The role of nonbinding alternative dispute resolution in litigation

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Abstract

This paper analyzes pretrial mediation, in which a panel estimates the value of the plaintiff’s claim. Each party must decide whether to accept or reject the resulting award. If either party rejects, the case proceeds on toward trial; however, most cases are ultimately settled. We develop and then test a model in which each party has private information about the claim, but the mediation panel does not. The model predicts (1) the probability that each party accepts or rejects the mediation award, and (2) if the award is rejected and the case is later settled, how the settlement payment compares to the mediation award. ©2000 Elsevier Science B.V. All rights reserved.

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1. Introduction

In recent years there has been a rapid growth of interest in, and use of, various methods of alternative dispute resolution. These methods include arbitration, mediation, abbreviated trial procedures, and even rent-a-judge programs. The common characteristic of these methods is that a third party offers an opinion or provides information about a dispute to the litigants.

This paper analyzes pretrial mediation. In this procedure a mediation panel offers an opinion of the value of the plaintiff’s claim. The rules of mediation examined here apply to medical malpractice litigation in Michigan. As explained below, the essential
features of these rules are used in civil litigation of all kinds, in many State and federal courts.\footnote{As of 1988, 22 States and the District of Columbia had some type of court-annexed arbitration program for civil claims (Bernstein (1993), p. 2252, n. 3). A number of federal statutes have authorized the creation or expansion of nonbinding arbitration programs in federal district courts. A 1990 report by the Federal Courts Study Committee recommended that Congress “broaden statutory authorization for local rules for alternatives and supplementary procedures in civil litigation, including rules for fee and cost incentives” (Bernstein (1993), pp. 2253–2254).}

After a legal claim is filed in court, it must go through mediation before it can go to trial. Each party, plaintiff and defendant, presents its case to a panel of five persons, which evaluates the claim and proposes an appropriate award (if any) for the plaintiff. Each party then decides whether to accept or reject the award. If they both accept, the case is resolved, and the defendant pays the plaintiff the amount of the award. If either party rejects, the case proceeds on toward trial.\footnote{In Michigan, unlike the situation in many other states, the mediators’ evaluation may not be introduced into evidence at trial (M.C.L.A. 600.4919(4)).} It should be noted that each party must submit its response to the mediation award without knowing the response of the other party (a failure to respond within the prescribed period is considered a rejection).\footnote{Immediately after the responses have been received from both parties, the mediation panel informs both parties of the response of the other party. Thus a party, say a defendant, who files an acceptance knows that if the other party (the plaintiff) does not accept, she will learn that the defendant was willing to accept the amount of the mediation award. Some defendants’ lawyers told us that this potential consequence is not taken lightly, since the mediation award then becomes ‘the new minimum’ in subsequent settlement negotiations.}

An important feature of this procedure is that a penalty is imposed on a party who rejects the mediation award unless the party is able to improve its position at trial. A party who rejects the mediation award must pay the costs of the opposing party unless the trial verdict turns out to be ‘more favorable’ to the rejecting party than the mediation award.\footnote{Here we are simplifying matters just a little for the sake of exposition. As indicated in the text ahead, if the opposing party has also rejected the mediation award, that party is entitled to costs only if the verdict is ‘more favorable’ to that party than the mediation award.} The verdict is considered ‘more favorable’ to the plaintiff if it is more than 10 percent above the mediation award, and ‘more favorable’ to a defendant if it is more than 10 percent below the mediation award.

The basic features of Michigan’s mediation program are found in many court-annexed arbitration programs in both state and federal district courts. In courts which have such programs, claims generally must be submitted to nonbinding arbitration before a trial can be requested. Typically, as in Michigan, the arbitration hearing is much briefer and more informal than a trial; the usual rules of evidence do not apply. Either party can, by requesting a trial, decline to accept the arbitration award. In many jurisdictions, as in Michigan, the arbitration panel’s decision is not admissible at trial. Often a penalty is imposed on a party who has requested a trial if he fails to improve his position at trial.\footnote{Many states have a rule that requires a party who requests a trial to pay her opponent’s post-arbitration attorneys’ fees, costs, or both if she fails to improve her position at trial. In some states the party who requests a trial is required to pay the cost of arbitration if she does not improve her position at trial. Bernstein (1993) (2264, n. 58) describes specific cost-shifting provisions in Arizona, California, Colorado, Florida and Hawaii. A 1990 report by the Federal Courts Study Committee recommended that federal districts that were participating in a pilot program on nonbinding arbitration should experiment with fee and cost-shifting provisions (Bernstein (1993), 2264).} Thus the analysis...
of Michigan’s mediation program has implications for court-annexed arbitration programs throughout the United States.

One objective of this paper is to develop a theoretical model which will predict (1) how often each party will accept or reject the mediation award, and (2) assuming the case is subsequently settled, how large the settlement payment is in comparison to the mediation award. Our primary objective, however, is to test the predictions of the model against data, and to consider possible explanations for the manner in which the data diverge from the predictions of the model. We have a data set that reports for each of 477 cases the mediation award, the responses of both parties to the mediation award, and the settlement payment or trial verdict, so we are able to compare the theory with the evidence.

In our model the parties to a lawsuit each have private information about the value of the claim. Each party must decide whether to accept the award of a mediation panel (which makes its decision without such information), or instead proceed on toward trial. In making this decision, each party takes into account the possibility of paying or being paid a penalty that is imposed on a party who makes an unwarranted rejection of the mediation award (our model incorporates the actual rule of State law which imposes this penalty). In the event the mediation award is not accepted by both parties, the case proceeds on toward trial. We assume, however, that before the trial can occur, all information about the claim becomes public knowledge, and the case is then settled.

Our model yields a predicted distribution of expected court awards and resulting settlement payments given each of the three permutations (plaintiff accepts, defendant rejects), (plaintiff rejects, defendant accepts), and (plaintiff rejects, defendant rejects). Each such distribution can then be compared to the mediation award made in the case.

Very little work seems to have been done in this area. There is a literature that examines the social costs and benefits of alternative dispute resolution. For the most part this literature concerns the effect of these procedures on settlement, or more broadly, on the total costs of litigation (a subsidiary theme is their effects on nuisance suits and small claims). For example Shavell (1995) examines the effects of required nonbinding alternative dispute resolution on the frequency of lawsuits, on whether the parties to lawsuits settle or go to trial, and on the aggregate costs of litigation.

The thrust of this paper is quite different. Our objective is to arrive at a better understanding of the bargaining process between the parties, in litigation in which there is required but nonbinding alternative dispute resolution. Toward that end, we have developed a model that yields implications about the relation between mediation awards and settlement payments, given the response of each party to the mediation award.

Finally, we examine how the data diverge from the predictions of the model, and consider several alternative possible explanations for these disparities. Bernstein (1993) examines a variety of factors affecting the outcome of nonbinding alternative dispute resolution, including risk aversion, the effects of fee and cost-shifting provisions of these programs, the effects of lawyers’ fee arrangements, and whether parties have an incentive to manipulate the process, that are relevant to our later discussion of why the data diverge from the predictions of the model. Another study related to this paper is an empirical analysis of medical malpractice litigation by Farber and White (1991). As part of this study, they provide

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information on the parties’ responses to the mediation award. They also compared mediation awards to settlement payments, and found a positive correlation of 0.94 in levels and 0.81 in logs. We are not aware of any previous work that predicts a conditional distribution of court awards, given the response by the parties to a proposed award made by a third party, such as a mediation or pretrial screening panel.

2. A theoretical model

The theoretical model we develop is novel and, we think, interesting for its own sake, but the predictions of the model are essentially what one would expect. We suspect that most readers will be more interested in seeing how the data diverge from the predictions of the model, than they will be in the model itself. Accordingly in this section we will only set forth the assumptions of the model, explain the method of solution in general terms, and describe the results. Readers interested in the details will find a full exposition of the model in Appendix A.

We assume that the plaintiff maximizes his expected net recovery (expected trial award minus costs of litigation), and that the defendant minimizes her expected total liability (expected trial award minus costs of litigation). There is an exogenous cost of litigation for each party, which is incurred only if there is a trial. Both parties are risk-neutral. At the outset each party has private information about the value of the plaintiff’s claim, which is characterized as a random draw from a uniform (0,1) distribution. The two random variables representing the private information of each party are independent.\(^7\) The defendant is assumed to be liable, so there is uncertainty only about the amount of damages.

The mediation panel makes its award without the benefit of the information of either party. In our model the parties are subject to the provision of Michigan law that imposes costs on a party who, after rejecting the mediation award, fails to improve his position at trial. In deciding whether to accept the mediation award, each party compares the mediation award with the outcome of a trial; in evaluating the trial option, each party takes into account not only the costs of trial but also the likelihood that the penalty for an unwarranted rejection of the mediation award will be imposed. It turns out that it is optimal for the defendant to accept the mediation award if the variable representing the defendant’s information about the strength of the claim exceeds a certain threshold, which we call \(d\). In other words, if the defendant’s information is that the plaintiff’s case is strong, the defendant should accept the mediation award. Similarly, it is optimal for the plaintiff to accept the mediation award if the variable representing the plaintiff’s information is less than a threshold value \(p\), indicating that the plaintiff’s case is weak. The threshold values of \(p\) and \(d\) are determined in a Nash equilibrium. In other words, each party chooses its optimal strategy, i.e., threshold value, given its belief about the strategy of the other party, and in the equilibrium these beliefs turn out to be correct.

\(^7\)This assumption seems reasonable if, as assumed in some models, private information of the plaintiff pertains to damages, while private information of the defendant pertains to liability. See Cooter and Rubinfeld (1989). Of course the way our model is constructed the defendant is assumed to be liable (as explained in the text in the next sentence), so that the private information of each party represents uncertainty about damages.
Table 1
Probabilities of various responses to the mediation award

<table>
<thead>
<tr>
<th>$C_p$</th>
<th>$C_d$</th>
<th>$p$</th>
<th>$d$</th>
<th>Both accept</th>
<th>Both reject</th>
<th>Only plaintiff accepts</th>
<th>Only defendant accepts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual probabilities</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1) Settled cases</td>
<td>0.153</td>
<td>0.394</td>
<td>0.380</td>
<td>0.073</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2) Settled and litigated cases</td>
<td>0.136</td>
<td>0.400</td>
<td>0.390</td>
<td>0.073</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How simulated probabilities are calculated</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(A) Symmetric legal expenses</td>
<td>$(1-d)^*p$</td>
<td>$d^*(1-p)$</td>
<td>$p^*d$</td>
<td>$(1-p)^*(1-d)$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/3</td>
<td>1/3</td>
<td>0.856</td>
<td>0.144</td>
<td>0.733</td>
<td>0.021</td>
<td>0.123</td>
<td>0.123</td>
</tr>
<tr>
<td>0.300</td>
<td>0.300</td>
<td>0.812</td>
<td>0.188</td>
<td>0.660</td>
<td>0.035</td>
<td>0.152</td>
<td>0.152</td>
</tr>
<tr>
<td>0.275</td>
<td>0.275</td>
<td>0.778</td>
<td>0.222</td>
<td>0.605</td>
<td>0.049</td>
<td>0.173</td>
<td>0.173</td>
</tr>
<tr>
<td>0.250</td>
<td>0.250</td>
<td>0.742</td>
<td>0.258</td>
<td>0.550</td>
<td>0.067</td>
<td>0.192</td>
<td>0.192</td>
</tr>
<tr>
<td>(B) Asymmetric legal expenses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/3</td>
<td>0.300</td>
<td>0.844</td>
<td>0.173</td>
<td>0.698</td>
<td>0.027</td>
<td>0.146</td>
<td>0.129</td>
</tr>
<tr>
<td>1/3</td>
<td>0.275</td>
<td>0.836</td>
<td>0.195</td>
<td>0.673</td>
<td>0.032</td>
<td>0.163</td>
<td>0.132</td>
</tr>
<tr>
<td>0.300</td>
<td>1/3</td>
<td>0.827</td>
<td>0.156</td>
<td>0.698</td>
<td>0.027</td>
<td>0.129</td>
<td>0.146</td>
</tr>
<tr>
<td>0.300</td>
<td>0.275</td>
<td>0.802</td>
<td>0.211</td>
<td>0.633</td>
<td>0.042</td>
<td>0.169</td>
<td>0.156</td>
</tr>
</tbody>
</table>

Note: in the simulation results reported under (A) and (B), the results for $p$, $d$, and the last four columns on the right are all determined by the assumptions made about $C_p$ and $C_d$, the costs of litigation for the plaintiff and defendant respectively.

The probabilities of the responses to the mediation award that are predicted by the model are set forth in Table 1. For comparison we include the actual frequencies of different responses computed from the data, in the first two rows. In the probabilities predicted by the model, reported in the bottom half of the table, we first assume that the costs of litigation are identical for the parties, and then relax this assumption. In Table 1 we make alternative assumptions that the costs of litigation for each party are 1/3, 0.30, 0.275, and 0.25. We include the case where costs are 1/3 since plaintiff’s lawyers often charge a contingent fee of one-third of the recovery in medical malpractice cases. We also employ assumptions that the costs of litigation are less than 1/3, since there are likely to be economies of scale in litigation for relatively large claims. Note that when the costs of litigation are symmetric, the probability that only the plaintiff accepts the mediation award exactly equals the probability that only the defendant accepts it.

In Table 1, if we reduce the cost of litigation, while keeping it the same for both parties, the probability that either party accepts the mediation award declines. This result seems quite reasonable; the option of litigation should be relatively more attractive to each party when there has been a reduction of not only the direct cost of litigation, but also of the indirect cost, which is the possible penalty for rejecting the mediation award. In the last four rows of Table 1 we examine how the equilibrium changes when the costs of litigation are asymmetric. Here we find that if the costs of litigation are higher for one party, that party accepts the mediation award more often than the other party.
2.1. How the data were obtained

We have collected data on 477 medical malpractice cases, 424 of which were settled, and 53 decided by trial, after going through mediation in a Michigan court. For each case this data set reports (1) the mediation award, (2) how the parties responded to the mediation award, and (3) the settlement payment or trial verdict. In this section we explain how we obtained these data. Those who are not interested in the details can go to the next section without loss of continuity.

We first obtained a data set from the Michigan Insurance Bureau on 21,628 medical malpractice claims, almost all of which were closed between 1978 and 1990. These data provide detailed information about the characteristics of each case, the amount of the judgment or settlement, and the manner in which the case was resolved — whether by mediation, pretrial settlement, arbitration, trial verdict, or by being abandoned by the plaintiff.

Our plan was to compare the mediation award to the outcome of the case. We thought an analysis of this kind would be most productive when based on a relatively homogeneous set of claims such as these medical malpractice cases. The Insurance Bureau data set did not report the mediation award, but did indicate the court in which the claim was filed and the case number in that court. Since we were in Michigan’s Wayne County, we selected those cases that had been filed in the Wayne County Circuit Court and sorted them in order of their case numbers. We then applied to the Chief Judge of that court, and obtained his permission to search the court files to collect data on the cases’ mediation awards. Many claims are resolved without going through mediation, either because they are never filed in court, are abandoned by the plaintiff, or are settled before reaching the stage of mediation. By collecting data from the individual case folders at the Wayne County Circuit Court, we were able to construct a data set of cases that had gone through mediation. Finally, using each case’s court number, we merged information from the Insurance Bureau’s tape, in particular the amount of the settlement payment or trial verdict, with the data on the mediation award obtained from the files of the Circuit Court. The sample thus constructed has 477 Michigan medical malpractice cases closed between 1984 and 1990.

3. The conditional distribution of settlement payments, given the parties’ responses to the mediation award

We want to compare the implications of our model to the data set described above. In order to do so, we must explain how the settlement payment is determined in our model.

The model assumes that at the time of the mediation hearing each party has private information about the case. At this stage each party’s information is incomplete, since it does not have the private information of the opposing party. However, we assume that later, when the case is settled, each party has complete information about the case. For

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8 The Honorable Richard C. Kaufman, then Chief Judge of the Third Judicial Circuit Court of Michigan. We promised Judge Kaufman that we would not disclose any confidential information about these cases.
Table 2
Probability that (settlement payment ≥ mediation award)\(^a\)

<table>
<thead>
<tr>
<th>(C_p)</th>
<th>(C_d)</th>
<th>(p)</th>
<th>(d)</th>
<th>If both reject</th>
<th>If only plaintiff accepts</th>
<th>If only defendant accepts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual probabilities</td>
<td>0.539</td>
<td>0.242 (0.099 for &gt;)</td>
<td>0.742</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Settled cases</td>
<td>(1/3)</td>
<td>(1/3)</td>
<td>0.856</td>
<td>0.144</td>
<td>0.500</td>
<td>0.10</td>
</tr>
<tr>
<td>0.300</td>
<td>0.300</td>
<td>0.812</td>
<td>0.188</td>
<td>0.500</td>
<td>0.10</td>
<td>0.90</td>
</tr>
<tr>
<td>0.275</td>
<td>0.275</td>
<td>0.778</td>
<td>0.222</td>
<td>0.500</td>
<td>0.10</td>
<td>0.90</td>
</tr>
<tr>
<td>0.250</td>
<td>0.250</td>
<td>0.742</td>
<td>0.258</td>
<td>0.500</td>
<td>0.10</td>
<td>0.90</td>
</tr>
<tr>
<td>(A) Symmetric legal expenses</td>
<td>(1/3)</td>
<td>0.300</td>
<td>0.844</td>
<td>0.173</td>
<td>0.527</td>
<td>0.131</td>
</tr>
<tr>
<td>(1/3)</td>
<td>0.275</td>
<td>0.836</td>
<td>0.195</td>
<td>0.542</td>
<td>0.152</td>
<td>0.928</td>
</tr>
<tr>
<td>0.300</td>
<td>(1/3)</td>
<td>0.827</td>
<td>0.156</td>
<td>0.473</td>
<td>0.084</td>
<td>0.869</td>
</tr>
<tr>
<td>0.300</td>
<td>0.275</td>
<td>0.802</td>
<td>0.211</td>
<td>0.515</td>
<td>0.122</td>
<td>0.911</td>
</tr>
<tr>
<td>(B) Asymmetric legal expenses</td>
<td>(0.5)</td>
<td>(0.2)</td>
<td>0.804</td>
<td>0.196</td>
<td>0.486</td>
<td>0.144</td>
</tr>
</tbody>
</table>

\(^{a}\) Note: in the simulation results reported under (A) and (B), the results for \(p\), \(d\), and the last three columns on the right are all determined by the assumptions made about \(C_p\) and \(C_d\), the costs of litigation for the plaintiff and defendant respectively.

example, suppose that the parties know the court would award \(X\) in the event of a trial. \(^9\)
In this case they would normally settle it for some amount not less than \(X - C_p\) (since the plaintiff could obtain this through litigation) but not greater than \(X + C_d\) (since the defendant would lose this through litigation). To compare the data to the model, we assume that the settlement payments generally represent \(X\), the amount the court would award in the event of litigation. \(^{10}\) We also assume that all claims that go to mediation are settled. Thus we abstract from the possibilities that a claim might instead be dropped by the plaintiff or litigated to verdict, and from issues of selectivity raised by those possibilities. In Appendix B we show that the premise that all claims are settled is neither overly restrictive, nor inconsistent with the assumption of optimizing behavior by both parties.

Table 2 sets forth the predictions of the model as to how the settlement payment compares to the mediation award, given the different possible responses of the parties to the mediation award. For comparison we report the actual conditional probabilities that the settlement payment equals or exceeds the mediation award, obtained from our data set.

\(^9\) This assumption is in no way inconsistent with the assumption of our model that each party has private information about the claim at the time of the mediation award. Between mediation and trial the parties generally acquire considerable information about the case through pretrial discovery, settlement negotiations and discussion at the settlement conference.

\(^{10}\) We are abstracting from the issue of selectivity bias, i.e., the hypothesis of Priest and Klein (1984) that claims that are settled are systematically different from those that are litigated to verdict. According to this hypothesis, claims are more likely to be litigated the more uncertain is the outcome of litigation. Thus litigation is most likely when the probability of a plaintiff victory is close to 50 percent. Our model does not deal with the issue whether to settle or litigate, and is ill suited to do so, since the uncertainty in our model relates to damages rather than liability.
Table 3
How the settlement payment compares to the mediation award, for different responses of the parties to the mediation award

<table>
<thead>
<tr>
<th>Settlement is greater</th>
<th>Settlement is equal</th>
<th>Settlement is less</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plaintiff accepts, defendant rejects</td>
<td>9.9%</td>
<td>14.3%</td>
<td>75.8%</td>
</tr>
<tr>
<td>SD = 79,411</td>
<td>SD = 49,642</td>
<td>SD = 72,400</td>
<td>SD = 69,845</td>
</tr>
<tr>
<td>Δ = 32,904</td>
<td>n = 16</td>
<td>n = 23</td>
<td>n = 122</td>
</tr>
<tr>
<td>Plaintiff rejects, defendant rejects</td>
<td>41.3%</td>
<td>12.6%</td>
<td>46.1%</td>
</tr>
<tr>
<td>SD = 167,198</td>
<td>SD = 99,867</td>
<td>SD = 215,983</td>
<td>SD = 181,225</td>
</tr>
<tr>
<td>Δ = 74,608</td>
<td>n = 21</td>
<td>n = 4</td>
<td>n = 77</td>
</tr>
<tr>
<td>Plaintiff rejects, defendant accepts</td>
<td>61.3%</td>
<td>12.9%</td>
<td>25.8%</td>
</tr>
<tr>
<td>SD = 198,278</td>
<td>SD = 54,151</td>
<td>SD = 119,858</td>
<td>SD = 159,444</td>
</tr>
<tr>
<td>Δ = 113,536</td>
<td>n = 19</td>
<td>n = 4</td>
<td>n = 8</td>
</tr>
<tr>
<td>Plaintiff accepts, defendant accepts</td>
<td>3.1%</td>
<td>84.6%</td>
<td>12.3%</td>
</tr>
<tr>
<td>SD = 65,581</td>
<td>SD = 58,570</td>
<td>SD = 47,353</td>
<td>SD = 57,405</td>
</tr>
<tr>
<td>Δ = 10,123</td>
<td>n = 55</td>
<td>n = 8</td>
<td>n = 65</td>
</tr>
<tr>
<td>Total</td>
<td>106</td>
<td>103</td>
<td>215</td>
</tr>
<tr>
<td>25.0%</td>
<td>24.3%</td>
<td>50.7%</td>
<td>100%</td>
</tr>
</tbody>
</table>

a All amounts are in 1982–1984 dollars. S is the mean settlement payment for the applicable cell. Δ is the difference between the mean settlement payment and the mean mediation award for the applicable cell.

4. Data on the actual behavior of litigants

4.1. Comparison of the settlement payment to the mediation award

We are now prepared to compare the predictions of our model to the data, set forth in Table 3. This table provides summary statistics on 424 medical malpractice cases that were settled after going through mediation in a Michigan State court. Cases are grouped according to how the parties responded to the mediation award. Within each group, the table indicates how the settlement payment compares to the mediation award.

Consider first the first and third rows of the table. In the first row, wherein only the plaintiff accepts the mediation award, our model predicts that the settlement payment will be less than or equal to the mediation award in 90 percent of the cases. It turns out that this prediction is borne out exactly by the data. In the third row, the mediation award was accepted only by the defendant. Our model predicts that the settlement will be less than or equal to the mediation award in 10 percent of these cases. While the sample is small, the data show that this condition actually holds for 39 percent of the cases, although the settlement is strictly less for only 25.8 percent. There is clearly an asymmetry in favor of defendants; they are able to obtain settlements more favorable than their mediation position 26 percent of the time, while plaintiffs do so only 10 percent of the time. The difference is highly significant (p-value=0.032).
Now consider the second row, in which the mediation award was rejected by both parties. Here the model predicts that the proportion of cases for which the settlement exceeds the mediation award will exactly equal the proportion for which the settlement payment is less. It turns out that these proportions are 41.3 percent and 46.1 percent, respectively. Again there appears to be an asymmetry in favor of the defendant, although this one does not approach statistical significance ($p$-value=0.51). It is also striking that 13 percent of the time, the case is settled for an amount which was previously rejected by both parties.

### 4.2. The difference between the parties’ rate of acceptance of the mediation award

All things considered, the model has done pretty well so far. Some other implications of the model do not fare so well. One implication was that, if costs of litigation were symmetric, the defendant would accept the mediation award as often as the plaintiff. It is, however, clear from the data that plaintiffs are more likely to accept mediation awards than defendants. In this sample the share of mediation awards accepted by plaintiffs was 53.3 percent, while defendants accepted only 22.6 percent. The null hypothesis that the rate of acceptance is the same is rejected with a $p$-value of $0 \times 10^6$. There are several possible explanations for this disparity; it may be that (1) plaintiffs are more risk-averse than defendants, or (2) their costs of litigation are larger, or (3) that mediation panels are biased in favor of plaintiffs, or (4) mediation panels are impartial, but the information presented to the panel is biased in favor of the plaintiff’s position. Another possibility is (5) a difference between the incentives of the parties’ lawyers. Lawyers for plaintiffs in medical malpractice cases almost invariably work on a contingent-fee basis, while lawyers for defendants are generally paid according to the number of hours worked. A lawyer being paid an hourly wage has an incentive to encourage his client not to accept the mediation award in order to prolong the litigation. In contrast, a contingency-fee lawyer has an incentive to encourage his client to accept a mediation award, unless he believes the award is much less than the claim’s expected value. If the mediation award approximates the claim’s expected value, as suggested by prior empirical studies, the lawyer would not expect to recoup the value of most of the time he invests in the case after mediation (Bernstein (1993) pp. 2249, 2275–2277). Shepherd (1995) found that plaintiffs’ attorneys who were paid by the hour conducted substantially more discovery than those who worked under a contingent fee agreement.

Interviews with lawyers provided some informal support for explanation (1), at least when the defendant is a physician. The lawyers informed me that the rate at which the defendant rejected the mediation award was unusually high in medical malpractice cases compared to other civil litigation. Each lawyer attributed this to the fact that at least in some cases, the defendant physician had a contractual right of control over the litigation, and was typically more inclined to deny liability and reject the mediation award than a lawyer for a hospital or insurance company would be. This could, of course, be considered a simple

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11 The chi-square statistic is 86.7 with one degree of freedom. Farber and White (1991), who had a much smaller sample (80 observations), also found that plaintiffs accepted the mediation award more often than defendants.

A case of moral hazard, since the decisions are being made by one party (the physician), while the consequences are being borne by another (the insurance company). One can easily be risk-neutral or even a risk-lover with someone else’s money.

Of all the foregoing possible explanations, the most plausible would seem to be (1) the one based on the plaintiffs’ greater relative risk aversion, and (5) the one based on the difference between the incentives of the parties’ lawyers. Both these issues are of course outside the scope of our model. With respect to (5), our model does not differentiate between lawyer and client. With respect to (1), our model assumes risk neutrality, and therefore cannot deal with risk aversion, unless greater risk aversion is interpreted as a higher cost of litigation for the plaintiff. If so interpreted, i.e. as a risk premium for certainty equivalence, it would imply the qualitative result found in the data, that plaintiffs accept mediation awards more frequently than defendants.

### 4.3. Another asymmetry

Another comparison is noteworthy: of all cases where the mediation award was rejected by the defendant, the settlement was less than the mediation award 61 percent of the time. In contrast, of all cases in which the plaintiff rejected the mediation award, the settlement exceeded the mediation award 44 percent of the time. This asymmetry is highly significant \( p\text{-value} = 0.0004 \). There is a possible explanation for this disparity that does not rely on differences in risk preferences, bargaining power, or agency problems. This explanation is based on the idea that the penalty for an unwarranted rejection of the mediation award is a greater concern for defendants than for plaintiffs. This is true because it is generally feasible, i.e., cost-effective, to collect the penalty from a defendant, but generally infeasible to collect it from a plaintiff. The plaintiff in a medical malpractice case is an individual, whereas the defendant, or at least the party who will be liable, is generally either an insurance company or a large self-insured organization. If the plaintiff is subject to the penalty, collection of the penalty is feasible only if the plaintiff wins at trial, since the penalty can then simply be subtracted from the recovery. However if the plaintiff wins, it seems unlikely he will be subject to the penalty, since the penalty provisions compare the court award, which represents the plaintiff’s full damages, to the mediation award, based only on the claim’s expected value.

Suppose there is uncertainty about liability but not about damages. Let \( q \) equal the probability that the plaintiff will win at trial, and \( X \) equal the damages if the defendant is liable. Assume that \( C_p < X \) and \( C_d < X \). Suppose the mediation award \( M \) is a random draw from a uniform distribution from 0 to \( 2qX \), with a mean equal to the claim’s expected value \( qX \). Now suppose the plaintiff follows a rule of rejecting the mediation award whenever \( M < 0.9qX \), while the defendant rejects whenever \( M > 1.1qX \). Then the plaintiff and defendant would each reject 45 percent of the time, and the award would be accepted by both 10 percent of the time. Given that the plaintiff rejected, he would be subject to the penalty whenever he lost at trial, but not if he won, since \( M < 0.9qX \Rightarrow 1.1M < qX < X \).

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13 The chi-square value is 12.5 with one degree of freedom.
The expected penalty for the plaintiff who rejects would be \((1-q)Cd\) if the plaintiff had assets that could be reached, but in fact the expected penalty is zero. Given that the defendant rejects, he will be subject to the penalty when the plaintiff wins, if \(X>0.9 M\). But then the defendant will always be liable for the penalty if \(X>0.9\cdot 2qX\) or equivalently if \(q<0.555\) (if \(q>0.555\), the defendant who rejects will be subject to the penalty a fraction of the time equal to \((1-q)/q\cdot 1.25\)). Thus the defendant who intends to reject the mediation award, unlike the plaintiff, has an incentive to manipulate the mediation process to avoid a possible penalty. The defendant could do this by deliberately botching the job of presenting its case, so that the mediation panel will overstate the expected value of the claim. Then if the case is subsequently settled, the settlement payment, which reflects the actual expected value of the claim, will tend to be much less than the mediation award. The point is that when the defendant intends to reject the mediation award, it will have a motive to manipulate the mediation process, the consequence of which is that settlement payments will be less than the mediation award. However, one should not observe corresponding behavior on the part of plaintiffs who intend to reject the mediation award. This would explain the asymmetric results described above.

4.4. The assumption that the parties act independently of each other

One implication of the assumptions used in constructing our model is that the plaintiff’s decision whether to accept the mediation award is independent of the defendant’s decision whether to do so. Let us call the plaintiff’s signal of claim quality \(X_P\), and the defendant’s signal \(X_D\) (this is the notation used in the Appendices). We assumed that the signals of claim quality \(X_P\) and \(X_D\) are independent. Since the plaintiff’s decision whether to accept turns on the value of \(X_P\), while the defendant’s decision depends on \(X_D\), those decisions are also independent. However, it is clear from Table 3 that in fact the probability that the plaintiff will accept is not independent of the probability that the defendant will do so. The null hypothesis of independence is rejected with a \(p\)-value of 0.0019. One would expect these probabilities to be negatively correlated, since a mediation award that strikes one party as attractive is likely on that account to be unattractive to the other party. However, it turns out that the decision by each party to reject is positively correlated. The conditional probability that the plaintiff rejects is 0.32 if the defendant accepts, and 0.51 if the defendant rejects. This may reflect the belief that it is important to counter a ‘tough guy’ strategy adopted by the other party. If one party acts intransigent, the other party may find it expedient to be just as unreasonable. Shepherd (1995) found that defendants who believe

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14 Two lawyers informed me that in these cases it is a common practice for the defendant to waive its right to collect the penalty, in exchange for a promise from the plaintiff to forego the right to appeal the adverse decision of the trial court. Interviews with Geoffrey L. Gillis and Michael McFerren, September and October 1998.

15 Bernstein (1993) stresses the possibility that a party will manipulate the ADR process, by presenting a weak case in order to avoid sanctions for rejecting the ADR award (Bernstein (1993) p. 2301, n. 172; p. 2307 n. 200, and p. 2381 n. 238).

16 The chi-square value is 9.6 with one degree of freedom.

17 It is true that under Michigan rules each party must decide whether to accept the mediation award without being notified of the response of the other party. Nonetheless a party can inform the other party of its intent not to accept the award, or can telegraph that intent in many ways, e.g. through behavior at the mediation hearing, demands made in settlement negotiations, etc.
the plaintiff is conducting excessive pretrial discovery will retaliate by conducting more discovery.

Having reviewed all the behavior that is not explained by our model, we wish to point out the contribution that the model does make. Our model in effect offers an explanation for the fact that a party can obtain a settlement on terms more favorable than those he has already accepted in mediation. According to our model, this outcome occurs because the settlement reflects the penalty that would be imposed on the party who rejected the mediation award in the event of litigation. There are other possible explanations. For example, it is possible that after mediation the parties could obtain new information, not previously available to either of them, which could change their opinions about the expected outcome of a trial. Our model does not rely on this type of change in the information set.

5. Comparison of the trial verdict to the mediation award

Up to this point we have made a comparison only of settlement payments and mediation awards. In Table 4, however, we provide a comparison of trial verdicts and mediation awards, with cases grouped according to how the parties responded to the mediation award.

It is immediately striking how poorly plaintiffs do at trial. Plaintiffs obtain a verdict less than the mediation award in 83 percent of cases, and the verdict is in fact zero 60 percent of the time. Thus, relative to the mediation award, plaintiffs do considerably worse at trial than they do in a settlement agreement. Now we already know that cases going to trial are not a random sample of all the cases that go through mediation, since they do not include cases in which both parties have accepted the mediation award. If we therefore exclude from Table 3 the 15.3 percent of cases that were accepted by both parties, shown in the fourth row, the percentages for the first three rows of the table become 44.8 percent, 46.5 percent, and 8.6 percent, respectively, which are virtually the same as the percentages for the corresponding rows of Table 4: 47.2, 45.3, and 7.5. Table 4, however, suggests that the cases that go to trial are not a random sample of the remaining cases that have gone through mediation, since the plaintiffs fare so poorly. The implication is that the cases that go to trial are drawn disproportionately from claims that are weak — for reasons that were not known to the mediation panel, since the weakness of the claim was not reflected in the mediation award.

It appears that plaintiffs would be liable for the penalty for an unwarranted rejection of the mediation award in all four cases in row 3 of Table 4 (in which plaintiff rejects and defendant accepts) and in the 23 cases in row 2, column 3 (in which both parties reject). 18 It is noteworthy that in 19 of these 27 cases — 70 percent — the plaintiff obtained a verdict of zero, making it rather unlikely that the defendant would be able to collect the penalty. This result tends to reinforce the conclusion reached earlier, that the penalty is much more of a concern for defendants than for plaintiffs.

18 Although in these cases both parties rejected the mediation award, all of these verdicts (including the positive verdicts) are at least 10 percent less than the mediation award, so the plaintiff is liable notwithstanding the fact that the defendant also rejected.
Table 4
How the trial verdict compares to the mediation award, for different responses of the parties to the mediation award

<table>
<thead>
<tr>
<th></th>
<th>Verdict is greater</th>
<th>Verdict is equal</th>
<th>Verdict is less</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plaintiff accepts, defendant rejects</td>
<td>28.0%</td>
<td>72.0%</td>
<td>n=25</td>
<td>13.2%</td>
</tr>
<tr>
<td>n=7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$V_p = 248,602$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\Delta p = 162,373$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plaintiff rejects, defendant rejects</td>
<td>4.2%</td>
<td>95.8%</td>
<td>n=24</td>
<td>9.8%</td>
</tr>
<tr>
<td>n=1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$V_p = 43,229$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\Delta p = 0$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plaintiff rejects, defendant accepts</td>
<td>25.0%</td>
<td>75.0%</td>
<td>n=4</td>
<td>7.5%</td>
</tr>
<tr>
<td>n=1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$V_p = 52,746$</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>$\Delta p = 50,452$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\Delta z = 99,524$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>13.2%</td>
<td>3.8%</td>
<td>83.0%</td>
<td>100%</td>
</tr>
<tr>
<td>n=7</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>$V_p = 248,602$</td>
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</tr>
<tr>
<td>$\Delta p = 162,373$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* All amounts are in 1982–84 dollars. n is the total number of trial verdicts, and $n_{zero}$ is the number of zero verdicts. $V_p$ is the mean of the nonzero trial verdicts for the applicable cell. $\Delta p$ is the difference between the mean of the nonzero trial verdicts and the mean mediation award for such verdicts for the applicable cell. $\Delta z$ is the mean mediation award for all trial verdicts of zero for the applicable cell.

On the other hand, it is somewhat surprising that in 30 percent of the cases where the plaintiff is liable for the penalty the plaintiff has a positive recovery. Recall our previous conjecture that if the plaintiff wins it is unlikely he would be subject to the penalty, since the penalty provisions compare the court award, which represents the plaintiff’s full damages $X$, to the mediation award, which represents only the claim’s expected value $qX$. Here, however, there are nine cases in which the plaintiff rejects the mediation award but ‘wins’ by obtaining a positive recovery, and yet the plaintiff is liable for the penalty in all but one case! It must be that either (1) mediation panels are grossly overestimating the value of these claims (a circumstance which would by itself encourage litigation), or (2) courts are not in fact awarding full damages after deciding that the defendant is liable. Rather they are discounting damages to reflect doubts about liability, and to that extent are moving toward an award of expected value rather than full damages.

6. Summary and conclusion

This paper develops a model in which the parties to a lawsuit each have private information about the value of the claim. Each party must decide whether to accept the award of a
mediation panel (which makes its decision without such information), or instead proceed on toward trial. In making this decision, each party takes into account the possibility of paying or being paid a penalty which is imposed on a party who makes an unwarranted rejection of the mediation award. Since we intend to test the model against data from Michigan, the model incorporates the rule of Michigan law which imposes this penalty.

Given the costs of litigation, the model predicts the probability of each permutation of possible responses of the parties to the mediation award, and the distribution of expected court awards for each possible response. We then compare the predictions of the model to the data. We make the strong, but not unreasonable, assumption that the amount paid in settlement represents the expected value of the claim in litigation. If, however, one of the parties would be liable for costs in the event of litigation, we further assume that this potential liability is reflected in the settlement.

The model performs quite well in some respects but not in others. In general, we find that the data depart from the model because of asymmetries in favor of the defendant. Plaintiffs accept the mediation award far more often than defendants. In addition, defendants obtain settlements more favorable than a mediation award they accepted more than twice as often as plaintiffs do. Of all the possible explanations for these results, the most promising candidates are that (1) plaintiffs are much more risk-averse than defendants, or (2) since lawyers for plaintiffs, but not those for defendants, work under a contingent fee agreement, they have a greater incentive to encourage their clients to accept the mediation award. One reason why defendants might be less risk-averse than plaintiffs is moral hazard; in cases where a defendant physician has the right to control the litigation, he can make decisions without having to bear the consequences, which will be visited on his insurance company.

Another asymmetry in the results arises because defendants tend to do better than plaintiffs in the settlements of cases in which they have previously rejected the mediation award. While this might be explained by factors (1) or (2), it could also reflect the fact that defendants, but not plaintiffs, have an incentive to manipulate the mediation process, simply because the threat of sanctions for rejecting the mediation award is more significant to defendants than it is to plaintiffs.

Finally, in a comparison of trial verdicts and mediation awards, set forth in Table 4, we found that plaintiffs generally did worse at trial than they did in settlement agreements, relative to the mediation award. One possible explanation is that defence lawyers are more apt to underachieve at the mediation hearing in cases which they believe are most likely to go to trial, in order to avoid the penalty for an unwarranted rejection of the mediation award. Table 4 also shows that in 70 percent of the cases where the plaintiff is liable for the penalty, there is no recovery, making it unlikely that the defendant will be able to collect the penalty. In addition, the table shows that it is not especially unusual for the plaintiff to obtain a positive recovery that is less than the mediation award. This suggests that either (1) claims that go to trial are greatly overvalued by mediation panels, or (2) the courts are apt to award the plaintiff something like the expected value of his claim rather than full damages, as would be required by a literal interpretation of the law.

Our model does not allow for differences in risk preferences, agency problems, or for difficulties in collecting from a party the penalty for collecting the mediation award. Consequently this model cannot explain the asymmetries in the data described above. The contribution of our model is that it offers an explanation for those cases in which the party
obtains a settlement on terms more favorable than those he has already accepted in mediation. According to the model, this outcome occurs not because new information has come to light, but rather because the settlement reflects the penalty that would be imposed on the party who rejected the mediation award. However, the principal contribution of this paper is in showing how the data depart from the predictions of the model, and considering the possible reasons for those deviations.

Acknowledgements

I am grateful for helpful comments and advice from Togo Nishiura, and for support from the Richard J. Barber Fund for Interdisciplinary Legal Research

Appendix A. Derivation of theoretical results

A.1. The theoretical model

The model assumes that each party has information about the quality of the plaintiff’s claim not available to the other party or to the mediation panel, at the time the panel makes its award. This assumption might be justified on the ground that the hearing before the mediation panel is both brief and informal; there are no witnesses and no rules of evidence, and each party has only 15 min to present its case. Let us call the plaintiff’s private information about claim quality $X_p$, and the defendant’s information $X_d$. If the case is litigated to verdict, the court’s award will be $X_p + X_d$, where $X_p$ and $X_d$ are both random variables uniformly and independently distributed between 0 and 1.

Each party’s private information is modelled as a random variable because it is not known by the other party. For example, the plaintiff’s information is a random variable from the perspective of the defendant. However, we assume that the defendant knows the distribution of this random variable so that he can form an expectation about its value.

The cost of litigation is $C_p$ for the plaintiff and $C_d$ for the defendant. Let us assume, as Farber and White (1991) did, that the mediation award is the expected value of the claim, which is 1.

As noted above, the law imposes a penalty on a party who has been too optimistic about his prospects in litigation. A party who rejects the mediation award must pay the costs of the opposing party unless the trial verdict is ‘more favorable’ to the rejecting party than the mediation award. However, if the opposing party has also rejected the mediation award, that party is entitled to costs only if the verdict is ‘more favorable’ to that party than the mediation award. The verdict is ‘more favorable’ to the plaintiff if it is more than 10 percent above the mediation award, and ‘more favorable’ to a defendant if it is more than 10 percent below the mediation award. Thus if only the defendant has rejected, the defendant must pay costs if the verdict is not more than 10 percent below the mediation award, i.e., if it is greater than or equal to 90 percent of the mediation award. If only the plaintiff has rejected, the plaintiff must pay costs if the verdict is not more than 10 percent above the mediation award, i.e., if it is less than or equal to 110 percent of the mediation award. If both parties have rejected the mediation award, the defendant must pay costs only if the verdict exceeds...
110 percent of the mediation award, and the plaintiff must pay costs only if the verdict is less than 90 percent of the mediation award. We have incorporated these rules of Michigan law into the model.

In view of the penalties for rejection of the mediation award described above, if the plaintiff rejects the mediation award, but the defendant was willing to accept it, and the case is then litigated to verdict, the plaintiff will have to pay the defendant $C_d$ if $X_p + X_d < 1.1$.

Let us assume that there exists some $d$ between 0 and 1 such that it is optimal for the defendant to accept the mediation award if $X_d > d$, and to reject the mediation award otherwise. Similarly, there exists some $p$ between 0 and 1 such that it is optimal for the plaintiff to accept the mediation award if $X_p < p$, and optimal to reject otherwise. The basic strategy is to (1) determine the plaintiff’s optimal $p$, given that the defendant has some arbitrary value of $d$; (2) determine the defendant’s optimal $d$, given that the plaintiff has some arbitrary value of $p$; solve these equations simultaneously to arrive at the $p^*$ and $d^*$ of the Nash equilibrium.

We will approach the solution in the following way: we assume the plaintiff observes $X_p$ and knows $d$, but must decide whether to accept the mediation award without knowing $X_d$. We can write down the expected net recovery for the plaintiff if (1) he accepts, and (2) he rejects. We set these two things equal, which will give us an equation in $X_p$, $d$, $C_p$ and $C_d$. We then solve for the resulting value of $X_p$, which will be $p^*|d$ (i.e., the optimal $p$, given $d$). Next, we assume the defendant observes $X_d$ and knows $p$, but must decide whether to accept the mediation award without knowing $X_p$. We can then write down the total expected liability of the defendant if (1) he accepts and (2) he rejects. We set these two amounts to be equal, which will give us an equation in $X_d$, $p$, $C_p$ and $C_d$. We then solve for the resulting value of $X_d$, which will be $d^*|p$ (i.e., the optimal $d$, given $p$). Finally we solve these two equations simultaneously to arrive at the unconditional $p^*$ and $d^*$ of the Nash equilibrium.

A.1.1. The expected net recovery for the plaintiff

A.1.1.1. If the plaintiff accepts the mediation award. If the plaintiff accepts the mediation award, his expected recovery $= 1$ if the defendant also accepts, which will occur if $X_d > d$, an event with probability $1-d$. Suppose, however, the defendant rejects, an event with probability $d$. Then the plaintiff’s expected recovery will be $X_p + E(X_d|\text{def. rejects}) - C_p$ plus a payment of $C_p$ in the event that $X_p + X_d \geq 0.9$ and we note that $E(X_d|\text{def. rejects}) - (d/2)$. Now there will clearly be a payment if $X_p \geq 0.9$, since then $X_p + X_d \geq 0.9$. Also, it is clear there will be no payment if $X_p + d < 0.9$, since $X_d < d$. Otherwise, if $0.9 - d < X_p < 0.9$, the probability that $X_d \geq 0.9 - X_p = (d - (0.9 - X_p))/d$.

Consequently, the expected value to the plaintiff of accepting the mediation award, given $d$, is

$$[\text{if the defendant accepts :}] \ (1 - d) +$$

$$[\text{if the defendant rejects :}] \ d \left( X_p + \frac{d}{2} - C_p \right) + dC_p$$

$$\times \left[ 0 \text{ if } X_p < 0.9, \frac{d - (0.9 - X_p)}{d} \text{ if } 0.9 - d < X_p < 0.9, \text{ and } 1 \text{ if } X_p \geq 0.9 \right]$$

(A1)
A.1.1.2. If the plaintiff rejects the mediation award. Next we want to determine the expected recovery for the plaintiff if he rejects the mediation award. If he does so his expected recovery is $X_p + E(X_d) - C_p$ plus a possible payment or penalty. Note that $E(X_d) = (1/2)$.

Suppose first the defendant accepts, an event with probability $1 - d$. Then the expected payment for the plaintiff $= -C_d$ if $X_p + X_d < 1.1$ or $X_p + X_d < 1.1$ and 0 otherwise. But since the defendant accepts, $X_d$ now ranges between $d$ and 1. The probability that $X_d < 1.1 - X_p$ will equal 1 if $1 < 1.1 - X_p$ or $X_p < 0.1$; moreover it will equal 0 if $d > 1.1 - X_p$ or $X_p > 1.1 - d$; and finally, if $0.1 < X_p < 1.1 - d$, this probability will be $(1.1 - X_p - d)/d$.

Second, suppose the defendant instead rejects the mediation award, since $X_d < d$.

Recall that this is an event with probability $d$. Now the expected payment to the plaintiff is

\begin{align*}
(1) & \quad -C_d \text{ if } X_p + X_d < 0.9, \text{ or} \\
(2) & \quad C_p \text{ if } X_p + X_d > 1.1, \text{ or} \\
(3) & \quad 0 \text{ if } 0.9 < X_p + X_d < 1.1.
\end{align*}

The probability that $X_p + X_d < 0.9$, so that the plaintiff must pay costs, will equal 1 if $d < 0.9 - X_p$, since $X_d < d$, and will equal 0 if $X_p \geq 0.9$. Finally, if $0.9 - d < X_p < 0.9$, this probability will equal $(0.9 - X_p)/d$.

On the other hand, the probability that $X_p + X_d > 1.1$, so that the defendant must pay costs, $= \Pr(X_d > 1.1 - X_p) = 0$ if $X_p \leq 0.1$ or if $d \leq 1.1 - X_p \Rightarrow X_p \leq 1.1 - d$.

If, on the other hand, $d > 1.1 - X_p$, then the $\Pr (X_d > 1.1 - X_p) = (d -(1.1 - X_p))/d$.

Consequently, to summarize all of the preceding discussion, the expected value to the plaintiff of rejecting the mediation award, given $d$, is $X_p + (1/2) - C_p$ plus a possible payment or penalty. This expected reward or penalty is

\begin{align*}
& \text{if the defendant accepts:} \quad (1 - d) \cdot (-C_d) \\
& \cdot \left\{ \begin{array}{ll}
1 \text{ if } X_p < 0.1; & 1.1 - X_p - d \text{ if } 0.1 < X_p < 1.1 - d; \\
& 1 \text{ if } X_p > 1.1 - d \\
& \end{array} \right. \\
& \text{and } 0 \text{ if } X_p > 1.1 - d \\
& \\
& \text{if the defendant rejects:} \quad d \cdot (-C_d) \\
& \cdot \left\{ \begin{array}{ll}
1 + \text{ if } X_p < 0.9 - d; & 0.9 - X_p \text{ if } 0.9 - d < X_p < 0.9; \text{ and } 0 \text{ if } X_p \geq 0.9 \\
& \end{array} \right. \\
& + d \cdot (C_p) \cdot \left\{ 0 \text{ if } X_p \leq 1.1 - d; \text{ and } \frac{d -(1.1 - X_p)}{d} \text{ if } X_p > 1.1 - d \right\}. \quad (A2)
\end{align*}

A.1.1.3. Determining the optimal $p$, given $d$. As indicated above, we can solve for $p^*_d$ (the optimal $p$, given $d$) by writing down the condition that the plaintiff’s expected recovery in the event he accepts just equals the expected recovery in the event he rejects. The value of $X_p$ for which this condition holds should be $p^*_d$. At lower values of $X_p$ the plaintiff is better off by accepting, given $d$, and at higher values the plaintiff is better off by rejecting.
For the plaintiff, higher values of $X_p$ both make the outcome of litigation more attractive, relative to the mediation award, and reduce the probability of a penalty for rejection.

Now suppose $0.9 - d < X_p < 1.1 - d$. If we subtract the expected value to the plaintiff of rejecting the mediation award from the expected value of accepting it, we obtain

$$\frac{1}{2} - d + dX_p + \frac{d^2}{2} + 0.1C_p + X_pC_p - X_p + 2C_d - 2X_pC_d - dC_d$$

We can set this equal to 0 and replace $X_p$ with $p$. We can then solve for $p^*|d$:

$$p^* = \frac{(1 - 2d + d^2 + 0.2C_p + 4C_d - 2dC_d)}{2(1 - d - C_p + 2C_d)}.$$  \tag{A3}

### A.1.2. The total expected liability of the defendant

The determination of the total expected liability of the defendant is exactly symmetric to the analysis of the plaintiff’s expected net recovery. We determine the defendant’s total expected liability by examining his liability if (1) he accepts or (2) he rejects, the mediation award. The algebra is set forth in the following section. We then determine the value of $d$ which is optimal for the plaintiff, given the $p$ chosen by the plaintiff. We combine this equation with the equation which states the $p$ that is optimal for the plaintiff, given $d$, and then solve the two equations simultaneously. There are actually three pairs of equations corresponding to three different boundary conditions: one pair applies if $p + d < 0.9$, another applies if $0.9 < p + d < 1.1$, and the third applies if $p + d > 1.1$. In the second case, where $0.9 < p + d < 1.1$, the two equations which must be satisfied are (4) and (9) from Section 1 below, subject to the constraints that $p$ and $d$ are between 0 and 1 and $0.9 < p + d < 1.1$. This model can be solved in a straightforward manner through the use of Newton’s method (details available from the author upon request).

#### A.1.2.1. If the defendant accepts the mediation award

If the defendant accepts the mediation award, his liability will equal 1 if the plaintiff also accepts, which will occur if $X_p < p$, an event with probability $p$. Suppose, however, the plaintiff rejects, an event with probability $1 - p$. Then the defendant’s total expected liability will be $E(X_p) + X_d + C_d$ minus a payment of $C_d$ in the event that $X_p + X_d < 1.1$. The probability that $X_p < 1.1 - X_d$, so that the plaintiff must pay costs, can be analyzed as follows: Since the plaintiff has rejected, we know $X_p > d$, so if $p > 1.1 - X_d$, then $X_p > 1.1 - X_d$. Consequently the probability that $X_p < 1.1 - X_d = 0$ if $p > 1.1 - X_d = X_d > 1.1 - p$.

If, on the other hand, $p < 1.1 - X_d = X_d < 1.1 - p$, then since $X_p > p$, the probability that $X_p < 1.1 - X_d$ will equal $(1 - X_d - p)/(1 - p)$.

We can now write down the total expected liability of the defendant, given $p$, if he accepts the mediation award:

- **[if the plaintiff accepts:]** $p +$
- **[if the plaintiff rejects:]** $(1 - p) \times [X_d + E(X_p | \text{plaintiff rejects}) + C_d] + (1 - p) \times (-C_d) \times [(1.1 - X_d - p)/(1 - p)]$ if $X_d < 1.1 - p$; and $0$ if $X_d > 1.1 - p$

and we may also note that $E(X_p | \text{plaintiff rejects}) = (1 + p)/2$. 
A.1.2.2. If the defendant rejects the mediation award. Next we want to determine the defendant’s total expected liability if he rejects the mediation award. First suppose the plaintiff accepts, which will occur if $X_p < p$, an event with probability $p$. The defendant’s expected liability will then be $E(X_p)+X_d+C_d$ plus a payment of $C_p$ in the event that $X_p+X_d > 0.9 \Rightarrow X_p > 0.9 - X_d$. Since the plaintiff accepts, it must be that $X_p < p$. Thus if $0.9 - X_p > p$, then $0.9 - X_d > X_p$. Consequently the defendant will not have to pay costs if $X_d < 0.9 - p$. If, on the other hand, $X_d > 0.9 - p \Rightarrow p > 0.9 - X_d$, then the probability that $X_p > 0.9 - X_d$ will be $(p - (0.9 - X_d))/p$.

Now suppose the plaintiff also rejects the mediation award, which occurs if $X_p > p$, an event with probability $1 - p$. In this case the change in the defendant’s liability is

1. $- C_d$ if $X_p + X_d < 0.9$ or
2. $C_p$ if $X_p + X_d > 1.1$, or
3. $0$ if $0.9 < X_p + X_d < 1.1$.

The defendant’s liability will increase by $C_d$ if $X_p + X_d > 1.1 \Rightarrow X_p > 1.1 - X_d$. We know $X_p > p$ since the plaintiff rejects, so $X_p > 1.1 - X_d$ if $p > 1.1 - X_d$ or $X_d < 1.1 - p$. If, on the other hand, $p < 1.1 - X_d$, $Pr(X_p > 1.1 - X_d) = (1 - (1.1 - X_d))/1 - p$. Also, if $X_d < 0.1$, $Pr(X_p > 1.1 - X_d) = 0$.

The defendant’s liability will be reduced by $C_d$ if $X_p + X_d < 0.9 \Rightarrow X_p < 0.9 - X_d$. Again $X_p > p$ since the plaintiff rejects, so if $p > 0.9 - X_d$ or $X_d > 0.9 - p$, then $X_p > 0.9 - X_d$ so the defendant’s liability will not be reduced. If, on the other hand, $X_d < 0.9 - p \Rightarrow p < 0.9 - X_d$, then the $Pr(X_p < 0.9 - X_d)$ will equal $(0.9 - X_d - p)/(1 - p)$. Also, if $X_d > 0.9$, then clearly the $Pr(X_p < 0.9 - X_d) = 0$.

We can now write down the total expected liability of the defendant, given $p$, if he rejects the mediation award. Note first that $E(X_p) = (1/2)$. Then the total expected liability will be $(1/2) + X_d + C_d$ plus a possible payment or penalty. This expected reward or penalty is

$$\begin{align*}
\text{[if the plaintiff accepts :]} & \quad p \cdot C_p \\
& \cdot \left\{ 0 \text{ if } X_d < 0.9 - p; \quad \text{and } \frac{(p - (0.9 - X_d))}{p} \text{ if } X_d > 0.9 - p \right\} + \\
\text{[if the plaintiff rejects :]} & \quad (1 - p) \cdot C_p \\
& \cdot \left\{ 0 \text{ if } X_d < 0.1; \quad \text{and } \frac{(1 - (1.1 - X_d))}{1 - p} \text{ if } 0.1 < X_d < 1.1 - p; \right. \\
& \quad \left. \text{and } 1 \text{ if } X_d > 1.1 - p \right\} + (1 - p) \cdot (-C_d) \cdot \left\{ \frac{0.9 - X_d - p}{1 - p} \text{ if } X_d < 0.9 - p; \right. \\
& \quad \left. \text{and } 0 \text{ if } X_d > 0.9 - p; \quad \text{and } 0 \text{ if } X_d \geq 0.9 \right\} 
\end{align*}$$

(A7)

A.1.2.3. Determining the optimal $d$, given $p$. Our calculations of $d^*|p$ (the optimal $d$, given $p$) are done in a manner exactly symmetric to our determination of the plaintiff’s optimal $p$, given $d$. We write down the condition that the defendant’s expected liability if
he accepts just equals his expected liability if he rejects. The value of $X_d$ for which this condition holds should be $d^*$.

At higher values of $X_d$ the defendant is better off by accepting, given $p$, and at lower values the defendant is better off rejecting. For the defendant, lower values of $X_d$ both make the outcome of litigation more attractive, relative to the mediation award, and reduce the probability of a penalty for rejection.

Now suppose $0.9 - p < X_d < 1.1 - p$. If we subtract the expected value to the defendant of rejecting the mediation award from the expected value of accepting it, we obtain

$$\frac{-p^2}{2} + p - pX_d - 1.1C_d + X_dC_d - 2X_dC_p - pC_p + C_p.$$ (A8)

We can set this equal to 0 and replace $X_d$ with $d$. We can then solve for $d^*|p$:

$$d^* = \left(\frac{2p - p^2 - 2.2C_d - 2pC_p + 2C_p}{2(p + 2C_p - C_d)}\right).$$ (A9)

If we assume instead that $0.1 < X_d < 0.9 - p$, we obtain

$$p - pX_d - \frac{p^2}{2} - pC_d - 0.2C_d + 0.1C_p - X_dC_p.$$ (A10)

If we then solve for $d^*|p$, we obtain:

$$d^* = \left(\frac{2p - p^2 - 2pC_d - 0.4C_d + 0.2C_p}{2(p + C_p)}\right).$$ (A11)

A.2. Theoretical results

It may be helpful to comment on the interpretation of our model. Instead of assuming that there are fixed costs of litigation $C_p$ and $C_d$, we could assume that legal expenses are proportionate to the amount of the recovery. Thus $C_p$ and $C_d$ may be interpreted either as fixed expenses or as the share of the recovery which determines the party's legal expenses.

Table 1 sets forth equilibrium values for $p$ and $d$ for various plausible values of $C_p$ and $C_d$, the costs of litigation for the plaintiff and defendant. We include the case where $C_p = C_d = 1/3$, since plaintiffs' lawyers often charge a contingent fee of one-third of the recovery. The table also indicates predicted probabilities of the different possible responses of the parties to the mediation award. We first assume that the costs of litigation are symmetric, and then relax this assumption.

A.2.1. The conditional distribution of court awards, given the parties' responses to the mediation award

Recall that if the case is litigated, the court award would be $X_p + X_d$, while the mediation award equals 1. Here we compare the mediation award to the amount the court would have awarded if the case had been litigated to verdict. Table A.1 makes this comparison for the values of $C_p$ and $C_d$ employed in Table 1. From column 6, we can see that for cases in which both parties reject the mediation award, court awards are distributed symmetrically.
Table A.1
Probability that (expected court award ≥ mediation award) * 

<table>
<thead>
<tr>
<th>C_p</th>
<th>C_d</th>
<th>p</th>
<th>d</th>
<th>If both accept</th>
<th>If both reject</th>
<th>If only plaintiff accepts</th>
<th>If only defendant accepts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual probabilities</td>
<td>0.539</td>
<td>0.242 (0.099 for &gt;)</td>
<td>0.742</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How simulated probabilities are calculated</td>
<td>p/(1+p−d)</td>
<td>d/(1+d−p)</td>
<td>(p+d−1)/(p+d)</td>
<td>1/(2−p−d)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(A) Symmetric legal expenses</td>
<td>1/3</td>
<td>1/3</td>
<td>0.856</td>
<td>0.144</td>
<td>0.500</td>
<td>0.500</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>0.300</td>
<td>0.300</td>
<td>0.812</td>
<td>0.188</td>
<td>0.500</td>
<td>0.500</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>0.275</td>
<td>0.275</td>
<td>0.778</td>
<td>0.222</td>
<td>0.500</td>
<td>0.500</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>0.250</td>
<td>0.250</td>
<td>0.742</td>
<td>0.258</td>
<td>0.500</td>
<td>0.500</td>
<td>0.00</td>
</tr>
<tr>
<td>(B) Asymmetric legal expenses</td>
<td>1/3</td>
<td>0.300</td>
<td>0.844</td>
<td>0.173</td>
<td>0.505</td>
<td>0.527</td>
<td>0.017</td>
</tr>
<tr>
<td></td>
<td>1/3</td>
<td>0.275</td>
<td>0.836</td>
<td>0.195</td>
<td>0.509</td>
<td>0.542</td>
<td>0.029</td>
</tr>
<tr>
<td></td>
<td>0.300</td>
<td>1/3</td>
<td>0.827</td>
<td>0.156</td>
<td>0.495</td>
<td>0.473</td>
<td>0.00</td>
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<tr>
<td></td>
<td>0.300</td>
<td>0.275</td>
<td>0.802</td>
<td>0.211</td>
<td>0.504</td>
<td>0.515</td>
<td>0.012</td>
</tr>
</tbody>
</table>

* In the simulation results reported under (A) and (B), the results for p, d, and the last four columns on the right are all determined by the assumptions made about C_p and C_d, the costs of litigation for the plaintiff and defendant respectively.

around the mediation award, i.e., the mediation award is the median of the distribution of court awards. Column 5 indicates that the same observation applies to those cases in which both parties accept the mediation award; if these cases were litigated to verdict, an equal number of court awards would be above and below the mediation award. For cases in which the mediation award is acceptable to the plaintiff, but not to the defendant (column 7), all court awards will be less than or equal to the mediation award. For cases in the converse situation, where the mediation award is accepted by the defendant but not by the plaintiff, all court awards will be greater than or equal to the mediation award.

Appendix B. The assumption that all claims are settled

In our analysis of settlement payments we abstracted from the fact that a claim might not actually be settled; it might instead be (1) dropped by the plaintiff, or (2) litigated to verdict.

With respect to alternative (1), before mediation the expected value of the claim in litigation for the plaintiff is X_p + E(X_d) - C_p. Since E(X_d) = 1/2, the expected value of the claim in litigation will be nonnegative so long as C_p ≤ 1/2. This condition is quite plausible, and is assumed to be true throughout the paper. Thus allowing claims to be dropped would not affect our predictions of the probabilities of various responses to the mediation award, set forth in Table 1.

After mediation, the question is whether the plaintiff would wish to drop his claim if, say, X_p was close to zero and the defendant’s response, namely a rejection of the mediation
award, indicated a low value for $X_d$. Recall that if the mediation award is accepted by the plaintiff but rejected by the defendant, the plaintiff’s expected recovery is $X_p + (d/2) - C_p$. This will be positive only if $X_p > C_p - (d/2)$. If $X_p$ were very small, and $C_p$ was regarded as a fixed cost of litigation, the plaintiff could wish to drop the case unless $d \geq 2 C_p$. However, we can avoid these complications in several different ways: one way is to regard all dropped cases as being settled for a settlement payment of 0.

Another way, consistent with the other assumptions of our model, is to assume that the plaintiff has made an irrevocable commitment to litigate or settle once the case has gone to mediation. The best solution, however, is to regard the plaintiff’s legal expenses as being a fraction $C_p$ of the recovery $X_p + X_d$ which, as explained in the text, is an entirely valid interpretation of the model. In this case the plaintiff’s net recovery from litigation cannot be negative, and the requirement that no cases are dropped will be met.

By construction we are also abstracting from alternative (2), the possibility that the claim is litigated to verdict. This raises a potential issue of selectivity bias, given the hypothesis of Priest and Klein (1984) that claims that are settled are systematically different from those that are litigated to verdict. According to this hypothesis, claims are more likely to be litigated the more uncertain is the outcome of litigation. Thus litigation is most likely when the probability of a plaintiff victory is close to 50 percent. However, our model does not deal with the issue whether to settle or litigate, and is ill suited to do so, since the uncertainty in our model relates to damages rather than liability.

References


