs.

number of suits, it is impossible to establish a reputation based on credible threats.

A simple example can illustrate this. Consider the case where there is perfect information and only two plaintiffs. (Perfect information is where each side knows with confidence the other's payoffs.) Let the value of each suit be $100; and let both the plaintiffs' and defendant's costs of going to trial be equal to $50. If trial occurs, then the defendant loses $150 and the plaintiff receives $50. The second plaintiff must decide what demand to make. As the second plaintiff is the last plaintiff, there are no future suits. In this case, if the demand is below $150 the defendant is better off accepting the demand than going to trial. The second plaintiff will therefore maximize expected return by demanding $150. (I will assume here and elsewhere, that parties will settle when indifferent between settlement and litigation.) More importantly, the defendant's actions in the first suit cannot change the result in the second suit - the second plaintiff will always demand $150.

In the first suit the defendant has future suits with which potentially to establish a reputation. Yet analysis of the second plaintiff's demand revealed that nothing that the defendant can do will affect the second and last suit. If the defendant in the first suit were to reject a demand below $150, say $140, costs would be incurred, in this case $10, that could not be recovered in the future. Thus, in the first suit, the defendant will not reject any demand below $150. Knowing this, the first plaintiff will also demand $150. There is, therefore, no way for the defendant to act that will influence the first plaintiff's demand. The defendant facing two plaintiffs with perfect information faces demands of $150 and there is no way for the defendant to change it.

This result, observed by Selten in the context of predation to prevent market entry, extends to any finite number of suits. The reasoning parallels the two-suit case. In the last suit, the defendant will not be able to affect the settlement value since there are no future suits. In the next to last suit, because the result cannot affect the last suit, the defendant will not be able to credibly threaten to be tough and once again cannot affect the demand. In the third to last suit the defendant still can do nothing to change the demand because future suits will not be affected by his current actions. This process of "unraveling" continues, so that even in the first suit, the defendant can do nothing to change the demand. By this logic, where there is perfect information and a finite number of suits, the repeat defendant cannot maintain a reputation that will affect the settlement value of the number of suits.

Several observations should be made about this result. Primarily, this result does not match many people's perceptions of reality. In almost every interaction, people appear to consider reputation as an important factor. Yet this result suggests that under perfect information, the repeat player will not be able to use considerations of future suits to affect the settlement of the current suit. Either an assumption in the model is unrealistic, people are acting irrationally, or the intuition is empirically incorrect.

There is good reason to believe that the assumption of perfect information is unrealistic. This assumption requires plaintiffs to know the defendant's payoffs without a doubt and therefore prevents the defendant from making credible threats. (When credibility was not required, as in the Nash equilibrium, perfect information did not prevent the defendant from creating a strategy that altered settlement values. Credibility, therefore, is related to information.) The assumption of perfect information requires that each plaintiff remain confident that the defendant will accept his demand even if the defendant were to attempt to bluff by rejecting a large number of demands that rationally he should have accepted. This represents an unrealistic level of confidence. In addition, this level of confidence is precisely the factor that makes it impossible to have a credible threat. If some plaintiffs doubt that future plaintiffs are rational or have perfect information, the equilibrium will deteriorate because a plaintiff in an early round will not be able to reason that future plaintiffs will be unaffected by the defendant's bluffs.

The model with perfect information does, however, tell us one thing: reputation based on credible threats must rely on either imperfect information or irrationality. The remainder of this paper will therefore consider the model under imperfect information. In these cases, the plaintiffs will have a lower level of confidence in their knowledge of the defendant's valuations and therefore credible threats will be possible.

III. The Case Where the Number of Future Suits is Not Known in Advance

Consider the case in which either the number of future suits is not known in advance to the plaintiffs or the number of suits is infinite: the plaintiff knows that there will be other similar suits, but does not know how many suits there will be or whether there will ever be an end to these suits. This situation should be quite common. It may come about because a company intends to stay in business indefinitely and never expects to see an end to a particular type of lawsuit,[10] or because it is difficult to predict how many people will incur a legally cognizable injury and which of those people will choose to sue. Liberal discovery rules may not reveal this information because discovery may be costly, settlement may occur before discovery, the information may not be discoverable, or the information may be unknowable.

Given that the number of suits is not known, consider the following settlement strategy for the defendant: the defendant makes the threat that he will only settle for "S," a value between the expected liability minus the plaintiff's litigation

[10] For example, a manufacturer may expect a certain percentage of its products to create products liability litigation and yet may continue to produce--the liability is simply part of the costs of production. Such a company would expect to see similar litigation throughout the period that it manufactures the product.

costs, (the minimum settlement value for the plaintiffs) and the expected liability plus the defendant's litigation costs (the maximum value for the defendant); the threat states further that if the defendant should ever settle for more than S, then the defendant will settle for the value of the suit plus litigation costs in all future cases. This strategy, dependant only the defendant's discount rate (the rate at which the defendant can invest money) and the probability of future suits, constitutes a credible threat that will force the plaintiffs to demand S.

To prove this, first note that there is no "unraveling" as was seen in the perfect information situation because there is no last suit. In addition, note that the plaintiffs will clearly demand S given that the defendant will follow this strategy. It, therefore, remains to be shown that the threat is credible; i.e. that the defendant would reject a demand above S.

I will use a numerical example to illustrate this. Suppose that the damages are 100. Suppose also that the defendant's and each plaintiff's litigation costs are 50. Therefore, the settlement range in which S must lie is between 50 and 150. Finally, suppose for the moment that there will be an infinite number of future suits. The defendant must make a decision to reject or accept D.

The defendant's decision to reject D depends on his discount rate. Suppose that if the defendant accepts the demand of D, he pays D today and the present discounted value of 150 forevermore and if he rejects the demand, he pays 150 today and the present discounted value of S forevermore. The present discounted value of paying S once each period forevermore is represented by S/r (r = interest rate). Therefore, the defendant will reject the demand D if and only if:

$$150 + S/r < D + 150/r.$$

Solving for R, we get:

$$r < (150 - S)/(150 - D).$$

Now, $S < D < 150$, so $r < 1$, which is the same as $d > 1/2$, satisfies the condition for all D.

This calculation assumed that the defendant would accept 150 in all future cases if he deviated from his strategy of rejecting demands above S. This assumption is correct. The reason is that all plaintiffs are rational and have perfect information concerning the defendant's payoffs. If the defendant could re-establish his strategy without paying the penalty, then nothing stops him from deviating once more and re-establishing his reputation a second, third, or fourth time. Since he cannot make his new threat on the basis that he will be punished for deviating, then the new threat is not credible. Therefore, a rational plaintiff with perfect information will demand 150. Faced with demands of 150 regardless of his actions, it makes sense for the defendant to accept these demands and therefore the threat is credible, and the example is complete: if the defendant's discount rate is above 1/2, the defendant's threats are credible; a plaintiff faced with a credible threat of rejection of any demand above S will only demand S and the defendant's strategy is effective.

It is a simple matter to extend the example to the case where the number of future suits is indefinite but not infinite. This situation is conceptually the same as the infinite case because there is always a chance of future suits. The present discounted value of accepting a demand above S must be compared with the present discounted value of rejecting the demand: if the discount rate multiplied by the probability of future suits is above 1/2, then it will be possible.

The discount rate generally reflects the rate at which the defendant can invest money. It can also be viewed as reflecting the frequency of suits. If it will be a long time before future suits, it is less worthwhile to sacrifice profits today to achieve gain in the future. Thus, the result can be interpreted as follows: where there is perfect information and the defendant has an indefinite stream of future suits, depending on the discount value and the frequency of suits, the defendant can establish a reputation that will affect the settlement values. The discount rate limitation essentially acts as a cap on the type of repeat player (as regards the frequency of future suits) who can use this strategy.

Once again, several observations should be made about this example. First, the model under these assumptions about information predicts no litigation; every suit will be settled. Plaintiffs will always demand S and the defendant will always accept it. Only an irrational litigant would do otherwise. In order to explain the existence of litigation (as opposed to explaining the effect of reputation on the settlement value), we must turn to models of reputation based on different assumptions or models not concerned with reputation.

Second, a problem with this example is that there is a large number of strategies in equilibrium rather than just one. If the discount rate multiplied by the probability of future suits is less than 1/2, then all strategies using values of S between 50 and 150 are in equilibrium. The defendant could threaten only to accept S+1, S-1, or for that matter, only to accept any given value between 50 and 150. Even worse, the defendant could follow an apparently "bizarre" strategy such as settling only for S every other suit and settling for 2S the rest of the time, or settling for 51 every third suit and settling for 149 the rest of the time and still be acting in equilibrium with credible threats. The model under these assumptions about information, therefore, does not contain a unique strategy.[11]

Despite this indeterminacy there are good reasons to believe that the defendant will largely set the equilibrium strategy in accordance with the example. First, the defendant has much more at stake than the plaintiff in the outcome of each suit. The amount for which he settles in a particular suit affects the amount for which he can settle in future suits. Second, the cost of going to court in a particular case represents a much lower

[11] Milgrom and Roberts characterize all equilibrium strategies in their appendix.

percentage of the defendant's total costs than of each plaintiff's. Thus the defendant may be more willing to go to court in a particular case. If it is the defendant who largely picks the equilibrium strategy, then the multiplicity of equilibrium strategies should not bother us, as the defendant will surely pick the strategy most favorable to himself.

In addition, while the large number of equilibrium strategies destroys the mathematical neatness of the example, it still gives us important information about reputation: where there is uncertainty about the number of suits that will be brought in the future, the defendant can influence the settlement values. Reputation, while impossible with perfect information, is possible where there is uncertainty concerning the number of suits and therefore reputation is a function of uncertainty.

However, the same problems that plague the model with perfect information are inherent to the model with uncertainty as to the number of suits: the extraordinary degree of rationality and confidence required by the plaintiffs (in this case to prevent the defendant from redeveloping his reputation after he accepts a demand above S). Suppose the defendant, after deviating from the strategy and accepting 150, rejected the next twenty demands of 150 in a row. Would the twenty-first plaintiff, in reality, still demand 150? It seems likely that the plaintiffs would begin to doubt their information that tells them that it is rational for the defendant to accept such demands. In this example, the plaintiffs must know, without doubt, the defendant's payoffs and they must know that all other plaintiffs know this as well. Given that each plaintiff may not even know whether future suits exist, it is extremely improbable that they would have this information. The assumptions about information and behavior, therefore, are unrealistic and the existence if the equilibria where reputation affects settlement values relies heavily on these assumptions and hence the example may have limited application.

It may be possible to rejuvenate this example in more intuitive, less formal terms. It is possible to imagine a defendant telling a particular plaintiff that it is impossible to settle this suit on certain terms because everyone in the future will know the terms, even if there are attempts to keep it quiet. This may happen even if the plaintiff knows that the defendant could settle this suit for more were it a single-suit. It is also believable, intuitively, that a plaintiff would follow this threat if it is clear that there are future suits which will be affected by the settlement value and this is exactly what this example is attempting to capture. Logically, it relies on fairly strong beliefs by the plaintiffs concerning future plaintiffs actions, but intutively, it makes sense.

In any event, the third example is designed to avoid problems with unrealistic beliefs. In this case, the plaintiffs are unsure of the defendant's payoffs, and therefore the defendant's behavior in the past influences their beliefs. This means that if the defendant were to appear to act irrationally, such as by rejecting 20 reasonable demands in a row, the plaintiffs would adjust their beliefs appropriately. It is the effect on beliefs on future parties concerning the likely behavior of the repeat player that captures the intuition of reputation.

IV. The Case Where the Defendant's Payoffs are Not Known for Certain

Consider the case where the plaintiffs are uncertain about the payoffs of the defendant they are facing rather than about the number of the suits. Uncertainty about the defendant's payoffs may come about because the plaintiffs do not know the internal cost structure of the defendant. Alternatively, they may not know the defendant's attorney's fees, the defendant's agenda, or even whether the defendant is entirely rational. As noted above, it is unlikely that the plaintiffs have perfect information regarding future suits, and therefore this assumption is realistic.

When there is uncertainty concerning the defendant's payoffs, plaintiffs will base their belief concerning the defendant's payoffs on their initial assumptions and on their observations of past behavior by the defendant. Each plaintiff will make a demand that maximizes expected return based on this belief. Knowing this, the defendant can lower the plaintiffs' demands by acting in a manner that influences their beliefs as to his payoffs. In addition, even plaintiffs who are fairly sure of the defendant's payoffs can be forced to make low demands because the defendant can credibly threaten to reject reasonable demands on the basis that he must do so in order to affect other, future plaintiffs' beliefs. By acting in this manner, dependent on the amount of uncertainty and the number of suits, the defendant can create a reputation that will affect settlement amounts.

Because the mathematical details of the model under these assumptions are complex and not of general interest, I will only explain the general method by which the equilibrium is established and concentrate instead on the implications of the model. A formal, explicit example is given in the Appendix.

The example is fairly straightforward in concept. First, a simplifying assumption regarding the uncertainty about the defendant's payoffs is must be made. The defendant is allowed to have only two possible sets of payoffs, each with a different maximum settlement value. The plaintiffs are unsure about which set of payoffs a particular defendant has. Plaintiffs will think the defendant is "tough" if they believe his maximum settlement value is the lower of the two possible values; they will think the defendant is "weak" if his maximum settlement value is the higher of the two values. As omniscient observers, we know the defendant's true payoffs, which make him weak, but the plaintiffs believe that there is a positive chance that he is tough.[12]

[12] The case where the defendant is actually tough is straightforward. The defendant would simply reject any demand over his maximum settlement amount and accept any demand lower than this amount. The plaintiffs would always demand the defendant's maximum settlement amount.

For the purposes of example, assume that if the defendant is weak then he will settle for 150. If the defendant is tough, then he will settle for no more than 100. Just as the example given in the previous model, the value of the suit, if tried, is 100, and the plaintiffs' litigation costs are 50.

In this case, each plaintiff will make one of only two settlement offers: 150 or 100. The plaintiffs will never offer some value between 100 and 150, because if the defendant is tough, he will still reject it, and if the defendant is weak, he will accept a higher demand. The plaintiffs will never demand something less than 100 because 100 will surely be accepted and the plaintiffs prefer 100 to something less than 100.

Given the past history of the lawsuits, each plaintiff will calculate the probability that the defendant will reject the demand based on their belief that the defendant is weak and the probability that a weak defendant will act tough. Each plaintiff will then make the demand that maximizes their expected outcome. For example, if the probability that the defendant is weak is 3/4, and the probability that a weak defendant will litigate a demand of 150 (so as to "act" tough) is 2/3, the expected outcome of a demand of 150 is:

$$\text{prob(rejection)} \times 50 + \text{prob(acceptance)} \times 150 =$$

$$(3/4 \times 2/3 + 1/4) \times 50 + (3/4 \times 1/3) \times 150 = 75.$$

The expected outcome if the plaintiff demands 100 is 100, which is greater than 75, so the plaintiff will demand 100.

Now, if the defendant wishes to take advantage of this uncertainty, he must act in a manner that causes some plaintiffs to demand 100 when they otherwise would have demanded 150. This can be done in two related ways: the defendant, by acting tough, can influence the plaintiffs' beliefs as to his type; and the defendant can make the plaintiffs fear that regardless of his type, he will act tough so as to influence future plaintiffs' beliefs. Using these factors and knowledge of how they will effect the demands, the defendant can carefully develop a strategy that will maximize his expected outcome.[13] Under this strategy, the defendant credibly threatens plaintiffs to reject high demands and thereby effects settlement values.

Once this strategy is communicated to the plaintiff, the plaintiff will make a demand which depends on his beliefs and on the number of future suits. As the number of future suits decreases, the value to the defendant of acting according to his reputation goes down and therefore the plaintiffs become less

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[13] This strategy cannot always be a simple strategy of rejecting all demands of 150. To see this, suppose that the plaintiffs' beliefs were such that if the suits were taken alone, each plaintiff would demand 150 and suppose that the defendant adopts this strategy. The plaintiffs would not change their beliefs concerning the defendant because regardless of whether he is tough or weak, he will reject demands of 150 and therefore when the defendant rejects 150 the plaintiffs have no new information upon which to change their beliefs. The last plaintiff, who is in a single-suit situation, will then demand 150. The second to last plaintiff will also demand 150 because the last plaintiff cannot be influenced. The third, fourth and n^{th} plaintiff similarly demand 150. Just as with perfect information, the equilibrium unravels. Therefore, the defendant cannot always reject demands of 150. The strategy must be more complex: the defendant must reject demands of 150 only with some positive probability.

concerned about the defendant acting to influence future beliefs and more concerned about their own beliefs concerning the defendant.

A numerical example can help illustrate this. Suppose the plaintiffs initially think there is a one percent chance that the defendant is tough and that there are twenty plaintiffs. Formal analysis shows that the first 14 plaintiffs will demand 100 because of fear that the defendant will act tough to influence future plaintiffs. The final six plaintiffs, because there are fewer future rounds, may demand either 150 or 100 depending on their beliefs about the defendant's type and their beliefs about how the defendant will act. In the last suit, the plaintiff will determine the probability that the defendant is tough or weak and make the value maximizing demand without regard to any future suits. In this manner, the defendant creates a strategy that influences settlement values.

Once again, there are several observations that should be made. First, the simplification of allowing only two possible settlements created an arbitrary value, namely the tough defendant's maximum settlement value. The tough defendant could easily have had a maximum settlement value of 99 or 101 rather than 100. The equilibrium works well if the two parties agree that the defendant has one of two sets of payoffs, but in fact, the center of disagreement is likely to be this very point. The value of the threat is ultimately determined by the ability of the defendant to convince that plaintiff that the threat is a possible value for a tough defendant and therefore the value is determined by the type of imperfect information. If the imperfect information is only about externally imposed costs, such as the cost of an attorney, then the defendant may not be able to threaten at a very low value because the cost is easily estimated. If, however, the plaintiff believes that the defendant has unknown, internal stakes or derives unknown benefits from litigation, then the defendant may be able to set a lower value. Thus, this model tells us that under certain conditions, it is possible to establish a reputation; the exact behaviors, however, are determined by the type of asymmetric information, which is an empirical question determined in part by the behaviors of the parties.

Another important aspect of this case is that reputation can exist even where there is very little uncertainty. That is, for any positive probability p that the defendant is weak, we can find a T, such that if there are T plaintiffs, the defendant will surely reject a demand of 150 in the first suit and the first plaintiff, therefore, will demand 100. In addition, if there are more than T plaintiffs, all plaintiffs before the last T plaintiffs will demand 100. As noted above, with a 1 percent probability that the defendant is tough, only 7 plaintiffs are needed so that the defendant will surely reject 150 in the first suit, and if there are 20 plaintiffs, the first 14 will also demand 100. Even a very tiny amount of uncertainty will create this effect with a small number of suits. Because such small failures in information can still create the equilibrium, this model should have wide application.

Under these assumptions about information, the model does predict litigation. Once there are few enough future suits so that the plaintiffs do not simply demand 100 (in the example, the final six plaintiffs), each plaintiff will follow a "mixed strategy:" he will sometimes demand 100 and sometimes demand 150. When the plaintiff demands 150, the defendant will also follow a mixed strategy and if the defendant chooses to reject the demand, then there is litigation. Interestingly, litigation only occurs as the number of suits dwindles. It is difficult to say without further investigation whether this is empirically correct: it may be true that litigation is likely in early suits for other reasons such as to establish the law under which all similar suits will be governed.

The example given here used a slightly more general information failure than is actually needed. Milgrom and Roberts, in the context of predation, established that a similar equilibrium exists when the plaintiffs lack "common knowledge" of the defendant's payoffs. (Milgrom and Roberts). "Common knowledge" simply means that each plaintiff, while perhaps sure of the defendant's payoffs, is not sure that all the other plaintiffs know the defendant's payoffs. When there is not common knowledge, a given plaintiff who may know the defendant's payoffs may still fear that the defendant will reject a high demand to influence other plaintiffs who this plaintiff is not sure know the defendant's payoffs. With this uncertainty, the defendant can develop a strategy that can influence the plaintiffs' demands much like the defendant's strategy when the plaintiffs are uncertain as to his payoffs. In any realistic setting the plaintiffs will almost certainly lack such common knowledge.

This example captures certain aspects of reality missed by the previous two cases. In this example, reputation concerns acting to influence somebody's beliefs as to your future behavior. This fits intuition well. This example also does not require the plaintiffs to base their behavior on the obstinacy of future plaintiffs. The objection to the model under the previous assumptions about information was that because of assumptions about information, the plaintiffs would know with certainty how future plaintiffs would act. This is precisely the assumption that is dropped here. Finally, this example is sensitive to the type of information possessed by the parties in that the settlement range is determined by the plaintiffs knowledge of the defendant's payoffs. Again, this is intuitively plausible. This example, therefore, predicts that a reputation for being tough is feasible under almost universal conditions and with plausible predictions about behavior.

V. Conclusion

The model presented establishes that reputation can be an important factor in the decision to settle a suit. Unless there is perfect information, a finite number of suits, and rational parties who know the other side to be rational, it may be possible for a repeat player to establish a reputation that influences settlement amounts.

There are several implications and possible extensions of this model. The effect of reputation on settlement values raises serious questions about the deterrent effect of lawsuits against a repeat player. If a repeat player can frequently settle for less than the actual damages, there may be under-deterrence. However, this in only a preliminary observation. Factors such as punitive damages, transaction costs, class actions, and risk aversion, among others, will affect the settlement value and therefore, this conclusion. At most, we can say the reputation should play a part in the determination.

Second, it may frequently be the case that both parties are repeat players. One reason for this is that lawyers hired by single-suit parties are often repeat players within their communities. Explicitly modeling this situation is considerable more complex than where there is only one repeat player, but it has been done in the context of predation. (Kreps and Wilson). The results are similar to the situation presented here.

Finally, there is more work to be done on the effects of reputation on the litigation-settlement decision. Models based on reputations for honesty or cooperation may show that these traits are as effective for a repeat player as acting tough. In addition to helping scholars understand these decisions, such models may have implications for behavior by parties to a suit.

APPENDIX

The model that is the basis of each proposition is as follows: the defendant is a repeat player; the plaintiffs are all single-suit litigants and are all identical; the value of the suits are all the same; and the defendant has a discount rate for future suits. Each plaintiff makes a take it or leave it demand to the defendant. S is the value of the suit, c_d is the defendant's litigation costs, c_p is each plaintiff's litigation costs, and δ is the defendant's discount rate where $\delta = 1/(1+r)$, r = interest rate. Clock time backwards, so that the last suit is t=1 and a T-suit "game" has t=T as the first suit. Finally, assume that the parties, if they are presented with a position in which they are indifferent between litigation and settlement will choose settlement.

As discussed in the body, to be realistic, reputation must be based on credible threats. It is therefore required that the equilibrium consist of a set of strategies such that given any past history of litigation, the strategies are optimal for all future litigation and such that the beliefs of the parties are accurately based on their initial beliefs and the history of the lawsuits. Such an equilibrium is a "sequential equilibrium."

Proposition 1: Where there is perfect information and a known, finite number of suits, it is a unique sequential equilibrium for each plaintiff to demand $S+c_d$.

Proof: By induction on T, the number of suits.

Let T=1. This is the case where both parties are single suit litigants. The plaintiff will maximize his expected return by demanding $S+c_d$ because the defendant will surely accept this and will never accept anything higher. Therefore, the plaintiff will make this demand.

It remains to be shown that it is true for T=t+1 given that it is true for T=t. This is true because the defendant will accept a demand of $S+c_d$ in the t+1 suit as by assumption there is no way of affecting the demand in suit t. Therefore the plaintiff will maximize expected return by demanding $S+c_d$.

Q.E.D.

Proposition 2: When there are an infinite number of suits and the defendant's discount rate is greater than 1/2, then for any x, $S-c_p < x < S+c_d$, the following strategy constitutes a sequential equilibrium:

> **For the defendant: accept anything less than or equal to x, so long as in past suits, no demand greater than x has ever been accepted; otherwise accept any demand less than $S+c_d$.**
>
> **For the plaintiffs: if no demand greater than x has ever been accepted, then demand x; otherwise demand $s+c_d$.**

Proof: The strategies clearly constitute the best response given that the other party is going to follow their stated strategy. All that remains to prove is that the strategies are optimal if the other party deviates from the strategy. Suppose a plaintiff deviates and offers y>x. Defendant must either accept or reject y. Defendant will reject y and therefore follow the stated strategy if and only if:

$$S+c_d + x/r < y + (S+c_d)/r$$

Solving for r:

$$r < (S+c_d-x)/(S+c_d-y)$$

Since $x < y < S+c_d$, the inequality is always satisfied when r <

1, which is equivalent to $\delta>1/2$. If the defendant deviates and accepts $y>x$, then it is clearly optimal for future plaintiffs to demand $S+c_d$. Q.E.D.

Corollary: Where the probability of the existence of future suits is p and where $d*p > 1/2$, the strategies above constitute a sequential equilibrium.

Proof: Compute the expected values of settlement or rejection a demands above S based on p and d. Q.E.D.

Finally, consider the case where the plaintiffs are unsure of the defendant's maximum settlement value. Suppose the defendant has only one of two possible maximum settlement values and is correspondingly weak or tough. To reduce notational complexity, say the defendant's possible maximum settlement values are 150 and 100. Let D_W be the defendant if he is weak in that he will settle for 100. Let the plaintiffs think the defendant is weak with probability p and tough with probability 1-p. Let π_t be the plaintiff in suit t. I will show that no matter how small the probability that the defendant is tough, if there are enough suits, there is a sequential equilibrium where the plaintiff in the t=T suit demands 100.

Proposition: If $p < 1-1/2^T$, then there is a sequential equilibrium in which π_T will demand 100.

Proof: I will find a relationship with the required properties between T and the plaintiff's demand in suit T by induction on T.

T=1: I show that if $p < 1/2$, the plaintiff will demand 100; otherwise, the plaintiff will demand 150. If the plaintiff demands 150, then there is a p chance that the demand will be accepted and a (1-p) chance of rejection. Therefore, the expected value is 150p + 50(1-p). A demand of 100 will surely be accepted, so the required condition for demanding 100 is:

$$150p + 50(1-p) < 100 \text{ or}$$

$$p < 1/2.$$

Therefore, for p < 1/2, T must be at least 1 for plaintiffs to demand 100.

T=2: Assume p > 1/2. (Otherwise, both plaintiffs will demand 100.) First I show that it is not optimal for the defendant always to reject or always to accept demands of 150.

1. Suppose that D_w decides always to fight demands of 150. Then prob(weak/fought at t=2) = p > 1/2.[14] But p > 1/2 means that π_1 demands 150. So D_w will not always fight demands in the first suit as he cannot influence the demand in the second suit.

2. Suppose that D_w decides always to settle. Then prob(weak/fought at t=2) = 0 < 1/2. This means that π_1 demands 100 if he sees litigation in the first suit. But then D_w should litigate in the first suit if the demand is 150 because 150 + 100 < 150 + 150. Therefore, D_w will not always settle.

Thus, the strategies must be such that D_w sometimes litigates and sometimes settles demands of 150 at t=2, and P_1 sometimes demands 150 and sometimes demands 100 at t=1, given that there was litigation at t=2. That is, there must be "mixed"

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[14] The notion prob(a/b) is used to stand for the probability that event "a" occurs given that "b" is true or has already occurred.

strategies. In order to achieve these "mixed" strategies, it must be the case that the party who is mixing is indifferent to the choices he faces. (If he were not, then he would always pick the choice he prefers.)

Let q_2 = prob(D litigates at t=2 given D is weak). (We have just shown that q_2 is not 0 or 1.)

As noted above, in order for P_1 to mix, he must be indifferent to demanding 100 and demanding 150. Therefore, having observed litigation in the prior suit, P_1 must believe that the defendant is tough with probability 1/2 or, in other words, prob(weak/litigated at t=2) = 1/2. Applying Bayes' rule:

$$1/2 = \text{prob(weak/litigated at t=2)} =$$

$$\frac{\text{prob(weak)prob(litigates/weak)}}{\text{prob(weak)prob(litigates/weak) + prob(tough)}} =$$

$$pq_2/[pq_2 + (1-p)].$$

Solving, we get $q_2 = (1-p)/p$.

Finally, note that q_2 is the probability that a weak defendant litigates a demand of 150 at t=2. The probability that a demand of 150 is rejected by any defendant at t=2 is:

$$\text{prob(litigates at t=2/demand of 150)} =$$

$$\text{prob(tough) + prob(weak)prob(litigates/weak)} =$$

$$(1-p) + pq_2 =$$

$$(1-p) + p(1-p)/p = 2(1-p).$$

Now, π_2 demands 150 only if this is less than 1/2, and demands 100 otherwise. Therefore, π_2 demands 100 if (1-p) > 1/4.

So we have:

$T = 1$, π_1 demands 100 if $p < 1/2$; and

$T = 2$, π_2 demands 100 if $p < 3/4$; and which finishes the two-suit situation.

The proof for an arbitrary number of suits is completed by showing that π_T demands 100 if $p < 1-1/2^T$. This is shown by assuming that it is true for n-1 suits and then proving that it therefore is true for n suits.

Let p_n = prob(litigates at t=n/weak). Assume that π_{n-1} demands 100 only if prob(D is tough/fought at t=n) > $1/2^{n-1}$. Setting this to equality, so that π_{n-1} is indifferent, and using Bayes' Rule, we get:

$$1/2^{n-1} = p/[p + (1-p)p_n].$$

Solving for p_n:

$$p_n = (2^{n-1} - 1)p/(1-p).$$

So the probability that π_n faces litigation is he demands 150 is:

$$\text{prob(litigation/demand or 150)} =$$

$$p + (1-p)(2^{n-1} - 1)p/(1-p) = 2^n p.$$

Therefore, π_t demands 100 if $p < 1 - 1/2^t$. For any probability less than one that the defendant is weak, we can now find a T such that in the t=T suit, the plaintiff will be intimidated into demanding only 100 and the proof is complete.