REVIEWS IN ADVANCE

Annu. Rev. Law Soc. Sci. 2005. 1:35–59
doi: 10.1146/annurev.lawsocsci.1.041604.115856

First published online as a Review in Advance on June 14, 2005

ECONOMIC THEORIES OF SETTLEMENT BARGAINING

Andrew F. Daughety and Jennifer F. Reinganum
Department of Economics and Law School, Vanderbilt University, Nashville, Tennessee 37235; email: andrew.f.daughety@vanderbilt.edu, jennifer.f.reinganum@vanderbilt.edu

Key Words multiple litigants, externalities, asymmetric information

■ **Abstract** We briefly review two basic models of settlement bargaining based on concepts from information economics and game theory. We then discuss how these models have been generalized to address issues that arise when there are more than two litigants with related cases. Linkages between cases can arise because of exogenous factors such as correlated culpability or damages, or they can be generated by discretionary choices on the part of the litigants themselves or by legal doctrine and rules of procedure.

INTRODUCTION

This review provides a selective survey of recent work on the economics of settlement bargaining, emphasizing settings in which there are multiple (more than two) litigants. The research on multiple-litigant settlement bargaining has built on previous work on bilateral settlement bargaining and employs the tools used therein. Thus, we first provide a brief review of the salient concepts from information economics in the bilateral settlement bargaining context.

The essential feature of multilateral bargaining is the creation or presence of externalities that arise when bargaining between two litigants is influenced by the possibility, or necessity, of simultaneous or subsequent bargaining by a litigant with other parties. For example, a confidential settlement between an early plaintiff and a defendant is likely to affect the information and case viability of a later plaintiff suing the same defendant if the defendant's culpability is, to some extent, correlated across the cases. Thus, in the section below entitled Externalities Induced by Litigant Discretionary Choice, we consider recent papers that examine how discretionary choices by one or more litigants (to create or capitalize on possible linkages among yet other litigants) generate such externalities. The preferences of the litigants concerning the use of such devices need not directly conflict; that is, the litigants need not have preferences such that one litigant's payoff improves if the other's payoff is reduced (i.e., as in diametrically opposed). In the case of confidential settlement, early plaintiffs and a defendant (who is common to

1 Jun 2005 21:17 AR AR258-LS01-03.tex XMLPublishSM(2004/02/24) P1: KUV
AR REVIEWS IN ADVANCE10.1146/annurev.lawsocsci.1.041604.115856

the early and to later plaintiffs) may agree that employing the device is mutually advantageous (but this may or may not be true for later plaintiffs).

However, sometimes existing legal doctrine (for example, the doctrine of joint and several liability) or rules of procedure (such as collateral estoppel) may induce bargaining externalities. Of course, as stated above, the choice by one or another of the litigants to make use of the relevant legal doctrines or procedural rules may be voluntary, but in this case preferences of the individual litigants over the use of such doctrines and procedures are usually diametrically opposed; such rules exist to provide recourse when agreement is not possible. We discuss this possibility in the final section, entitled Externalities Induced by Doctrines or Procedural Rules.

BILATERAL SETTLEMENT BARGAINING

Hay & Spier (1998) and Daughety (2000) provide detailed reviews of settlement bargaining between two parties in which disagreement may lead to trial. This section provides a very brief review of the bilateral settlement bargaining literature, with special emphasis on the models used in the rest of the discussion. Early papers on this topic, such as those by Landes (1971), Gould (1973), Posner (1973), and Shavell (1982), considered settings in which both litigants knew all relevant information. In such cases, because trial is costly, both litigants are better off avoiding trial and agreeing to split the avoided costs. Thus, this literature provided models that predicted that no trials would occur when information was symmetric (that is, either everything was commonly known or all assessments of unknowns were shared). These papers also provided models in which bargaining might collapse, thereby resulting in a trial. In this approach, trials occur when there are irreconcilable conflicts between the litigants as to assessments over the likely outcome in court; these irreconcilable conflicts reflect differences the parties could not eliminate even if all information were commonly known. Analyses with irreconcilable assessments that drive the possibility of settlement failure are known as inconsistent priors analyses. Thus, the decision-theoretic models provide the possibility of inefficient settlement bargaining, but the cause of the inefficiency lies in intransigence on the part of the litigants.

Models of settlement bargaining that employ game theory and information economics have developed over the past 20 years. In these models, bargaining agents may possess different information (called private information); if the information were common knowledge to both bargainers, there would be no barrier to settlement, but the asymmetry in what each agent knows may result in bargaining failure. The presence of private (that is, asymmetric) information affects the strategic behavior of the bargainers; thus, such models rely on strategic response to informational differences, rather than on intransigence, to provide a range of outcomes, some of which involve inefficiency. More precisely, if *A* and *B* are bargaining and *A* possesses some information that is relevant to the transaction (and *B* does not have this information but knows that *A* does), then in choosing bargaining strategies, both *A* and *B* have to account for how their opponent will modify their bargaining strategies in the light of this asymmetry. For example, a plaintiff is likely to know more about the actual damages she has suffered owing to a harm from a product than is the product's manufacturer. Knowing this, and recognizing that plaintiffs have an incentive to inflate their demands, the game's equilibrium may involve the manufacturer being more resistant to higher demands than to lower ones: His willingness to go to trial increases as the plaintiff's settlement demand increases. Alternatively, a manufacturer is likely to be better informed as to his likely liability. Thus, in bargaining, defendants might understate their culpability, and plaintiffs will be more resistant to accepting lower offers. This feeds back to influence the plaintiff's decision about what demand to make, recognizing that higher demands are likely to elicit a higher chance of bargaining failure, leading to a costly trial. Thus, in contrast with the early (full information) literature and in contrast with the inconsistent priors literature, trial may occur not because of intransigence but because of rational wariness. Moreover, the equilibrium prediction provides the likelihood of trial as a specific function of the distribution of damages (and/or the degree of culpability) and the attributes of the parties involved.

Bebchuk (1984) and Reinganum & Wilde (1986) provided what are now viewed as the canonical models of settlement bargaining, employing tools from game theory and information economics. Both models assume that one party is better informed about a salient fact (or facts) than is the other party.[1] Continuing with the earlier example, assume a consumer bought a product from a manufacturer and has been harmed by the product. The consumer (as plaintiff, denoted *P*) sues the manufacturer (as defendant, denoted *D*) for damages. Moreover, for ease of discussion, assume that the parties agree that *D* will be found liable with probability p, but that damages (denoted d) are *P*'s private information. This is not unreasonable because *P* is likely to be better informed as to her damages than is *D*; here, *P* is the informed party and *D* is the uninformed party. *P*'s possible levels of damages (alternatively, the possible values of her private information) are called *P*'s types. To fill in the details of the model, assume

1. *D*'s conjecture as to the possible values of the actual damages follows a distribution $F(d)$, with d ranging between a lowest possible value, d_L, and a highest possible value, d_H;
2. this distribution is commonly known to *P* and *D* and has an associated density denoted $f(d)$;
3. each party must pay their own court costs, denoted t_P for *P* and t_D for *D* (respectively), if bargaining fails and they go to trial (for convenience, let aggregate court costs be $T = t_P + t_D$), and that these trial costs are commonly known; and

[1]We discuss one-sided models below; two-sided asymmetric information models combine aspects of the one-sided models; for details see Schweizer (1989) and Daughety & Reinganum (1994).

4. at trial the court can correctly determine the true level of damages (which is the private information P possesses).[2]

To understand the Bebchuk analysis,[3] assume that the bargaining follows an ultimatum structure: D makes a settlement offer, s, to P, who then either accepts the offer (resulting in s dollars transferred from D to P) or rejects the offer (thereby going to trial, where the court awards damages d with probability p).[4] For P's threat to go to trial to be credible, we require that $pd_L \geq t_P$; that is, the net expected payoff for the type with the lowest possible damages is nonnegative (this last assumption can be relaxed, but doing so complicates the exposition unnecessarily). Such bargaining games in which the uninformed player moves first are called screening (or sorting) models because the demand made by the uninformed player acts to screen the second-mover's types into those who will accept the offer and those who will reject it. This means that whatever the initial distribution of possible damage levels (the distribution of possible types of P, denoted above as F), the model can provide a prediction of the resulting likelihood of settlement or trial and the expected returns and costs associated with the bargaining process.

D's objective is to make an offer that minimizes total expected trial and settlement costs. Because there is a continuum of P's types between d_L and d_H, an offer s that screens these types into two groups will make some type, denoted $\tilde{d}$ (called the marginal type), just indifferent between the offer s and going to trial; at trial this type would obtain $p\tilde{d} - t_P$. That is, the offer s selects the marginal type $\tilde{d} = (s + t_P)/p$. However, if this type of P were to choose to go to trial, D's cost at trial would be $p\tilde{d} + t_D$. Therefore, we can think of D's problem as making an offer (that is accepted by some type $\tilde{d}$, and by all those types with lesser damages than $\tilde{d}$) so that expected costs are minimal. This is formalized as the following optimization problem:

$$\min_{\tilde{d}} \int_{\tilde{d}}^{d_H} (px + t_D) f(x)\, dx + F(\tilde{d})(p\tilde{d} - t_P). \qquad 1.$$

The first term is the expected cost to D of going to trial, because all types above $\tilde{d}$ will reject the offer $s = p\tilde{d} - t_P$ (they can do better at trial). In the integral, D's cost at trial for any such type is weighted by the likelihood that D is of that type.

[2] A variety of papers in the literature weaken or manipulate some of these assumptions.

[3] In Bebchuk's paper, the private information was about liability, whereas in Reinganum & Wilde's (1986) paper the private information concerned damages. To make the comparisons between the models straightforward, we pose both applied to the case of privately known damages.

[4] More complex models with counter-proposals are possible, but if we focus on the last stage of any such finite-horizon process, it has the form of an offer/demand followed by a response, followed either by settlement or trial. Note that, in contrast with the standard bargaining literature, it is plausible to posit a last stage because defendants have an incentive to delay, thereby necessitating that courts set a deadline.

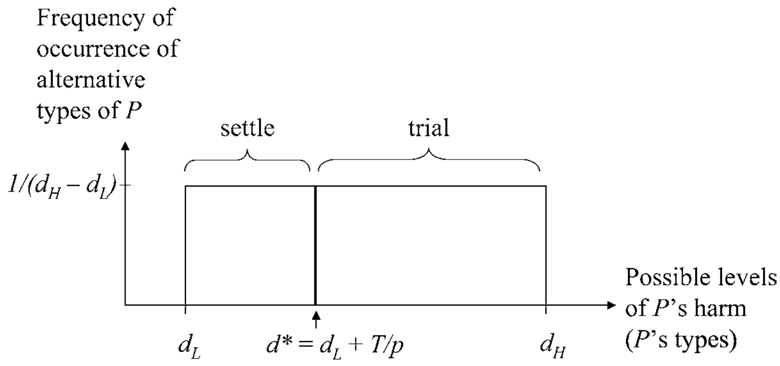

Figure 1 Equilibrium in a screening model.

The second term above is the expected cost of settlement to D because all types at and below $\tilde{d}$ accept the offer $p\tilde{d} - t_P$ (they do no better, and most do worse, at trial). The term $F(\tilde{d})$ weights the offer by the fraction of types who will accept it. Once the marginal type $\tilde{d}$ that minimizes this total expected cost is found (denoted as d^*, the solution to Equation 1), the optimal offer by D is $s^* = pd^* - t_P$. This is an equilibrium as long as the limits on the integral are not violated, so d^* must be less than d_H and greater than d_L.

Figure 1 illustrates the equilibrium in a screening model for the case where possible damage levels are uniformly distributed [that is, all values of d are equally likely, so $f(d) = 1/(d_H - d_L)$]. By solving the problem in Equation 1 above, one can show that the equilibrium marginal type is $d^* = d_L + T/p$ (as shown in the Figure), so the equilibrium offer is $s^* = pd^* - t_P = pd_L + T - t_P = pd_L + t_D$.[5] Thus, the likelihood of settlement is $F(d^*) = (d^* - d_L)/(d_H - d_L) = (T/p)/(d_H - d_L) < 1$, the likelihood of trial is $(d_H - d_L - T/p)/(d_H - d_L) > 0$, and the expected total trial cost is $T(d_H - d_L - T/p)/(d_H - d_L)$. This last item is the social cost associated with the presence of asymmetric information. Notice also that the distribution of types going to trial is just a truncated version of the original distribution of types, F. Thus, the model predicts that cases with low levels of damages will settle, whereas only those with sufficiently high levels of damages will proceed to trial.

This model provides a number of other implications; we list a few here. First, an increase in the range of expected stakes (that is, an increase in $d_H - d_L$ or an increase in p) or a decrease in either litigant's court costs leads to a reduction in the likelihood of settlement. Second, redistribution of court costs from one litigant to the other (that is, adjustments in t_P and t_D, holding T fixed) has no impact on the likelihood of settlement or on the magnitude of the social cost. Third, a cap on damages (if modeled as a reduction in d_H) leads to a reduction in the

[5]The requirement that $d^* < d_H$ means that, for screening to be an equilibrium, we require $p(d_H - d_L) > T$. That is, the range of the expected stakes should exceed the total court costs.

likelihood of trial and a reduction in the social costs associated with bargaining (of course, this does not account for the fact that *P*s with very high damages would be undercompensated).

In the Reinganum & Wilde (1986) model, the informed party moves first and the uninformed party then considers the demand and decides whether to accept or reject the offer (again, rejection leads to trial). This type of model is called a signaling model because the first mover signals information via their settlement offer. Returning to the example outlined earlier, *P* makes a demand, with higher demands reflecting a *P* with greater damages. Now *D* must be wary of high demands from *P*, as a low-damaged *P* would also like to make a high demand if *D* would naively infer that damages awarded at trial would be high. Thus, *D* rationally rejects higher demands more frequently (that is, *D* is willing to go to trial with a higher likelihood for demands that are higher). It is the equilibrium wariness of *D* that deters mimicry and results in the signal being informative (that is, the signal provides useful information about *P*'s type to *D* when *D* is trying to decide what is likely to happen at trial, and whether to reject the demand from *P*).

While somewhat more technically demanding [see Reinganum & Wilde (1986) for details], the basics of the model are that *P* makes a demand and *D* uses the demand to update his assessment of which type of *P* he is likely to go to trial against, should bargaining break down. Thus, for any demand *S*, *D* forms beliefs $b(S)$ as to which type (or types) would have made such a demand. *D* then decides whether to accept or reject the demand employing these beliefs: *D* accepts the demand *S* if and only if $S \leq pb(S) + t_D$. Let *D*'s probability of rejecting demand *S* be denoted as $r(S)$. Because *P* must choose *S*, recognizing that she will go to trial against *D* if he rejects her demand, *P*'s problem is to choose *S* to maximize her return:

$$\max_S S(1 - r(S)) + (pd - t_P)r(S), \qquad 2.$$

where the first term reflects settlement at *S*, which occurs with probability $1 - r(S)$, and the second term reflects *P*'s return if she goes to trial. Under mild conditions there is a revealing equilibrium in which a *P* of type *d* makes the equilibrium demand $S^*(d) = pd + t_D$ and *D*'s beliefs are correct. Furthermore, *D*'s equilibrium rejection function, $r^*(S)$, is zero at the lowest type's revealing demand, $S_L \equiv S^*(d_L) = pd_L + t_D$; is increasing and concave in *S*; and reaches a maximum value, which is less than 1, at the highest type's revealing demand, $S_H \equiv S^*(d_H) = pd_H + t_D$. This rejection function is displayed in Figure 2, illustrating the earlier example involving a continuum of uniformly distributed types of possible damage levels for *P*.

In contrast with the screening model, notice that one implication of the signaling model is that (except for $d = d_L$), all types have a positive chance of going to trial, with that chance increasing with the level of damages (because the settlement demand is increasing in the true level of damages). Moreover, the distribution of types who go to trial is different from the distribution of types who have been harmed: In the example, the initial distribution of types was a uniform distribution,

1 Jun 2005 21:17 AR AR258-LS01-03.tex XMLPublishSM(2004/02/24) P1: KUV
AR REVIEWS IN ADVANCE10.1146/annurev.lawsocsci.1.041604.115856

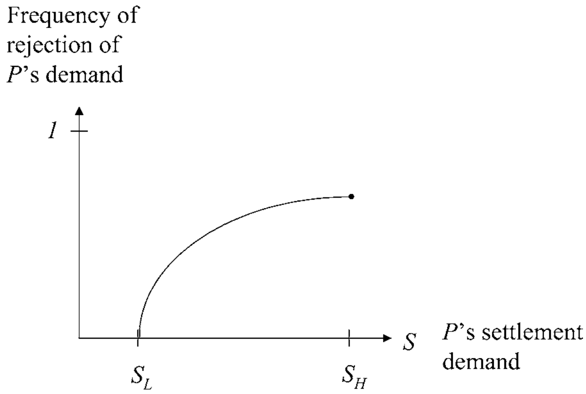

Figure 2 *D*'s equilibrium strategy in a signaling model.

but the resulting distribution implied by the rejection function shown in Figure 2 is weighted toward higher types. We can obtain comparative statics results similar (in direction) to those found in the screening model as well.

EXTERNALITIES INDUCED BY LITIGANT DISCRETIONARY CHOICE

Confidential Settlement

Imagine that a plaintiff, P_1, has been harmed by a product[6] produced by a defendant, *D*. P_1 may suspect that others have been harmed as well (that is, there may be other plaintiffs, P_2, P_3, etc.), but these harmed individuals might have suffered their losses at other times and places, so perhaps there is little or no chance for P_1 to find these other plaintiffs so as to pursue, say, a class action suit [suppressing the ability of plaintiffs to share information, such as might be obtained via discovery, appears to be a major purpose of protective orders used in a variety of cases; see Hare et al. (1988)]. Moreover, even if there were some way to locate others who may have been harmed, the existence of substantial issues of law might preclude the formation of a class.[7] Instead, when P_1 and *D* bargain, a confidential settlement, in which the details (and possibly even the existence) of the agreement are kept secret, might be mutually advantageous. The law provides for such secrecy either

[6]We restrict discussion to the products liability context for concreteness of the analytical results, but as has become apparent in the popular press, confidentiality has figured into a variety of other concerns (e.g., public health and sexual abuse of minors).
[7]See Judge Richard Posner's majority opinion in *In re Rhone-Poulenc Rorer Inc.*, in which the court decertified a class action lawsuit partly because of problems of discerning a common set of negligence standards across multiple jurisdictions.

1 Jun 2005 21:17 AR AR258-LS01-03.tex XMLPublishSM(2004/02/24) P1: KUV
AR REVIEWS IN ADVANCE10.1146/annurev.lawsocsci.1.041604.115856

via court-authorized sealing, or through contracts of silence that specify stipulated damages should the plaintiff violate the confidentiality agreement.

The central economic questions are (*a*) how does the possibility of bargaining over both money and confidentiality affect the likelihood of settlement and the settlement amounts (if agreement is reached), and (*b*) how does the availability of confidentiality, as a bargaining option, influence the welfare of all litigants (including that of possible future plaintiffs). The basic results are threefold. First, confidentiality improves the likelihood of settlement and raises the expected settlement amount between P_1 and D. In this sense, the early plaintiff obtains hush money to help the defendant suppress information if so doing helps reduce the likelihood of suits by later plaintiffs. Second, the degree of correlation of D's culpability (and, therefore, liability) across the individual plaintiffs' cases influences the degree to which confidentiality may reinforce or undermine deterrence. Such a correlation is weak when D's actions may have led to conditions contributing to the separate harms but each case may have substantially different issues of causation to prove. Thus, for example, D's chemical spill may have contributed to P_1's stomach cancer and to P_2's brain tumor, but informationally the only value P_2 obtains from knowing about the case between P_1 and D is that the spill may have a role in P_2's harm. In contrast, suppose that D is a national gasoline retailer, with a chain of gas stations around the country, all employing the same design for underground tanks for gasoline storage. Thus, although precise local geological conditions might affect the likelihood of a gasoline leakage into the water table, a high likelihood of liability in one case (a community P_1 versus D) implies a high likelihood of liability in any other case (another community P_2 versus D; see *Ashcraft v. Conoco*). We refer to this as strong correlation.[8]

Suppose D has private information regarding his culpability in two cases. As shown in Daughety & Reinganum (1999, 2002), if, on the one hand, the cases are weakly correlated, then even though D has private information regarding his culpability in P_1's case, both P_1 and D have the same expected value for D's future expenditures due to settlement negotiations or trial with future plaintiffs. Thus, it is possible for the early plaintiff's bargain to extract (as hush money) enough of a payment from D so as to make D face the same expected costs for potential harms as would occur without confidentiality: Under weak correlation, deterrence need not be reduced. On the other hand, in the case of strong correlation, the fact that D's culpability is common to the two cases makes D's costs in the continuation game (the future suits) dependent on this information, which means that P_1 cannot efficiently extract the full value of confidentiality she provides to D. Therefore, under strong correlation, deterrence is undermined. If correlation is weak, the average plaintiff (that is, a plaintiff who is equally likely to be early or

[8]The early case is assumed not to be fully determinative of what will occur in a later case. If it were, then we would think in terms of collateral estoppel, wherein liability in one case means liability in the next; see Externalities Induced by Doctrines or Procedural Rules, below.

late) may prefer the availability of confidentiality as a bargaining option, but if case correlation is strong, the average plaintiff is strictly worse off when confidentiality is available than when it is forbidden.

We briefly consider some of the details of the strong correlation case. Daughety & Reinganum (2002) consider a model in which D sequentially bargains with two plaintiffs (P_1 followed by P_2) over both the amount of each plaintiff's settlement and (in the case of P_1) whether to keep the settlement details confidential.[9] Assume that P_1 has already filed suit against D, and that although P_2 has not yet filed a suit, she is more likely to do so if she becomes aware of P_1's suit. For example, P_2 may not initially be aware that the harm she has suffered might be due to D's product or to D's culpability. The analysis considers three possible outcomes for the bargaining game between P_1 and D: (*a*) a confidential settlement specifying that both parties will keep all details secret, (*b*) an open settlement in which the details of the agreement are publicly available, and (*c*) a trial with a publicly available record. Associated with each possible outcome is a probability that P_2 will become aware that she, too, should sue D, with this probability being lowest under confidentiality and highest under trial. Moreover, because the cases are strongly correlated, to the degree that the outcome of the first suit provides information about D's culpability in the second case, this information will influence P_2's beliefs about the type of D she faces as well, possibly influencing the demand she might make in her own settlement bargaining process. Alternatively put, the first case generates a positive externality to P_2 (and a negative externality to D) by raising her awareness of D's involvement in her harm. Because P_1 cannot directly charge P_2 for this service, she instead charges D for reducing the size of the negative externality (that is, his expected losses due to a suit from P_2) by agreeing to provide confidentiality.

Sequential bargaining is modeled as a series of screening games, but now the outcome of the first screening game potentially signals information to the participants in the second screening game. Let p denote the probability that D is liable; assume that p is distributed uniformly on $[p_L, p_H]$ and that it is the same for both cases (this is strongly correlated culpability); moreover, assume that only D knows p. In each screening bargaining game, the plaintiff makes a demand, which is accepted by D types with sufficiently high values of p and rejected by those with lower values of p. Applying the screening analysis discussed above (see Bilateral Settlement Bargaining), we define settlement demands and marginal types associated with an open settlement and a confidential settlement in the first case (denoted s_O and p_O, and s_C and p_C, respectively). These expressions can be ordered as follows: $s_C > s_O$ and $p_C < p_O$. That is, the equilibrium settlement demand and the likelihood of settlement are both higher under confidentiality than under openness. This is because confidentiality creates a gain for D in which P_1

[9]Yang (1996) reports results from a model of correlated damages in which the settlement amount is (exogenously) sealed and finds that if the litigation costs are high, then D is willing to offer even more to settle the first suit (and deter the filing of the second suit), while if litigation costs are low, then confidentiality results in less settlement.

1 Jun 2005 21:17 AR AR258-LS01-03.tex XMLPublishSM(2004/02/24) P1: KUV
AR REVIEWS IN ADVANCE10.1146/annurev.lawsocsci.1.041604.115856

can share: Despite P_1's higher confidential settlement demand, more D types are willing to accept it. However, because confidentiality also suppresses publicity (relative to an open settlement and, especially, to trial) that might have triggered P_2's suit, P_2 is worse off when P_1 and D settle confidentially. Finally, a plaintiff behind the veil of ignorance (with an equal chance of becoming P_1 or P_2) is worse off under confidentiality, so the gain to P_1 is more than offset by the loss to P_2. Nevertheless, it can be shown that total expected litigation costs are lower when confidential settlement is permitted.

In sum, the foregoing analysis suggests that confidentiality should be expected to lower overall litigation costs, but it is not Pareto superior to openness. Furthermore, this analysis has not accounted for privacy considerations (such as valid privacy concerns for individual plaintiffs, or valid trade secrecy issues for firms), which undoubtedly make some confidential agreements welfare-enhancing. However, the fact that confidentiality is available as a bargaining tool makes the early negotiating parties better off at the expense of later plaintiffs. This suggests that one cannot rely on the arguments that the early parties might make for maintaining secrecy without examining how likely it is that a sequence of cases exists, and whether any culpability by the defendant in such a sequence is likely to be strongly correlated.

Most-Favored-Nations Clauses

A second linkage across seemingly bilateral settlement negotiations occurs when settlement bargains may use a most-favored-nations (MFN) clause, meaning that early settling plaintiffs are entitled to retroactive increases in their settlements should the defendant settle with later plaintiffs at better terms.[10] Such clauses have shown up in settlement agreements in a variety of settings, including cases involving antitrust violations, copyright infringement, bankruptcy, and racial discrimination, as well as the tobacco cases to be discussed below. The implications for settlement bargaining and a variety of examples of the use of MFNs have been explored in papers by Spier (2003a,b) and Daughety & Reinganum (2004).

The agreements reached between the tobacco industry and the states in the mid- to late 1990s [see Viscusi (2002) on the agreements] provide examples of two different (but related) uses of an MFN clause in a collection of settlement agreements. Over a period of a few years, four states reached agreements with the tobacco industry: Mississippi settled in 1997 for $3.6 billion, Florida settled in 1997 for $11.3 billion, Texas settled in 1998 for $15.3 billion, and Minnesota settled in 1998 for $6.6 billion. All four states had pursued a novel legal theory that the firms in the industry owed the states restitution for past health expenditures made by each state on behalf of smokers, and all four agreements contained MFN clauses. The MFN clauses in the Mississippi, Florida, and Texas agreements were triggered by

[10]The term most-favored nations derives from tariff agreements in international trade. Most-favored-customer clauses provide the parallel notion in consumer markets such that a customer is promised the lowest price offered to any other customer.

1 Jun 2005 21:17 AR AR258-LS01-03.tex XMLPublish^{SM}(2004/02/24) P1: KUV
AR REVIEWS IN ADVANCE10.1146/annurev.lawsocsci.1.041604.115856

the Minnesota settlement (yielding MFN payments of $550 million, $1.8 billion, and $2.3 billion, respectively). The remaining 46 states shortly thereafter signed the Master Settlement Agreement (MSA), which also contained an MFN clause, now to make sure that all the states would join the one agreement (the MSA did not trigger the earlier MFN clauses for the first four states). This suggests two possible motivations that we explore briefly below. One is that early (noncommon) litigants (e.g., the individual states) may propose MFN clauses as a means of obtaining later payments; for reasons made clear below, we refer to this as a leverage motive. The other motive is that the common litigant may propose an MFN clause to reduce delay and to improve commitment power on its behalf; we refer to this as the delay-reduction motive, and we discuss it first.

Spier (2003a,b) considers the following multiple-litigant bargaining scenario. Consider a defendant, *D*, facing a large number of plaintiffs who have individually suffered harms of different magnitudes due to the use of *D*'s product. Thus, the rectangular density shown in Figure 1 might represent the different harms of a large number of plaintiffs (rather than representing alternative levels of harm for a single plaintiff). Here, the harm each plaintiff has suffered is her own private information and *D* is uninformed with respect to this information (although *D* knows the distribution of plaintiffs' harms). *D* is contemplating settling with some of these plaintiffs and going to trial against the remainder, so the problem is one of screening. Moreover, bargaining in this model may occur over time, and delay in reaching an agreement is costly to all; for convenience, assume that there are now two possible rounds of bargaining. Consider the following strategy for *D*: *D* makes an offer to settle, perhaps making the offer s^* shown in Figure 1. In the screening analysis discussed in the section on Bilateral Settlement Bargaining, such an offer is a one-time, take-it-or-leave-it offer. However, if some plaintiffs settle at s^* and others do not, then *D*'s second offer will be higher than s^*, so as to further screen those plaintiffs who might go to trial under s^* (in Figure 1, those to the right of d^*). Of course, if the first group of plaintiffs recognizes that *D* will subsequently raise the offer, then they will not agree to s^*, but will instead wait for the improved offer. This results in delay, which is costly. Without the commitment power implicit in the one-time-only structure of the original Bebchuk-style screening analysis, *D* faces the possibility of having to make an increasing sequence of offers, which clearly would be inferior to the one-time-only offer that minimized overall cost, namely s^*.

Spier (2003a) shows that an MFN clause eliminates the incentive for *D* to make the higher second offer. To see why, note that an offer of s^* with an MFN clause means that any plaintiff who accepts s^* now will also obtain any increase associated with any later, better offer accepted by other plaintiffs, so no plaintiff has an incentive to wait. If *D* subsequently made a higher offer, he would have to make MFN payments to all those who previously settled; thus, he does not make a higher second offer. An MFN allows *D* to commit to his cost-minimizing offer s^*, thereby eliminating delay in reaching an agreement (hence, the delay-reduction motive); the MFN provides *D* with a degree of monopoly power, as he

1 Jun 2005 21:17 AR AR258-LS01-03.tex XMLPublishSM(2004/02/24) P1: KUV
AR REVIEWS IN ADVANCE10.1146/annurev.lawsocsci.1.041604.115856

no longer competes for settling plaintiffs with his future (second-round) self. Spier also compares the likelihood of settlement, the welfare of plaintiffs, and the total costs of litigation between a setting in which an MFN is allowed and one in which it is not. In keeping with the notation in the earlier section on bilateral bargaining, let the probability density describing the expected damages be denoted as $f(\cdot)$; Figure 1 shows an f that is constant. Spier (2003a) shows that the likelihood of settlement and plaintiff welfare improves (respectively: declines; stays constant) if f is increasing (respectively: decreasing; constant) in value at the point of the first-period marginal type when an MFN clause is precluded.[11] Thus, Figure 1 illustrates a type of watershed example, as f is constant everywhere. Distributions with rising densities imply that an MFN improves the settlement rate and is preferred by plaintiffs, whereas those distributions with declining densities yield the reverse results.

Daughety & Reinganum (2004) analyze the second motivation for using an MFN, which we refer to as a leverage motivation, when there is asymmetric information.[12] Consider a version of Spier's setup (a defendant who is uninformed about the damages individual plaintiffs have suffered), but now limit the number of plaintiffs to two, and assume there is an early plaintiff (P_1) and a later plaintiff (P_2). Furthermore, assume that the bargaining between each plaintiff and the common defendant is modeled as a signaling game (see Bilateral Settlement Bargaining). In period one, the informed P_1 makes a settlement demand of D, and there is either agreement or trial, followed by period two, in which the informed P_2 makes a demand of D, which again may result in agreement or trial. Without an MFN, the sequential pair of signaling games behaves just like a sequence of signaling games as illustrated in Figure 2 above.

Assume that P_1 and D conclude an agreement that contains an MFN and that the settlement amount was S_1. This agreement now affects what P_2 can hope to obtain in her settlement negotiations with D. P_2, who might have suffered a greater harm than P_1, knows that if D were to pay P_2 her full damages plus D's court costs (i.e., the amount that would be demanded in the no-MFN case), then this would generate an MFN payment to P_1, and D might be better off simply going to trial because a judgment at trial does not trigger an MFN payment (whereas a higher settlement does). Thus, D's rejection function is now progressively higher for all demands by P_2 above S_1. Hence, for demands she might make above S_1, P_2 moderates her demand to account for the higher likelihood of rejection that the MFN has now created. When P_2 does make a (moderated) demand above S_1, sometimes it is accepted by D and an MFN payment is made to P_1 as well, and

[11] More limited results hold for total litigation and trial costs: These are decreasing when the settlement rate is increasing or constant, but may move in either direction if the settlement rate is decreasing.

[12] Spier (2003b) explores the leverage motivation in an example with symmetric information. In such a setting the probability of trial is either one or zero, so the use of an MFN is predicted to raise total trial costs.

1 Jun 2005 21:17 AR AR258-LS01-03.tex XMLPublishSM(2004/02/24) P1: KUV
AR REVIEWS IN ADVANCE10.1146/annurev.lawsocsci.1.041604.115856

sometimes it is rejected by D. So P_1 is distinctly better off because of the expected MFN payment. But P_1's benefit from an MFN does not stop there because the possibility of the MFN payment means that there is a lower incentive for types of P_1 with low damages to try to mimic the types with higher damages because they have more to lose if they are rejected by D. This lower incentive, in turn, means that the probability that D will reject P_1's demand is not as high as it would be if there were no MFN payment possibility. Thus, P_1 can make the same demand as she would have before, and D will reject this demand with a lower likelihood.

In sum, the expected value of an MFN clause to P_1 reflects two effects: (*a*) the expected MFN payment and (*b*) the reduced likelihood of bargaining failure. This is referred to as a leverage motive because the first plaintiff is able to use an MFN clause and her role as an early settling player to leverage an advantage, extracting money owing to the presence of the later plaintiff. Not surprisingly, P_2 is always worse off (in expectation) because of the demand-moderating effect of the MFN and the potential increased likelihood of bargaining breakdown.[13] However, as Daughety & Reinganum show, overall litigation costs may fall with the use of an MFN. Thus, although not Pareto superior (because it would be opposed by the later plaintiff), the use of an MFN may be welfare-enhancing when viewed from the perspective of reducing total litigation costs.

As is illustrated by the settlements between the states and the tobacco industry, MFNs may reflect both leverage and delay-reduction purposes, and different multilateral bargaining settings may result in agreements using such clauses for one or both reasons. Significantly, as both analyses have shown, the use of an MFN may improve welfare (at least in a litigation-cost reduction sense) and might be Pareto improving (under the conditions discussed earlier in the delay-reduction setting). Use of the MFN in settlement bargaining contrasts with the use of most-favored-customer clauses in monopoly and oligopoly pricing, which have generally been found to be welfare-reducing (because their use generally enhances monopoly or cartel power).

EXTERNALITIES INDUCED BY DOCTRINES OR PROCEDURAL RULES

Collateral Estoppel and Precedent

Collateral estoppel makes a ruling in one case binding in subsequent related cases. For instance, if a driver is found liable for the injuries to the driver of another car, the passenger in the victim's car may argue that she need not separately establish the first driver's liability; rather, she may assert that collateral estoppel already

[13]Note that second plaintiffs with harms that are less than those suffered by the first plaintiff will make smaller demands than S_1, and face the no-MFN rejection probability, and therefore will not be affected by the presence of an MFN clause.

1 Jun 2005 21:17 AR AR258-LS01-03.tex XMLPublishSM(2004/02/24) P1: KUV
AR REVIEWS IN ADVANCE10.1146/annurev.lawsocsci.1.041604.115856

establishes liability, and only the passenger's damages remain to be determined. It is a matter of judicial discretion to determine whether collateral estoppel applies in a given situation. This doctrine thus establishes a link between cases brought by different plaintiffs that might otherwise not exist.

Another example is a government antitrust prosecution that establishes a firm's liability for the harms associated with its anticompetitive behavior. According to Briggs et al. (1996, p. 770), "Section 4 of the Clayton Act permits a private plaintiff to use findings from a prior antitrust suit brought by the government to pursue a treble damage suit against the same defendant for the same conduct." In this case, the statute specifically authorizes the application of collateral estoppel. Subsequent civil suits for damages need only demonstrate and document the extent of their harms.

Briggs et al. (1996) examine equilibrium settlement behavior in a sequence of suits. First, there is a government suit in which the defendant's type (a violator, denoted *V*, or nonviolator, denoted *NV*) is his private information. The defendant has an opportunity to make a settlement offer, to which the government may respond with settlement, with a trial, or by dropping the case; thus, this is a signaling game as discussed in the section on Bilateral Settlement Bargaining. If the government suit goes to trial and establishes the defendant's liability, or if the defendant settles (which is taken as an admission of liability in their model), then a private plaintiff will file suit and settle (because her damages are also assumed to be common knowledge). However, if the government drops its suit, then the defendant's liability has not been established; indeed, a rational (Bayesian) private plaintiff will lower her posterior belief that the defendant will be found liable in the future, which may deter the filing of her suit. So the question is how the possibility of a follow-on suit by a private plaintiff affects the defendant and the government's settlement behavior in the first suit.

First, consider a single suit between the government (*G*) and the defendant (*D*). *D* is in violation of antitrust laws (that is, he is of type *V*) with probability p; *D*'s type is his private information, whereas p is commonly known by *D* and *G*. Let d_G represent the damages that *G* will receive if she prevails at trial. Let t denote the cost of trial for each litigant; for simplicity, we assume this is the same for *D*, *G*, and the private plaintiff *P*. The following parameter restriction is maintained: (A1) $pd_G - t > 0$; that is, the ex ante expected value of *G*'s suit is positive. The equilibrium takes the following form. *G* files suit; a *D* of type *NV* makes no offer to settle while a *D* of type *V* mixes between making no offer and making the lowest offer that would be acceptable to *G* if *D* were known to be liable ($s = d_G - t$; we will call this a serious offer). *G* responds to a serious offer by accepting it and responds to no offer by mixing between trial and dropping the case.

Let τ_G denote $Pr\{\text{trial}|\text{no offer}\}$ and let η_G denote $Pr\{\text{no offer}|V\}$. For *G* to be willing to randomize between trial and dropping the case following no offer, then $[p\eta_G/(1-p+p\eta_G)]d_G - t = 0$. The left-hand side is $Pr\{V|\text{no offer}\}$ (which is found using Bayes' Rule) times the amount collected (d_G) from a *D* of type *V*, minus *G*'s trial costs, whereas the right-hand side is the value of dropping the case (i.e., zero). Similarly, for a D of type V to be willing to randomize between making no offer and offering d_G, then $\tau_G(d_G + t) = d_G - t$. The left-hand side is $Pr\{\text{trial}|\text{no offer}\}$ times the award D must pay plus his trial costs, whereas the right-hand side is the value of making a serious settlement offer, which is accepted for sure. Solving yields $\tau_G^* = (d_G - t)/(d_G + t)$ and $\eta_G^* = t(1-p)/p(d_G - t)$; these are fractional given (A1). Now consider the filing decision. Calculating G's equilibrium payoff using the equilibrium values τ_G^* and η_G^* allows us to verify that this equilibrium payoff reduces to $pd_G - t$, which is positive by (A1). Thus, anticipating that the game will play out in an equilibrium fashion, it is optimal for G to file suit.

Now suppose that there is a potential follow-on suit by a private plaintiff P; let d_P denote P's damages. Many of the properties of the previous case continue to hold; in particular, $\eta_G{}^*$ is unchanged. However, D's payoffs are now adjusted by the additional costs (of the second suit) that accompany both settlement and trial. If P would not file suit following a dropped suit by G, then for D to be indifferent between making no offer and settling (first with G and then with P), it must be that $\tau_G^{**}(d_G + t + d_P) = d_G - t + d_P$, or $\tau_G^{**} = (d_G - t + d_P)/(d_G + t + d_P)$. Note that $\tau_G^{**} > \tau_G^*$; in equilibrium, G will go to trial more often (following no offer) when there is a potential follow-on suit by a private plaintiff.

Che & Yi (1993) provide a model in which settlement does not imply an admission of liability. A defendant faces a sequence of two plaintiffs, and the decision regarding the defendant's liability in the second case is positively correlated with the decision in the first case. Although relitigation of a common issue is either estopped or not based on judicial discretion, the model of correlated decisions might be viewed as a situation in which both litigants in the first suit have symmetric but imperfect information about whether the judge in the second suit will find the first decision precedential. Che & Yi ask how this correlation of outcomes in a sequence of trials affects litigants' incentives to settle. They find that a defendant with a high likelihood of being found liable in the first case will be more eager to settle so as to avoid setting an unfavorable precedent, whereas a defendant with a low likelihood of being found liable in the first case will be more eager to go to trial so as to set a favorable precedent for the next case.

In each suit, it is assumed that the plaintiff has private information about her damages, that the probability that the plaintiff will prevail is common knowledge, and that the defendant makes a take-it-or-leave-it settlement offer; thus, this is a screening game in the taxonomy of the Bilateral Settlement Bargaining section. Let p_1 denote the probability that P_1 will prevail at trial. Then the probability that P_2 will prevail at trial, denoted p_2, is some base probability p_0 (independent of p_1), which is potentially modified by the outcome of the first suit. In particular, assume that: (*a*) $p_2 = p_0 + \epsilon$ if P_1 won her suit; (*b*) $p_2 = p_0$ if P_1 settled her suit; and (*c*) $p_2 = p_0 - \epsilon$ if P_1 lost her suit, where $\epsilon > 0$. Che & Yi refer to this as a mutual and symmetric precedential effect; they consider alternative versions in their paper. This probability structure is common knowledge to all the litigants.

Consider settlement negotiations in the second suit, conditional on the first suit's outcome. Using the analysis from the section on Bilateral Settlement Bargaining, we know that the marginal type in the second suit will be defined by $d_2^* = d_L + T/p_2$, and the associated likelihood of settlement will be $F(d_2^*) = T/p_2(d_H - d_L)$. From this, we see that the likelihood that the second suit will settle is highest when P_1 lost her suit and lowest when P_1 won her suit. Notice that if P_1 settled her suit, then P_2 faces the same probability of prevailing as if there were no P_1; that is, P_1's suit has no precedential effect. In addition, D's expected costs in the second suit are highest when P_1 won her suit and lowest when P_1 lost her suit.

Let $C_H > C_S > C_L$ denote D's expected cost in the second suit when P_1 won, settled, or lost, respectively, the first suit. In considering what offer to make to P_1, D recognizes the impact that P_1's decision regarding settlement will have on D's continuation payoff in his suit with P_2. Because P_1 is a nonrepeat litigant, a P_1 with damages of d_1 will accept any settlement offer $s \geq p_1 d_1 - t_P$. However, D now anticipates future costs of C_S if P_1 accepts his offer and future costs of $p_1 C_H + (1 - p_1)C_L$ if P_1 rejects his offer and trial occurs. These future costs are added to the usual costs associated with settlement and trial, respectively. Modifying the objective function given in the section on Bilateral Settlement Bargaining to reflect these continuation costs implies that the probability that the first case settles is given by $F(d_1^*) = (T + p_1 C_H + (1 - p_1)C_L - C_S)/p_1(d_H - d_L)$.

To determine the effect of the second suit on settlement behavior in the first suit, we compare the equilibrium probabilities of settlement in the first suit with and without the second suit. Recall that (using the section on Bilateral Settlement Bargaining) the probability of settlement in the first suit when there is no P_2 is given by $F(d^*) = T/p_1(d_H - d_L)$. It follows that $F(d_1^*) \geq F(d^*)$ if and only if $p_1 C_H + (1 - p_1)C_L \geq C_S$. Given the ordering of D's expected costs in the second suit, the left-hand side is an increasing function of p_1, which starts out below C_S and ends up above C_S. Thus, there is a unique value $p^* \in (0, 1)$ such that the presence of P_2 results in a greater likelihood of settlement when $p_1 > p^*$ (because D would then like to reduce his exposure to trial where he faces a relatively high risk of establishing an unfavorable precedent) and a lower likelihood of settlement when $p_1 < p^*$ (because D is then more willing to risk trial, where he faces a relatively high chance of establishing a favorable precedent).[14]

Class Action Lawsuits

Rule 23 of the Federal Rules of Civil Procedure authorizes the formation of a class action lawsuit. In a class action lawsuit, a small number of named (representative)

[14]Choi (1998) provides a model in which two imitators consider entering the market of an incumbent patent holder. A finding of patent validity (or invalidity) in an infringement suit against the first entrant is presumed to apply equally to the second entrant. He finds that the patent holder may accommodate (rather than sue) the first entrant to avoid a finding of patent invalidity. Accommodation plays the same role as settlement, as it avoids the setting of any precedent.

1 Jun 2005 21:17 AR AR258-LS01-03.tex XMLPublishSM(2004/02/24) P1: KUV
AR REVIEWS IN ADVANCE10.1146/annurev.lawsocsci.1.041604.115856

plaintiffs litigate on behalf of a very large number of harmed plaintiffs. Whether the individuals' cases are sufficiently similar so as to be aggregated into a class (i.e., whether the class will be certified) is a matter of judicial discretion. For instance, if a defendant's product has injured many consumers, then the issue of liability may be the same in each case. Pursuit of judicial economy and stability of the law suggests that this issue should be litigated once and for all. Moreover, the scale economies achievable for plaintiffs, whose individual harms might otherwise not rationalize a suit, can help ensure that victims receive compensation and defendants face the costs generated by their behavior, thus inducing more appropriate precaution.

If the extent of harm is also similar, then this too could be determined once and for all. If the extent of harm differs widely among the victims, then the class may be certified only for the issue of liability determination, but each individual must pursue a separate suit for damages. In most cases, participation in the class is voluntary; that is, individuals can opt out of the class and pursue their claims directly against the defendant. Thus, an interesting question arises when damages are somewhat heterogeneous, but nevertheless a class action has been certified to determine both liability and damages for the entire class. In this case, the award at trial may result in damages averaging; that is, a lump-sum amount may be awarded to the plaintiff class to be distributed in equal shares. In this event, those class members with relatively high damages will be undercompensated, while those with relatively low damages will be overcompensated. Thus, a potential class member who anticipates that she will be undercompensated may be tempted to opt out; on the other hand, by doing so she will have to bear the full costs of her suit against the defendant. Moreover, if a class member with comparatively high damages opts out, this lowers the average damages within the class and (assuming scale economies in litigation) raises the costs of each remaining member. Thus, multiple externalities are involved when individual suits are aggregated into a single suit. Scale economies in litigation costs represent a positive externality, but high-damaged plaintiffs suffer a negative externality from the presence of low-damaged plaintiffs in the class, and low-damaged plaintiffs enjoy a positive externality from high-damaged plaintiffs in the class. Finally, because each member is bound by the same liability decision at trial, there may be similar externalities if there is some heterogeneity in the probability of each plaintiff prevailing in an individual suit.

Che (1996) provides a formal model of the formation of a class action and the subsequent settlement negotiations between the class (or an opt-out) and a single defendant. The timing of the model is as follows. First, each plaintiff simultaneously and noncooperatively decides whether to join the class action or to opt out and pursue an individual suit; once made, this decision is irreversible. Moreover, it is assumed that no plaintiff can be excluded from the class. The defendant makes a take-it-or-leave-it settlement offer that the plaintiff either accepts or rejects. At trial, the court learns the average harm of the plaintiff class and awards this amount to each plaintiff. Che assumes that any settlement obtained by the class will also be shared equally among its members. Thus, all class members will agree about whether to accept or reject a given settlement offer. He first examines a model in

1 Jun 2005 21:17 AR AR258-LS01-03.tex XMLPublishSM(2004/02/24) P1: KUV
AR REVIEWS IN ADVANCE10.1146/annurev.lawsocsci.1.041604.115856

which the strength of individual claims (which may be viewed as a product of the likelihood of prevailing and the extent of damages), though heterogeneous, are observable. For simplicity, he considers only two plaintiff types, those with high stakes (*H*) and those with low stakes (*L*). If plaintiffs' types are observable, he finds that (under moderate scale economies in litigation) there is always a Nash equilibrium in which all *H*-type plaintiffs opt out, while all *L*-type plaintiffs join the class. This is because it is a dominant strategy for all *L*-types to join, but whether an *H*-type *P* joins the class depends on the anticipated behavior of the other *H*-type *P*s. If a *P* of type *H* expects that no other *H*-types will join, then she will not join either because she will suffer greatly from damages averaging. Thus, there is always an equilibrium in which only *L*-type *P*s join the class.

Next, Che considers a model in which each plaintiff's type is her private information vis-a-vis the defendant and other plaintiffs (the court still learns, and awards, the average class damages at trial). Incomplete information has a substantial effect on the kinds of participation equilibria that can exist. In particular, it is no longer possible for an equilibrium to exist in which all *L*-type *P*s join the class and all *H*-type *P*s opt out (recall that this kind of equilibrium always exists when information is complete) because if all *L*-type *P*s (and no *H*-type *P*s) are expected to join the class, then *not* joining the class is a clear signal of type *H* and would elicit a high settlement offer; but then any *P* of type *L* would want to defect from joining the class to opting out. Similarly, there cannot be an equilibrium in which all *H*-types (and no *L*-types) join the class because then *L*-types are revealed by opting out and would want to defect to joining the class, both to receive a higher settlement offer and to enjoy the lower litigation costs. Instead, some, but not all, plaintiffs of each type join the class. It is also possible that the class fails to form.

In a subsequent paper, Che (2002) considers a model that is quite similar to the preceding one, except that each member of a class will receive her correct damages at trial and the members of the class can decide internally (and contract over) how to allocate money received in settlement. The defendant only knows the distribution of plaintiffs' damages, but each plaintiff knows her own damages. The incentives for collective negotiation are then examined under two different assumptions about the information regime within the class: (*a*) all members costlessly observe all other members' damages, and (*b*) each member's damages remain her private information within the class as well.

Under the assumption that members' damages are costlessly observed within the class and that they can contract on the internal allocation of a settlement, each member will insist on receiving at least what she would receive at trial. Knowing this, all *H*-type *P*s will join. But then, as argued above, not joining is taken by *D* as a clear signal of weakness (and would be followed by a low offer), so *L*-types will join as well. Thus, the equilibrium involves all *P*s joining their cases. Notice how different this is from the result above in which, under the same informational circumstances, damages averaging could generate an equilibrium in which a class fails to form. This does not happen here because *H*-types' payoffs are not dragged down by the participation of *L*-types.

1 Jun 2005 21:17 AR AR258-LS01-03.tex XMLPublishSM(2004/02/24) P1: KUV
AR REVIEWS IN ADVANCE10.1146/annurev.lawsocsci.1.041604.115856

When damages are private information even within the class, then every *P* will be tempted to claim to be of type *H*. The class can resolve this issue by using a mechanism that specifies whether to accept a settlement offer *s*, and how to divide it among the members of the class, based on their reported types (for details, see Che 2002). In brief, this entails the *L*-types receiving information rents to induce them to forebear claiming to be of type *H* and to truthfully reveal that they are of type *L*; *H*-types do not have an incentive to claim to be *L*-types, so they receive no information rents. Only settlement offers that are high enough to cover both the aggregate expected payoff from trial plus the required information rents will be accepted. Thus, the class will be a tougher bargainer (i.e., will require a higher settlement offer) when it faces this internal allocation problem under asymmetric information. When the choice regarding participation is considered, it remains an equilibrium for all *P*s to join the class.

Joint and Several Liability

Joint and several liability (JSL) may apply when multiple tortfeasors act concurrently or in concert to cause a plaintiff's injury. For example, two firms that dump hazardous waste into a single waterway may harm the health of people living downstream. Under JSL, a plaintiff suing both defendants may collect the full amount of the damages if she prevails against either or both of the defendants at trial. In contrast, under nonjoint liability (NJL), a plaintiff can collect from each defendant only that portion of the harm that is attributable to that defendant. Thus, JSL introduces externalities between the defendants that would not exist under NJL; these externalities manifest themselves both at trial and in settlement negotiations.

The classic analysis of the impact of JSL on incentives to settle was provided by Kornhauser & Revesz (1994a). They consider a model in which a single plaintiff sues two defendants under complete, but imperfect, information about whether the defendants will be found liable. The assumption of complete information immediately suggests that there should be no trials in equilibrium, but this turns out to be false. Rather, they show that both cases will go to trial when the correlation between the defendants' likelihoods of being found liable is sufficiently low, but will settle when the correlation is high.

Assume that there are two defendants, each of whom has contributed equally to the plaintiff's harm; let the plaintiff's total harm be denoted $2d$. Each defendant suffers a trial cost of t, while the plaintiff suffers a trial cost of t per defendant; thus, there are no scale economies for the plaintiff in going to trial against both defendants. Finally, assume that each defendant is capable of paying the full damages $2d$.[15] Let p denote the probability that the plaintiff prevails when she goes to

[15] Their general model allows unequal contributions by the defendants to the plaintiff's harm, scale economies in the plaintiff's trial costs, different setoff rules, and a different selection rule when multiple equilibria exist. In Kornhauser & Revesz (1994b) they consider partially insolvent defendants and find that (for the case of equal contribution) this increases the parameter range over which settlement occurs.

trial against a single defendant, and let δp denote the probability that the plaintiff prevails against the second defendant, having prevailed against the first, when she goes to trial against both defendants. The parameter δ varies between $\delta = 1$ and $\delta = 1/p$. When $\delta = 1$ the probability of prevailing against both defendants is p^2 (that is, the case outcomes are uncorrelated), whereas when $\delta = 1/p$ the probability of prevailing against both defendants is p (that is, the case outcomes are perfectly correlated). In general, when the plaintiff goes to trial against both defendants, she has a probability δp^2 of prevailing against both defendants, and a probability $2p(1-\delta p)$ of prevailing against one defendant; in either case, she collects the full amount $2d$.

The timing of the game is as follows: The plaintiff makes a settlement demand of the pair of defendants, denoted (s_1, s_2). Simultaneously and noncooperatively, each defendant decides whether to accept or reject the settlement demand made of him. Finally, any defendant who rejects his demand is taken to trial by the plaintiff. We assume the unconditional pro tanto setoff rule, which specifies that if one defendant settles, then the amount of the settlement is deducted from what the plaintiff can hope to obtain from trial against the remaining defendant. We first characterize the Nash equilibrium strategies in the subgame following receipt of the settlement demands, and then determine the plaintiff's optimal demands. In the sequel, we denote the plaintiff by P and the defendants by D_1 and D_2.

Given a pair of demands (s_1, s_2), it is a Nash equilibrium for both D_1 and D_2 to accept their respective demands if and only if $s_i \leq p(2d - s_j) + t$, for $i = 1, 2$. This is because, given that D_j is expected to accept s_j, D_i can expect to pay the total harm less the amount of the settlement with D_j, should D_i be found liable at trial (which occurs with probability p); in addition, D_i will pay trial costs of t. Thus, D_i will prefer to accept any settlement demand $s_i \leq p(2d - s_j) + t$.

Given a pair of demands (s_1, s_2), it is a Nash equilibrium for D_i to accept s_i and D_j to reject s_j if and only if $s_i \leq .5\delta p^2(2d) + p(1-\delta p)(2d) + t$ and $s_j \geq p(2d - s_i) + t$. This is because, given that D_j is expected to reject s_j and go to trial, D_i can choose to go to trial as well, in which case D_i can expect to pay his share (half) of the total damages if both defendants are found liable (which occurs with probability δp^2), and D_i can expect to pay all the total damages if he is found liable while his codefendant is found not liable [which happens with probability $p(1-\delta p)$]. In addition, D_i will pay trial costs of t. If s_i is less than this amount, then D_i prefers to settle. On the other hand, if D_i is expected to settle for s_i, then D_j can expect to pay the full amount of the damages offset by the amount of the settlement with D_i if D_j is found liable, which occurs with probability p; in addition, D_j will pay trial costs of t. If s_j exceeds this amount, then D_j will indeed prefer trial.

Finally, given a pair of demands (s_1, s_2), it is a Nash equilibrium for both D_1 and D_2 to reject their respective demands if and only if $s_i \geq .5\delta p^2(2d) + p(1-\delta p)(2d) + t$, for $i = 1, 2$. In this case, each defendant prefers to go to trial (given that the other defendant is expected to go to trial as well) rather than to acquiesce to the plaintiff's demand.

We now consider P's optimal settlement demand pair (s_1, s_2). We assume that whenever it is a Nash equilibrium for both D_1 and D_2 to accept their respective demands, they do so.[16] This simplifies the exposition and ensures that any trials that occur are not the result of coordination failure. Moreover, it can be shown that, from *P*'s point of view, a pair of settlement demands that induces acceptance by only one *D* is always dominated by either a demand pair that induces both *D*s to accept or by a demand pair that induces both *D*s to reject. Thus, we need only ask (*a*) what settlement demand pair maximizes *P*'s expected payoff from settlement with both *D*s, and (*b*) when is the resulting expected payoff better than what she expects from trial against both *D*s?

To answer the first question, we define *P*'s maximized return from inducing both *D*s to accept their respective settlement demands as $V^P(A, A) = \max s_1 + s_2$ subject to: $s_i \leq p(2d - s_j) + t$, for $i = 1, 2$. *P*'s most-preferred settlement pair consists of $(s_1, s_2) = (s^*, s^*)$, where the two constraints intersect. This settlement demand is $s^* = (2pd + t)/(1 + p)$, which yields the payoff $V^P(A, A) = 2(2pd + t)/(1 + p)$. Alternatively, if *P* induces both *D*s to choose trial, she can expect to receive $V^P(R, R) = \delta p^2(2d) + 2p(1 - \delta p)(2d) - 2t$. This payoff reflects the fact that *P* collects the full damages $2d$ if she prevails against either *D*, or both; however, she pays the trial costs $2t$.

To answer the second question, we compare the payoffs $V^P(A, A)$ and $V^P(R, R)$. It is straightforward to show that $V^P(A, A) \gtreqless V^P(R, R)$ as $\delta \gtreqless \delta^* \equiv (2p^2 d - t(2 + p))/p^2(1 + p)$. Notice that $\delta^* < 1/p$ always holds, but $\delta^* > 1$ if and only if $t < p^2 d(1 - p)/(2 + p)$. Thus, we conclude that if $t \geq p^2 d(1 - p)/(2 + p)$, then all cases will settle under JSL. However, if $t < p^2 d(1 - p)/(2 + p)$, then cases whose outcomes are sufficiently highly correlated will settle, but *P* will go to trial against both *D*s if the case outcomes are sufficiently uncorrelated.

Two related strands of literature have been developed, but they are outside the purview of this survey. Klerman (1996) and Feess & Muehlheusser (2000) discuss how alternative setoff rules affect settlement incentives. Spier (1994) and Kahan (1996) discuss the effect of settlement under JSL on care taken in the primary activity.

Insolvency

Spier (2002) describes another settlement negotiation scenario that involves externalities and has a formal structure quite similar to the one just described. This situation arises when a single defendant has harmed two plaintiffs but does not have enough wealth to compensate both plaintiffs; indeed, we consider the case in which the defendant does not have enough wealth to fully compensate even one plaintiff because the commonalities with the Kornhauser & Revesz model are most

[16]For some parameters, there may be two symmetric equilibria (e.g., one in which both defendants accept and one in which both reject), or two asymmetric equilibria (in which one defendant accepts and the other rejects). Kornhauser & Revesz discuss this issue in detail; in a related paper to be discussed below, Spier (2002) uses risk dominance to select among equilibria.

evident when the defendant's insolvency problem is extreme [see Spier (2002) for the more general model, as well as several extensions]. In particular, we retain all the notation used above, but the defendant's wealth, denoted w, replaces the total damages $2d$ from above. In addition, Spier assumes that the defendant, denoted D, makes simultaneous settlement offers to the plaintiffs, denoted P_1 and P_2, who simultaneously and noncooperatively decide whether to accept or reject the offers. Of course, if P_i accepts her offer, this reduces the amount that P_j can expect to obtain at trial, just as in the unconditional pro tanto setoff rule.

Given a pair of offers (s_1, s_2), it is a Nash equilibrium for both P_1 and P_2 to accept their respective offers if and only if $s_i \geq p(w - s_j) - t$, for $i = 1, 2$. This is because, given that P_j is expected to accept s_j, P_i can expect to receive the defendant's total wealth less the amount of the settlement with P_j should P_i prevail at trial (which occurs with probability p); in addition, P_i will pay trial costs of t. Thus, P_i will prefer to accept any settlement demand $s_i \geq p(2d - s_j) - t$.

Given a pair of offers (s_1, s_2), it is a Nash equilibrium for P_i to accept s_i and P_j to reject s_j if and only if $s_i \geq .5\delta p^2 w + p(1 - \delta p)w - t$ and $s_j \leq p(w - s_i) - t$. This is because, given that P_j is expected to reject s_j and go to trial, P_i can choose to go to trial as well, in which case P_i can expect to receive her share (half) of the defendant's wealth if both plaintiffs prevail (which occurs with probability δp^2), and P_i can expect to receive all the defendant's wealth if P_i prevails but P_j does not [which happens with probability $p(1 - \delta p)$]. However, P_i will pay trial costs of t. If s_i exceeds this amount, then P_i will prefer to settle. On the other hand, if P_i is expected to settle for s_i, then P_j can expect to receive the defendant's total wealth offset by the amount of the settlement with P_i if P_j prevails at trial, which occurs with probability p; however, P_j will pay trial costs of t. If s_j is less than this amount, then P_j will indeed prefer trial.

Finally, given a pair of offers (s_1, s_2), it is a Nash equilibrium for both P_1 and P_2 to reject their respective offers if and only if $s_i \leq .5\delta p^2 w + p(1 - \delta p)w - t$, for $i = 1, 2$. In this case, each plaintiff prefers to go to trial (given that the other plaintiff is expect to go to trial as well) rather than to accept the defendant's offer.

As before, we assume that whenever there is a Nash equilibrium in which both plaintiffs accept their offers, this equilibrium is selected. Also as before, it can be shown that a settlement offer pair that induces P_i to accept and P_j to reject is always dominated by either an offer pair that induces both to accept or by an offer pair that induces both to reject. Thus, we need only ask (*a*) what settlement offer pair minimizes D's expected cost from settlement with both Ps, and (*b*) when is the resulting expected cost lower than what he expects from trial against both Ps?

D's minimized expected cost from inducing both Ps to accept their respective settlement offers is $V^D(A, A) = \min s_1 + s_2$ subject to $s_i \geq p(w - s_j) - t$, for $i = 1, 2$. D's least-cost offer pair consists of $(s_1, s_2) = (s^{**}, s^{**})$, where the two constraints intersect. This settlement offer is $s^{**} = (pw - t)/(1 + p)$, which yields the payoff $V^D(A, A) = 2(pw - t)/(1 + p)$. Alternatively, if D induces both Ps to reject his demands, he can expect to pay the amount $V^D(R, R) = \delta p^2 w +$

$2p(1-\delta p)w + 2t$. This payoff reflects the fact that *D* forfeits his entire wealth *w* if either *P* prevails, or both; in addition, he pays the trial costs $2t$.

We now compare the payoffs $V^D(A, A)$ and $V^D(R, R)$. It is straightforward to show that $V^D(A, A) \gtreqless V^D(R, R)$ as $\delta \gtreqless \delta^{**} \equiv (2p^2w + 2t(2+p))/p^2w(1+p)$. Notice that $\delta^{**} > 1$ always holds, but $\delta^{**} < 1/p$ holds if and only if $t < pw(1-p)/2(2+p)$. Thus, we conclude that if $t \geq pw(1-p)/2(2+p)$, then all cases will settle when *D* is insolvent. However, if $t < pw(1-p)/2(2+p)$, then cases whose outcomes are sufficiently highly correlated will go to trial, but *D* will settle with both *P*s if the case outcomes are sufficiently uncorrelated.

Note the similarities to (and differences from) the Kornhauser & Revesz (1994a,b) model: Here, the acceptance versus rejection constraints involve (*a*) a reversed inequality; (*b*) the substitution of *w* for 2*d*; and (*c*) the subtraction, rather than the addition, of *t*. The defendant's payoff differs from that of the plaintiff in Kornhauser & Revesz by the substitution of *w* for 2*d* and by the addition, rather than the subtraction, of the trial costs 2*t*; moreover, the defendant wants to minimize his expected costs, whereas the plaintiff in Kornhauser & Revesz wants to maximize her expected payoff. Finally, settlement negotiations fail when the case outcomes are sufficiently correlated, whereas in Kornhauser & Revesz they fail when the case outcomes are sufficiently uncorrelated.

SUMMARY

Recent work on the economics of settlement bargaining has emphasized multiple-litigant settlement negotiation. The essential feature of such bargaining is that seemingly bilateral negotiations affect, and are affected by, simultaneous or sequential settlement possibilities with other litigants. We subdivided this sampling of the literature into two groupings. In the first grouping, we considered papers in which discretionary choices by one or more of the litigants (to create, or capitalize on, possible linkages among yet other litigants) generate such externalities. In that section, the preferences of the litigants over the use of such devices need not be directly opposed.

The second grouping emphasized examples in which employing existing legal doctrine or rules of procedure may induce bargaining externalities. We noted that the choice by one or another of the litigants to use the relevant legal doctrines or procedural rules may be voluntary, but in this second grouping preferences of the individual litigants over using such doctrines and procedures are usually diametrically opposed; such rules exist to provide recourse when agreement is not possible.

In both types of analysis, formal models relying on game theory and information economics have been used to understand which attributes of such multiple-litigant bargaining are privately and/or socially advantageous (or disadvantageous), and when such devices, doctrines, or rules lead to a greater or lesser likelihood of settlement.

ACKNOWLEDGMENTS

We thank the National Science Foundation for support via NSF grant SES-0239908. We also thank Kathryn Spier for comments on an earlier draft.

The *Annual Review of Law and Social Science* is online at http://lawsocsci.annualreviews.org

LITERATURE CITED

Ashcraft v. Conoco, Inc. 1998. U.S. Dist. LEXIS 4092

Bebchuk LA. 1984. Litigation and settlement under imperfect information. *RAND J. Econ.* 15:404–15

Briggs HC III, Huryn KD, McBride ME. 1996. Treble damages and the incentive to sue and settle. *RAND J. Econ.* 27:770–86

Che YK. 1996. Equilibrium formation of class action suits. *J. Public Econ.* 62:339–61

Che YK. 2002. The economics of collective negotiation in pretrial bargaining. *Int. Econ. Rev.* 43:549–75

Che YK, Yi JG. 1993. The role of precedents in repeated litigation. *J. Law Econ. Organ.* 9:399–424

Choi JP. 1998. Patent litigation as an information transmission mechanism. *Am. Econ. Rev.* 88:1249–63

Daughety AF. 2000. Settlement. In *Encyclopedia of Law and Economics*, ed. B Bouckaert, G De Geest, 5:95–158. Cheltenham, UK: Edward Elgar

Daughety AF, Reinganum JF. 1994. Settlement negotiations with two-sided asymmetric information: model duality, information distribution, and efficiency. *Int. Rev. Law Econ.* 14:283–98

Daughety AF, Reinganum JF. 1999. Hush money. *RAND J. Econ.* 30:661–78

Daughety AF, Reinganum JF. 2002. Informational externalities in settlement bargaining: confidentiality and correlated culpability. *RAND J. Econ.* 33:587–604

Daughety AF, Reinganum JF. 2004. Exploiting future settlements: a signalling model of most-favored-nation clauses in settlement bargaining. *RAND J. Econ.* 35:467–85

Feess E, Muehlheusser G. 2000. Settling multidefendant lawsuits under incomplete information. *Int. Rev. Law Econ.* 20:295–313

Gould JP. 1973. The economics of legal conflicts. *J. Legal Stud.* 2:279–300

Hare FH, Gilbert JL, Remine WH. 1988. *Confidentiality Orders*. New York: Wiley

Hay BL, Spier KE. 1998. Settlement of litigation. In *The New Palgrave Dictionary of Economics and the Law*, ed. P Newman, 3:442–51. New York: Stockton

In re Rhone-Poulenc Rorer Inc., 51 F.3d. 1293 (7th Cir. 1995)

Kahan M. 1996. The incentive effects of settlements under joint and several liability. *Int. Rev. Law Econ.* 16:389–95

Klerman D. 1996. Settling multidefendant lawsuits: the advantage of conditional setoff rules. *J. Legal Stud.* 25:445–62

Kornhauser LA, Revesz RL. 1994a. Multidefendant settlements: the impact of joint and several liability. *J. Legal Stud.* 23:41–76

Kornhauser LA, Revesz RL. 1994b. Multidefendant settlements under joint and several liability: the problem of insolvency. *J. Legal Stud.* 23:517–42

Landes WM. 1971. An economic analysis of the courts. *J. Law Econ.* 14:61–107

Posner RA. 1973. An economic approach to legal procedure and judicial administration. *J. Legal Stud.* 2:399–458

Reinganum JF, Wilde LF. 1986. Settlement, litigation, and the allocation of litigation costs. *RAND J. Econ.* 17:557–66

Schweizer U. 1989. Litigation and settlement under two-sided incomplete information. *Rev. Econ. Stud.* 56:163–77

1 Jun 2005 21:17 AR AR258-LS01-03.tex XMLPublishSM(2004/02/24) P1: KUV
AR REVIEWS IN ADVANCE10.1146/annurev.lawsocsci.1.041604.115856

Shavell S. 1982. Suit, settlement and trial: a theoretical analysis under alternative methods for the allocation of legal costs. *J. Legal Stud.* 11:55–81

Spier KE. 1994. A note on joint and several liability: insolvency, settlement, and incentives. *J. Legal Stud.* 23:559–68

Spier KE. 2002. Settlement with multiple plaintiffs: the role of insolvency. *J. Law Econ. Organ.* 18:295–323

Spier KE. 2003a. The use of most-favored-nation clauses in settlement of litigation. *RAND J. Econ.* 34:78–95

Spier KE. 2003b. Tied to the mast: most-favored-nation clauses in settlement contracts. *J. Legal Stud.* 32:91–120

Viscusi WK. 2002. *Smoke-Filled Rooms—A Postmortem on the Tobacco Deal*. Chicago: Univ. Chicago Press

Yang BZ. 1996. Litigation, experimentation, and reputation. *Int. Rev. Law Econ.* 16:491–502