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ABSTRACT

We discuss the implications of various models of settlement negotiations for the revelation or suppression of private information held by the parties. This information may be relevant to multiple audiences, including those involved in the instant lawsuit; other potential litigants that may subsequently make use of the information in their own suits against one of the parties; and more distant observers and users of the legal process. We also examine how rules of evidence and rules of civil procedure can sometimes result in different degrees of purposeful or (arguably) unintended information suppression.

1. Introduction

What do settlement bargaining models tell us about revelation or suppression of private valuations? The law and economics literature uses concepts from information economics, and tools from game theory, to characterize economic aspects of such negotiations.[1] In this article we examine which parties (both those directly interested and those more distantly interested) become informed about parties' private valuations, recognizing that the rules of civil procedure in legal proceedings sometimes provide for different degrees of secrecy and purposeful information suppression.

Revelation or suppression of information about private valuations is not relevant in a vacuum, so we will refer to a variety of "audiences" whose presence or absence can matter. For example, in a simple suit involving a defendant facing a plaintiff, the litigants are part of what we will refer to as "immediate parties," as are the litigants' lawyers, any litigation funders (i.e., third parties making loans either to the plaintiff or to one of the law firms), expert witnesses, and the court to which the litigants would proceed for trial in the absence of a settlement agreement. At a

[1] See Daughety and Reinganum (2012) for a survey discussing these concepts and tools in the context of settlement bargaining.

greater distance would be "related parties," including potential litigants (who may be either currently aware of a case – such as a potential plaintiff who might sue the same defendant, but has not yet done so – or who might be currently unaware that they should contemplate bringing suit, but who might become aware due to information from the original case). Of course, associated attorneys for these related parties are also related parties. We will reserve the category "distant parties" to refer to agents in possible future suits (litigants, attorneys, funders, judges, etc.) who learn from the outcomes of previous cases and use this information to form beliefs about the likelihood of various litigation outcomes so as to inform their actions in future cases not directly related to the instant case. Also in the set of distant parties would be neutral observers, such as academics, legislators, and journalists (among others) whose primary interest is the functioning of the legal system.

In what follows we discuss several models of modeling settlement bargaining, focusing on those that have distinct implications about what information is revealed or suppressed, and with respect to which audiences. In Section 2 we provide a brief overview of the two primary models that are employed (in one form or another) in all the analyses to follow, and we also provide a brief review of the relevant information economics concepts. Section 3 considers models that emphasize immediate parties, while Section 4 expands attention to related parties. In both Sections 3 and 4 we also discuss what information can be observed by distant parties, and the effects that might have on yet other suits. In Section 5 we discuss yet further considerations with respect to distant parties. Section 6 provides conclusions.

2. Standard Models for Settlement Bargaining Employing Information Economics

In this section we discuss the two workhorses of settlement bargaining analyses (these are the "core" models that are extended in various ways in the other sections of the paper), with

attention paid to the robustness of these primary models. The basic analysis of settlement bargaining, from an information economics perspective, employs an "ultimatum game" wherein one party makes an offer and the other party chooses to either accept the offer or to reject it (and, since we are usually modeling pre-trial bargaining, rejection will lead to trial).[2]

This is a highly stylized story; for instance, it seems to not allow for counteroffers or revisions of offers. The vast majority of the papers in the settlement literature have employed this canonical form. One motivation for this form is that the parties' time preferences are not aligned in favor of early settlement. To see this, notice that if pre-trial interest does not accumulate on the trial award, then the plaintiff will prefer earlier settlement but the defendant will prefer delay. If pre-trial interest does accumulate (at an appropriate rate), then both parties are indifferent about when settlement occurs. The upshot of this is that one cannot rely on both parties being eager to settle and so it is plausible for the court to impose a deadline by scheduling a trial date. While the trial date is not immutable, neither is it perfectly flexible so, taking it as a hard deadline, one can imagine a "last period" before the trial date that is of the canonical form. Before this last period, there may have been offers and counteroffers, but one party makes the "last offer."

The literature generally considers one party to have better information than the other, and for this fact to be known by both parties; this leads to a modeling simplification wherein one party knows precisely a relevant piece of information (e.g., the damages suffered by the plaintiff, or the culpability of the defendant), but the other party only knows the probability with which the piece of information takes on different possible values (that is, the uninformed party employs a

[2] Later in this section we consider the robustness of using this canonical two-period form by considering an explicitly dynamic model, with multiple periods of offers, wherein settlement may occur at essentially any point in a (possibly long) time horizon, as well as a paper with endogenously-determined choices of whether to move simultaneously or in sequence.

distribution function for the possible values of the piece of relevant information; this distribution function is known by both parties).[3] Such models are known as one-sided asymmetric information models.[4] In these basic models (and in many more elaborate ones), it is assumed that any private information is learned through the costly trial process.

Thus, there are two possible ultimatum games of interest. One version involves the uninformed party making a settlement offer to the informed party; such analyses are said to employ a "screening" or "sorting" model. The other possibility involves the informed party making a settlement offer to the uninformed party; this is called a "signaling" model. One form or the other may fit different specific institutional settings. For example, in a products liability suit brought by a consumer against a manufacturer, a demand for damages in the plaintiff's complaint might be thought of as the first move; one might then think about the model as a signaling game if the plaintiff was likely to know more about the true harm she suffered, or a screening game if the defendant is more likely to be the better-informed party.

Before delving into these two bargaining models, a little notation and a further bit of terminology are needed. Let us say that the plaintiff, P, has suffered a harm, d, and knows the precise level of the harm, while the defendant, D, only knows that d follows a distribution between

[3] As will be discussed below, the possible values of the informed litigant's information are called the informed litigant's "types" while the probability distribution is called the uninformed litigant's "prior beliefs." Furthermore, in most of these analyses, disclosure of the information by the informed party is not possible (i.e., not credible), and disclosure or discovery, when incorporated, is usually taken to be costly.

[4] Two-sided asymmetric information models of settlement bargaining, wherein there are two relevant issues (perhaps both damages and culpability) and each party has private information about only one of the two pieces, have been considered (via an ultimatum game) by Schweizer (1989) and by Daughety and Reinganum (1994), and (in a simultaneous offer game) by Friedman and Wittman (2006). Interestingly, the sequential versions lead to a composition of the signaling and screening games we consider in this section. Sobel (1989) also allows for a two-sided analysis, and considers disclosure and discovery within the bargaining process. The one-stage version of his analysis yields an equilibrium like that in Reinganum and Wilde (1986), which is discussed in Section 2.2; the two-stage version is similar to the papers earlier in this footnote (albeit, they do not allow disclosure).

a low value, denoted as d_L, and a high value, denoted as d_H.[5] P, however, knows the true value of d. From D's perspective (and from P's, when she is trying to think about how D will react to any settlement demand she might make, since P knows that D does not know P's actual harm suffered), P could be any "type" between (and including) the endpoints of the distribution; that is, P's *type space* is all the numbers from d_L through d_H, even though only one of these will actually be the realized type.

2.1 Informational Implications of the Basic Screening Model of Settlement Bargaining

Continuing with the above example, P is the informed party and knows her type, while D is the uninformed party and has beliefs about what P's type is (a probability distribution over the possible types of P). In a screening model of settlement bargaining,[6] the uninformed party moves first, so that D makes an offer of settlement to P. In the second stage, P either accepts or rejects this offer, resulting in either a transfer of money from D to P (if the offer is accepted) or in a trial wherein, if D loses, he must pay an award to P and (no matter the outcome) both will pay their "court costs."[7] Notice that the types (levels of damages) of P are ordered from the smallest to the largest, so that any given offer by D will create two sets of types, with one set (those with lower damages) accepting the offer and the other set (those with higher damages) rejecting it.

Using this ordering of P's types, D chooses an offer so as to minimize his expected cost. Under some reasonable technical conditions on the model, there is an offer D could make to a

[5] It is straightforward to reformulate these models to use culpability or expected damages (the composition of both parameters). Also, in what follows, we associate "she" with P and "he" with D.

[6] See Bebchuk (1984); we provide mathematical details in the online technical appendix for this paper available at http://www.vanderbilt.edu/econ/faculty/Daughety/TechAppforRevelationandSuppression.pdf.

[7] These costs are the sum of all expenditures incurred by going to trial (court-assessed fees as well as payments to lawyers and experts); these costs can be significant in magnitude and reflect the specific scheme used to compensate the lawyer. This means that the plaintiff's threat to go to trial might not be credible. Most models assume that the size of the smallest damages award is sufficient to make the threat credible; Nalebuff (1987) considers a screening model wherein this assumption is relaxed.

"marginal type" of P, denoted as d^M, which would just balance the marginal expected cost of settling with all types below d^M with the marginal expected cost of going to trial against all types above d^M. Therefore, if P's actual type is below d^M, D does not learn P's actual type (P just accepts the offer and thereby terminates the discussion), while if P's actual type is above d^M, she would go to trial and her actual level of damages would become part of the public record (revealed). The set of types who would accept the offer are said to "pool" in that all the types of P with d at or below d^M take the same action (they all accept the offer). Thus, settlement in a screening model means that private valuations are revealed to immediate parties only if bargaining fails.

2.2 Informational Implications of the Basic Signaling Model of Settlement Bargaining

We continue with the same setup as before with one difference: the informed P makes a settlement demand of the uninformed D, so this is a signaling model.[8] The defendant, being rational, uses the demand the informed P makes to infer the true level of damages he faces (i.e., to infer P's type), if at all possible. A more precise statement is that since D observes P's demand, he can update his beliefs (i.e., draw an inference) about what type (or types) of P would make such a demand if P anticipates that D will engage in such (Bayesian) updating behavior.

Notice that if D were to always accept P's demand, then he is likely to overpay via settlement, since lower types of P would "mimic" higher types by making demands consistent with being a higher type. In particular, were D to commit to always accepting P's demand, then all types would demand as if they were the highest type, d_H. To eliminate the incentive for this sort of mimicry, in a signaling model D employs a strategy that rejects P's demands with positive

[8] See Reinganum and Wilde (1986); we provide mathematical details in the online technical appendix for this paper. We adhere to the standard terminology that plaintiffs make demands and defendants make offers.

probability (unless, of course, the demand would be consistent with the lowest type, as D can do no better at trial). Moreover, higher demands are rejected with higher probability, so that D imposes a cost on P of inflating her true level of damages. While the signaling model is technically more complicated than the screening model, the bottom line is that D's rejection strategy[9] increases sufficiently rapidly in response to P's demand, eliminating the incentive for different types of P to mimic types with higher damages; that is, in equilibrium every type of P ends up making a settlement demand that reflects her actual type. Therefore, the immediate parties learn P's private valuation; this property is called "full revelation" (or "full separation"), though as we shall see below, this revelation need not extend to related or distant parties if the settlement agreement includes confidentiality as to the amount.

2.3 Timing and Robustness of the Ultimatum Analyses

Some work has been done to examine the generality of the timing assumptions. Spier (1992) considers a T-period repetition of a screening model (so there are repeated demands by the uninformed litigant, and repeated decisions to accept or reject by the informed litigant, but no counteroffers), in this case an uninformed P versus a D who knows more about the damages that would have to be paid if the case were to go to trial. In this analysis, P incurs a positive cost of making a demand each period, and money obtained in the future is worth less to each party than the same amount transferred now. Since there is discounting of future transfers to P, the "pie" from P's perspective is shrinking, and P trades off the cost of negotiation with the cost of going to trial, recognizing that repeated demands may iteratively reduce uncertainty about D's type and thereby cause D to accept before the end of the horizon. Spier's prediction is consistent with the observed

[9] This strategy is a function of P's settlement demand, the size of the court costs each litigant faces, the likelihood that P will win, and both d_L and d_H, but is independent of the distribution function (D's prior beliefs) that was so central to the screening model.

U-shaped pattern for settlement (some cases settle quickly, others "on the courthouse steps").[10] While repeated demands in a screening model subdivide the set of settling D-types into subsets (each round generates a new set of types who accept at that point), the precise true level of D's private information is, again, only revealed by bargaining failure.

Daughety and Reinganum (1993) consider a (two-period) model that allows for simultaneous offers or for endogenously-determined sequencing of offers (that is, as represented in one of the foregoing ultimatum game models), starting with one informed litigant and one uninformed litigant, where the uninformed litigant can obtain information at a cost. They show that while both parties choose to make proposals in the first period (not wait), the outcome is the same as if one of the ultimatum game models had been used. Thus, endogenously-chosen timing still yields the same results (with respect to the revelation of private information) as the fixed timing patterns considered earlier.

3. Influences from Immediate Parties on Settlement and on Revelation

3.1 Actions Taken by Litigants to Influence Settlement Bargaining

Jeitschko and Kim (forthcoming) illustrate the use of actions taken before settlement bargaining so as to affect the outcome of the bargain. In their paper, P may pursue a preliminary injunction (PI) against D (say, in a copyright infringement case). The standard argument for seeking a PI is that it is defensive: if D's continuing action creates an irreparable harm and it is likely that P would win an infringement case at trial, then a court can grant an injunction restraining D before the trial concludes (and, more interestingly, before it begins). Jeitschko and

[10] Fenn and Rickman (1999) extend Spier's analysis to reflect the English cost allocation (loser pays) system and obtain similar results. The U-shaped prediction has been tested empirically by Fournier and Zuehle (1996) and found consistent with data from a survey of civil lawsuits.

Kim consider a further reason for seeking a PI: it may be strategically beneficial for P, as simply filing a PI (a costly action) can credibly signal to D that P's damages exceed a threshold value, and thereby enhance the likelihood of settlement. The analysis employs a screening model of settlement, but allows for the decision by P to pursue a PI before settlement so as to induce D to update his beliefs about the magnitude of P's damages.

Further, the authors assume that filing for a PI leads to a hearing, whose outcome (a PI is granted or denied) is correlated with the likely outcome of the trial to which settlement failure could lead; that is, there can be learning by both parties about the strength of the case and the likely outcome of the infringement proceeding itself. They show that being denied a PI may increase settlement, as P is now less optimistic about winning at trial, while the granting of a PI makes P more optimistic about eventually winning and can reduce the frequency of settlement.[11]

Two papers have re-considered the screening model and allowed for investment in case "strength," which affects settlement bargaining (and the likelihood of bargaining failure) and thereby the release of private information. Chone and Linnemer (2010) allow the informed P to make a costly investment in case preparation that raises the overall net payoff she obtains from the trial (if trial occurs). The investment decision by P is observed by D before he makes an offer (that is, the investment can act as a signal to D, and D's offer is then part of a screening analysis).[12] The information is of use to D because, in equilibrium, it is the higher-damaged types (who would need a higher offer in order to settle) who generally invest in case preparation, as long as trial costs

[11] Here the result may depend strongly upon the use of the screening model of settlement bargaining, as D under-adjusts the offer made to settle due to the fact that not only does the marginal type adjust up, but also the set of inframarginal types (those with damages less than the marginal type) expands and all these types can free ride on any increase in the offer by D.

[12] Similar to the analysis in Section 2.1 of the screening model, an offer made will make some type indifferent between going to trial and settling; this preference is now influenced by the possible trial costs P may face, the cost of the investment in case preparation, and the size of the gain in net value of the case due to the investment.

are not too great. However, this encourages some types with lower damages to invest, so as to try to suggest they have high damages; this "bluffing" persists in equilibrium and varies with the model's parameters. While quantitative differences in the set of types that settle occur, private information is only fully revealed if there is bargaining failure and the case goes to trial.

While Chone and Linnemer consider investments before bargaining, Farmer and Pecorino (forthcoming) consider investments in improving their cases after bargaining fails. In this case the investments in case strength cannot signal information, but the presence of the option later in the sequence of activities can affect settlement (which is modeled using a screening game). Moreover, if bargaining fails then the type of P is revealed (as before). Thus, the ability to invest in the quality of the case at trial can feed back into the bargaining phase, causing more settlement and sometimes more revelation of private information (for example, if P chooses disclosure).[13]

3.2 An Imperfectly-Informed Trial Court Judge

In all of the foregoing analyses, courts (embodied as a single decision-making judge) are always assumed to learn the true value of the relevant information at trial. Under this assumption the judge's decision cannot be influenced by the settlement bargaining process; it is simply the outside option should bargaining fail. However, if the judge is modeled as receiving an imperfectly-informative observation of P's true harm – specifically, he receives a perfectly-informative observation with some probability and with the complementary probability he receives a completely-uninformative observation – then the judge's subsequent reliance on information from the settlement stage will affect the plaintiff's and defendant's bargaining

[13] Space limitations unfortunately preclude a discussion of discovery or disclosure, as the general literature in this area is quite extensive. Early papers analyzing disclosure and discovery within the settlement bargaining game are by Sobel (1989) and Shavell (1989). The foregoing contribution, Farmer and Pecorino (forthcoming), also considers discovery and disclosure.

behavior. Daughety and Reinganum (1995) provide such a model in a signaling framework; they consider two different evidentiary rules about how a judge can subsequently rely on the outcome of settlement negotiations.

First, and consistent with prevailing evidentiary rules (Federal Rule of Evidence 408), the judge cannot observe the settlement demand that was made, he can only observe that settlement negotiations failed, and he (inevitably) uses this observation to revise his prior distribution about P's likely level of damages (in the event that he does not receive a perfectly-informative observation at trial); this game is similar to that considered in Section 2.2. Because cases with lower damages are more likely to settle than cases with higher damages, if the judge observes that a case has come to trial (and he does not observe the true damages at trial), then the expected damages he awards conditional on settlement having failed is higher than P's *ex ante* expected damages (based on the prior distribution of damages).

Second, the model is modified to allow the judge to observe the plaintiff's settlement demand (that is, this demand is introduced as evidence at trial) and to use this observation to revise his prior distribution about P's likely level of damages (in the event that he does not receive a perfectly-informative observation at trial). Notice that now there are two uninformed parties that are making inferences about P's true damages from her settlement demand. The plaintiff wants to persuade both the defendant and the judge (in the event that he does not observe her true damages perfectly at trial) that her damages are high, so her temptation to inflate her demand is greater when her demand is observable to the judge as well as the defendant. Daughety and Reinganum find that when the judge is sufficiently likely to observe P's true damages at trial, then there will still be an equilibrium wherein P's demand reveals her damages. However, in order to induce revelation, D must reject P's demands with a higher probability in order to counteract her higher temptation to

inflate her demand. Since P's demand is revealing, the judge always learns her damages perfectly at trial, either through direct observation or through her revealing settlement demand. Thus, in this parameter configuration, the judge learns more information and makes more accurate awards (than if P's demand were not observable), but this comes at a higher cost as more cases go to trial.

As the judge's observation at trial becomes increasingly imperfect (and therefore he must increasingly rely on the inference he makes from P's settlement demand), the nature of the bargaining equilibrium outcome changes. In particular, there is a set of higher-damaged plaintiffs who cannot be deterred from pooling at a very high demand that provokes rejection by the defendant. Essentially, these plaintiff types give up on trying to settle with D (who therefore does not learn P's true damages during settlement negotiations), and focus on persuading the judge that their damages are high. If the judge's observation at trial is sufficiently imperfect (and therefore he must rely heavily on the inference he makes from P's settlement demand), then all plaintiff types pool at a high demand, so that D does not learn P's true damages during settlement negotiations. Moreover, all cases go to trial so that – not only does the judge learn nothing from P's observed (but uninformative) settlement demand – he cannot even draw a meaningful inference from the fact that the case failed to settle; his posterior beliefs are the prior beliefs.

As long as the judge observes P's harm imperfectly at trial (and therefore would rely, at least to some extent, on information contained in the settlement demand), it turns out that keeping settlement demands inadmissible as evidence at trial reduces the *ex ante* expected number of trials, although the parties do not agree on which policy is best: on an *ex ante* basis, D prefers that P's demand be admissible, while P prefers that it remain inadmissible. The reduction in the *ex ante* expected number of trials suggests that this is a situation in which information *suppression* may

actually be beneficial: information suppression via one channel (the evidentiary rule) reduces expected litigation costs and may improve information revelation via another channel (the settlement process).

A distant party can infer the plaintiff's true damages from any publically-available details of a successful settlement demand.[14] If the case goes to trial instead, he will learn the same amount as the judge, although this will vary depending on the admissibility of the settlement demand.

3.3 A Litigation Funder

Now reconsider the base model wherein an informed P makes a settlement demand of an uninformed D; moreover, assume that the judge learns the true harm perfectly at trial. In this section, we discuss the impact of consumer legal funding on settlement behavior.[15] In order to be eligible for consumer legal funding, P must be represented by an attorney, and this will very likely mean that the attorney is first in line to receive a share of the proceeds (via a contingent-fee contract) from either settlement or trial. Consumer legal funding entails a litigation funder making a non-recourse loan to the plaintiff. The non-recourse aspect is that P need only repay the litigation funder out of her remaining (after paying her attorney) proceeds of either settlement or trial. Thus, this model will involve two "other immediate parties:" P's attorney and the litigation funder. However, we will take the contingent-fee contract as given and focus on the interaction between the plaintiff and the litigation funder, in order to examine how an optimally-structured

[14] If the settlement amount is confidential, then a distant party (who can, presumably, also calculate the equilibrium strategies for the plaintiff and defendant) will update his or her beliefs to reflect the information contained in the fact that the case settled: basically, since plaintiffs with lower damages are more likely to settle, the distant party's posterior distribution over harm will be downward-revised relative to the prior distribution. We discuss confidential settlement in Section 4.

[15] This section is based on Daughety and Reinganum (2013); see Garber (2010, pp. 9-10) for a description of consumer legal funding.

non-recourse loan affects the bargaining between P and D.

The basic structure of this model involves P first consulting with an attorney to verify that she has a valid suit; we take this to involve verification of the prior distribution of her damages award, should she win her suit at trial. Then P, now represented by counsel, contracts with a litigation funder; at this point, all parties have common knowledge of the distribution of damages. The contract consists of an up-front payment from the litigation funder to the plaintiff, and a specification of what P owes the litigation funder (the repayment amount) should there be any proceeds from the suit (via either settlement or trial). The non-recourse aspect implies that P can never repay more than she receives.[16] Then P returns to her attorney and they prepare the complaint; during this time period P and her attorney inevitably learn more about her true damages (assume, for simplicity, that they learn this perfectly). Finally, the complaint is filed and it contains P's settlement demand, to which D responds.

In the basic signaling model of settlement negotiations discussed in Section 2.2, a revealing equilibrium can exist because the payoff from P's outside option of going to trial is increasing in the amount of her damages (which is her private information). Daughety and Reinganum (2013) consider the full range of repayment amounts, where a repayment amount of zero results in the basic revealing equilibrium. As the repayment amount is raised, at first the equilibrium remains a revealing one, but trial occurs more often.

As the repayment amount rises yet further, eventually P's net payoff at trial (that is, her payoff after repaying the litigation funder to the greatest extent possible) becomes zero for a set of

[16] While there are many possible reasons why such a contract can benefit P and the litigation funder (for example, P may have worse access to credit markets and may therefore discount her future income more heavily than does the litigation funder; or the plaintiff may be more risk averse than the litigation funder), we abstract from these and focus only on the effect of such a loan contract on the subsequent settlement bargaining between P and D.

(lower-damaged) types; indeed, for every repayment amount there is a unique marginal type whose net payoff at trial is just zero. Since P's payoff from the outside option of going to trial no longer increases with her type for this set of types, these types cannot use the settlement demand to signal or reveal their types. Rather, they must make the same pooling settlement demand. The remaining (higher-damaged) plaintiff types' payoffs from the outside option of going to trial still continue to increase with type, and thus this higher set of types can use the settlement demand to signal their types. This results in a "partial pooling" equilibrium wherein types in the lower-damaged set make a common demand and D accepts it, whereas types in the higher-damaged set make revealing demands that D rejects with a positive probability that increases with the demand. As the repayment amount rises yet further, the set of pooling types increases, and the remaining higher-damaged plaintiff types' demands are rejected for sure, as any positive probability of acceptance would tempt the pooling types to mimic a higher-damaged type. Finally, as the repayment amount continues to rise, all types anticipate a net payoff of zero from trial and hence all types make a common pooling demand (equal to the average expected damages plus D's trial costs), which D accepts. It is straightforward to show that this "complete pooling" outcome maximizes the expected combined payoff of the plaintiff and the litigation funder, as it fully-extracts D and there are no litigation costs because every suit settles.[17]

The effect of consumer lending on information transmission is quite dramatic. Within the plaintiff and defendant bargaining game, consumer legal funding removes P's incentive to signal her type and thus no information is transmitted. Moreover, every suit settles at the average

[17] Although P's attorney is not modeled as an active player in this scenario, he is also quite happy with this litigation funding contract since he never has to go to trial, which entails both a cost and a risk of losing the suit. The optimal repayment amount can be quite substantial, and some have remarked that the imputed interest rate is enormous, but it is misleading to think in these terms because of the non-recourse nature of the loan. Finally, it is essential that control rights stay with P, as should the litigation funder *buy* the case from P, then bargaining will now be as in Section 2.2, with a positive likelihood of bargaining failure.

demand so a distant party learns nothing from either the settlement amount itself or from trial (as there are no trials in equilibrium). Although information transmission is suppressed, this is actually a Pareto-superior outcome (considering only the immediate parties) since all actors on P's side (P, her attorney, and the litigation funder) are better off and the defendant is exactly as well off as if there were no litigation funding (and thus D's incentives to take care are not diluted by the increased amount of settlement). On the other hand, notice that distant parties learn no more than the average damages for the case.

4. Influences from Related Parties on Settlement and on Revelation

In this section, we consider models involving important interactions between immediate parties and other related parties. For instance, a plaintiff and defendant who are currently engaged in a lawsuit may anticipate that there are other potential plaintiffs (or, perhaps, other potential defendants) that could be brought into the current suit (e.g., via joinder, class action or joint and several liability) or could be involved in a follow-on suit depending on the status or outcome of the current suit. The parties to the immediate suit may modify their behavior in anticipation of what information will be transmitted (or suppressed) to these other related parties (for example, they may conclude confidential settlement agreements so as to reduce the likelihood of follow-on suits).

4.1 Sequentially Related Suits without Confidentiality

In some scenarios, there may be a sequence of plaintiffs suing a common defendant wherein the outcome in the early suit can influence the filing and conduct of later suits.[18] Che and

[18] A prominent example is an antitrust suit wherein a government suit may establish the defendant's guilt and follow-on civil suits for treble damages need only establish the level of harm caused by D's anti-competitive behavior. In this context, Briggs, Huryn and McBride (1996) use a signaling model; D's private information concerns his guilt, and here a high offer implies guilt. Innocent Ds never offer to settle with the government; some guilty Ds do offer, knowing that this will trigger (private) follow-on suits that they will then also settle. Innocent Ds (and guilty Ds who are mimicking the innocent) make no offer and face the possibility of

Yi (1993) consider a sequence of plaintiffs suing the same defendant for damages. Each P has private information about her own damages and D makes the settlement offer; thus, the authors employ a sequence of screening models. There is a (commonly-known) probability that D will be found liable in the early suit; if that suit settles then the same probability applies in the later suit. But if that suit goes to court, then the probability that D will be found liable in the later suit is higher if the early P wins (in which case D will make a higher settlement offer in the later suit) and lower if the early P loses (in which case D will make a lower settlement offer in the later suit). These probabilities need not be one and zero, respectively, but the extent of updating is also assumed to be common knowledge. This updating can be viewed as learning something from the trial outcome about how the law applies in such cases. Thus, it can be viewed as a weak version of collateral estoppel or as the development of precedents that will apply in predictable ways to future suits.

The question at issue in this model is whether the existence of the later case will cause a defendant to seek trial more often or less often (respectively), in order to establish or avoid (respectively) a precedential decision.[19] Che and Yi (1993) find that when the probability that D will be found liable in the early suit is above a threshold value, then D will have a greater incentive to avoid trial by making a higher settlement offer and settling with more plaintiff types in the early suit. Conversely, when the probability that D will be found liable in the early suit is below the threshold value, then D will have a greater incentive to provoke trial by making a lower settlement offer and settling with fewer plaintiff types in the early suit. Thus, the potential to learn about

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trial, which would reveal their type. Thus, related parties obtain information both via trial and via settlement.

[19] Che and Yi (1993) consider another version of their model wherein the defendant's liability in the two suits is uncorrelated but the plaintiffs' damages are correlated. They assume that both suits are ultimately filed, whereas Yang (1996) is concerned with finding circumstances under which behavior in the early suit can deter the later suit.

how the law applies to a given issue or to establish a precedent may result in either more or less trial and hence to more or less revelation of information to the related party and to distant parties, depending on the magnitude of the prior probability of liability.

Hua and Spier (2005) consider a scenario in which a single P faces two Ds in sequence; P's damages are perfectly-correlated in the two suits and both Ds are uninformed about P's damages, while her damages are P's private information. Using a screening model wherein the uninformed early D makes a settlement offer to the informed P, they show that plaintiff types with higher damages have a stronger incentive to go to trial against the early D (as compared to the situation wherein there is no later D) because P benefits directly from a high award at trial in the early case and she also benefits indirectly because a higher award induces the later D to increase his level of care. Indeed, the first suit may go to trial too often (as compared to the social optimum). Both the early and the later D (and any distant parties) learn the true harm if the suit goes to trial, but in the event the early suit settles, they can only update their beliefs about harm based on the observation that settlement occurred.

This model has the interesting feature that the allocation of liability between P and the Ds has an impact on the extent to which information is revealed (through failed settlement resulting in trial) and the extent to which the later D adjusts his level of care in response. Since this information is productive, the optimal design of the liability system will account for the extent and value of information revelation by allocating some liability to each party.

4.2 Confidential Settlement

A defendant's behavior is often the alleged cause of harm to multiple private plaintiffs who bring suit sequentially. Suits may arise in sequence because plaintiffs only learn about the source of their harm from observing prior suits, or their harms can be realized at different times due to

latency. In this subsection, we first discuss a model wherein two Ps sue the same D in sequence; although there are some common aspects to the two suits, since the same defendant is involved, and the outcome of an early suit may reveal relevant information about D's culpability to a later P, the anticipation of the second suit will influence the outcome of the first suit, including any possible settlement agreement between D and the early P. This leads to bargaining over both the settlement amount and over an agreement to maintain confidentiality (in the first suit) regarding their settlement.[20]

Daughety and Reinganum (2002) assume that the existence of the later P is common knowledge between the early P and D, but they also both know that this later P will only file suit if she becomes aware of D's involvement in her harm and this awareness is highest following a trial, moderate following an open (with observable details) settlement, and lowest following a confidential settlement.[21] Moreover, D's culpability (the likelihood that he will be found liable) in the two suits is assumed to be the same, although the outcomes of the two suits need not be the same (it is as if a coin is flipped in each case, but it is the same coin). Whereas D knows this likelihood, neither plaintiff knows it. However, when D responds to the first plaintiff's demand, this response can reveal information about his culpability. In particular, it is assumed that this likelihood is revealed by a trial, but only inferences about it can be made from a settlement (as is typical in screening models), and the inference can be refined based on whether the settlement is open or confidential. This inference will govern the settlement demand that the later plaintiff will

[20] Yang (1996) also reports results for a version of his model wherein the amount of the early settlement is confidential. Since confidentiality affects the willingness of the later P to file suit, it affects D's strategic use of trial in the early suit.

[21] In Daughety and Reinganum (1999), a P bargains with a D who possesses two bits of private information: D knows his likelihood of being found liable in the instant suit and he knows whether he will face a second P later. In that analysis, which involves a sequence of screening models, the likelihoods that D will be found liable in the two cases are assumed to be independent of one another.

make of D, so D will take this into consideration in responding to the early P's demand (and the early plaintiff will take this into consideration in formulating her demand).

It is shown that, conditional on the status of settlements (either open or confidential), equilibrium involves two rounds of screening. In the early suit, P goes to trial with a D whose likelihood of being found liable lies below an equilibrium threshold level, and otherwise settles. In the later suit (if it is filed) following a settlement, the later plaintiff goes to trial against those D types with a relatively low likelihood of being found liable (but not an absolutely low level, as those D types went to trial in the first suit), and otherwise settles.

One might think that only the "worst" types would engage in confidential (as compared to open) settlement, but this is not the case: an interesting (and a bit counterintuitive) finding is that the set of defendant types that settles in equilibrium is larger under confidential settlement (involves a lower marginal type) than under open settlement. Confidential settlement reduces the probability of a later suit due to reduced publicity, and thus any D type is willing to pay more for confidentiality. Therefore, to induce the same marginal D type to settle, the early P can demand more under confidential than under open settlement. But if P is just indifferent under open settlement about inducing a particular (marginal) type to settle, then she strictly wants to induce this type to settle under confidential settlement. Thus, the early plaintiff settles with more defendant types under confidential than under open settlement. On the other hand, because more defendant types settle in the early case, it turns out that the later P (should she file suit) goes to trial with more D types under confidential than under open settlement.

By observing the sequence of suits, a distant party could learn D's type in the early suit if the case went to trial; if that suit settled, the distant party could learn D's type in the later suit if that suit went to trial; only if D settled in both suits would a distant party be left with purely an

inference (based on the screening demands) about D's culpability. It turns out that the set of types that end up going to trial in either the first or the second suit is the same, provided the later suit is filed. But since confidential settlement in the early suit suppresses some later suits by reducing publicity, the overall impact of confidentiality is to result in fewer trials and thus less information is revealed to distant parties.[22]

4.3 Joinder and Settlement

In the previous discussions, the roles of early and later plaintiff were exogenous, and each suit was pursued separately. Daughety and Reinganum (2011) allow for permissive joinder[23] of cases, wherein the number of Ps is random (for simplicity, one or two), and the timing of their filing of suit is endogenously-determined. If an individual is a victim, then she observes this fact (and her damages) privately. Neither D nor any other potential victim observes the total number of victims or their damages (which are independent and identical draws from a commonly-known distribution).[24] Each potential plaintiff can decide whether and when to file suit (at a fixed cost), whether to join her suit with that of another victim who has already filed suit (which lowers the litigation costs per plaintiff and increases the likelihood that each plaintiff will prevail), and whether to drop a suit that she has previously filed.

In the benchmark case wherein settlement is not allowed, they find that the equilibrium resembles a "bandwagon." Each victim pursues a strategy that involves the following behavior

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[22] When settlements of product safety-related lawsuits are confidential (which appears to be common), firms will choose to provide less-safe products; see Daughety and Reinganum (2005). Thus, even though confidentiality may more readily induce some settlement (and clear court dockets), it has a negative effect on product quality.

[23] Class action suits are a special type of joinder, with their own rules. Che (1996) considers the formation of classes and allows for opt-outs. There, the damage level (high or low) is each victim's private information, and the class (if it wins) will receive damages sufficient to provide each member with the average harm. This results in the class and the opt-outs being a mix of the two types.

[24] P and D are assumed to know the maximum possible number of victims (e.g., the number of buyers of a product).

(think of this occurring over two time periods):

(1) if damages are sufficiently high, file suit in period 1;

(2) if damages are moderate, wait in period 1 and then file suit in period 2 only if another victim filed suit in period 1;

(3) if damages are sufficiently low, then do not file suit in either period even if another victim filed suit in period 1.

The set of victim types that file suit in period 1 involves some types that would file even if it was known that there were no other victims, and some (lower-damage) types that will file suit in period 1 in the hope that there is another victim out there – who may be waiting in period 1 – but who will file in period 2 and join the first plaintiff. This set of plaintiff types will regret having filed suit if they are not joined by another plaintiff (but the filing cost is sunk); indeed, if the trial costs are sufficiently high, then such a plaintiff will drop her suit if she is not joined by another plaintiff. Note further that joinder can induce suits that would not have been pursued on a stand-alone basis (because of having an expected value less than zero, due to the cost of pursuing the litigation) to now be pursued. To the degree that this results in information about such suits being revealed, distant parties learn more about the distribution of harm.

In the benchmark model, if a suit is filed and goes to trial, then the defendant and any distant parties will learn the true damages. If a suit is filed, but subsequently dropped, then the defendant and any distant parties will know that the damages lie within a subset of the original support (high enough to justify filing, but low enough to justify subsequently dropping, the suit). If only one suit is filed (or no suits are filed, respectively) then the defendant and any distant parties do not know whether there was only one victim (or no victims, respectively) nor what harm these non-filing victims might have endured (though Bayesian updating about the number of

victims and their damages is possible).

Next, Daughety and Reinganum allow the defendant to settle strategically (and perhaps confidentially) with a single early filer[25] in order to undermine the filing of a later suit (by eliminating the possibility of scale economies with respect to cost or to evidence production). D may have a substantial motivation to settle if it is possible that there is a second victim but she is unaware that her harm is attributable to D's behavior.[26] In this case, a confidential settlement may preclude the second victim from even learning about the first victim's suit (and thereby making the connection between her harm and D's behavior). The ability to undermine the filing of a later suit makes it optimal for D to settle (and confidentially, if possible) a single early suit. Furthermore, even though the model assumes that D makes the settlement offer (and therefore has all of the bargaining power), he must compensate the early P for the foregone scale economies she might have enjoyed if a later P joined her suit (and which she could obtain by going to trial instead of settling).

Anticipating all of this, what is the optimal filing behavior of a victim who knows the defendant caused her harm? Such a victim knows that there is now no advantage to waiting until period 2: if there is another victim and if that victim were to file in period 1, then D would settle the case and there would be no one to join in period 2. Thus, the "bandwagon" turns into a "gold rush" wherein all suits that will be filed are filed in period 1. If all victims are sufficiently aware of the connection between their harm and D's behavior, then there are parameter values for which

[25] If both victims file in period 1, the defendant will still settle but has no additional incentives to do so beyond simply saving trial costs in the joint suit.

[26] The model assumes that a harmed victim has a base probability of discovering the link between her harm and the defendant's behavior, but any further improvement in this probability is suppressed by confidential settlement, whereas an open settlement raises this probability to one.

D would prefer that pre-emptive settlement be prohibited (because the total number of cases filed is higher in the gold-rush equilibrium than in the bandwagon equilibrium). On the other hand, if all victims are sufficiently unaware of the connection between their harm and D's behavior, then D will prefer a regime of confidential settlement to one of prohibited settlement.

There are two margins of information-revelation that are affected by settlement. First, the set of victim types that file suit is affected; as noted above, this set can be (but need not be) larger when only open settlement is allowed. Second, if some victims are unaware that the defendant is responsible for their harm, then confidential settlement can have a substantial blocking effect on information revelation and an unaware victim may be deterred from filing, even if she has suffered significant harm. This latter effect is particularly troublesome for a distant party because there are now multiple reasons for the observation that no suits were filed: D's behavior may not have caused harm; it may have caused harm but the level of harm may have been insufficient to warrant a suit; or it may have caused harm and the level of harm may have been substantial, but the victims may be unaware of the connection between their harm and D's behavior, and any revelation of that information via an early suit was suppressed by confidential settlement.

5. Further Considerations with Respect to Information and Distant Parties

Recall that distant parties include those without a direct interest in the current suit (or in directly-related actions) but who might have a more generally-derived interest, such as drawing conclusions about the prospects for a suit that they are contemplating. The presence of distant parties reflects the fact that lawsuits which yield publically-available information provide a public good. This argument is especially noteworthy for suits that go to trial[27] but, to a somewhat more

[27] An early argument along this line, discussed from the perspective of justice, was made by Fiss (1984). Hua and Spier (2005), discussed earlier in Section 4.1, also argue that since trial may involve greater investigation of the damages than settlement, trial

limited degree, would also hold for settlements that are publically available. This latter point reflects the fact that it is costly to search over all possible settlement agreements (less so for public records from trials, but even this type of search is costly since many court-sanctioned agreements are only documented at the county level), so the mere existence of an "open" settlement agreement does not imply the diffusion of information to all potentially interested, but distant, parties. Even the advent of online sources of information has not made the diffusion of such information automatic or universal. For example, Helland and Lee (2012) discuss the recent development of state-operated medical malpractice web sites with information about doctors and osteopaths, but: 1) only 17 states currently operate such web sites; and 2) data on the web sites may be (purposely) only in aggregate or censored form, and it differs from state to state.

One might wonder whether potential litigants (or their lawyers) are actually influenced by the presence of information about the outcomes of previous trials for similar cases; in particular, are distant parties influenced by such aggregate information? Recently, Seabury (2013) has examined a version of this question by regressing damage awards in individual cases against the average award in similar cases (in the same jurisdiction) for a previous year, finding a negative relationship between past and present outcomes. Allowing for the possibility that this effect reflects an increase in the deterrence effect of liability or that large past awards bias juries or judges, Seabury finds stronger support for a "settlement effect:" larger previous awards induce more current plaintiffs to pursue less valuable cases to trial rather than settling.

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with an early defendant creates a positive externality if the later defendant uses the information released via the first D's trial to adjust his choice of precautionary investment.

There is, potentially, a second source of influence on the prior assessments that distant parties make and on their behavior in settlement negotiations. Normally, when we think about causation in a lawsuit, we have in mind a definable sequence of actions that leads from the tortfeasor to the victim. However, the sources of many modern harms are harder to pinpoint. Particularly in the case of torts arising in certain mass-marketed products (for example, pharmaceuticals, tobacco, and vaccines) or from mass exposure incidents (for example, exposure of ground troops to dioxin or exposure of workers to hazardous chemicals, such as nickel-cadmium fumes in the making of batteries),[28] the inability of science to provide a precise description of the mechanism of causation has encouraged courts to rely on the testimony of experts who employ aggregate data and epidemiological analyses to assess the issue of general (in contrast with specific) causation via the assessment of the relative risk of a product causing a particular harm.[29] This reliance by courts on the use of summary statistics can, in turn, influence distant parties in their assessments as to whether to bring suit, the settlement demand to make, and the likelihood of settlement. In this context, Daughety and Reinganum (2010) use a screening model wherein D knows his true liability for a harm and P makes a settlement demand of D, but D cannot credibly prove his known level of liability in court. They show that anticipation that courts will use the prevalence of harm in a population to draw an inference of causation can lead to a "rational optimism effect" that creates increased incentives for higher settlement demands.

Thus, there is a two-fold effect of information revelation on distant parties. First,

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[28] See Green, Freedman, and Gordis (2000: 335, footnote 5) for detailed citations for these examples.

[29] For example, sufficient long-term smoking of cigarettes has been determined to generate a relative risk of ten of contracting lung cancer; many courts accept anything greater than two as sufficient to support general causation; see Green, et. al. (2000). In conjunction with specific causation support (the specific plaintiff consistently engaged in such an activity), such cases are likely to settle rather than go to trial.

revelation via either trial or publically-available records affects the formation of prior assessments by distant litigants involved in their own suits. Second, adoption by courts of procedures that depend upon aggregate summary statistics derived from available databases for the adjudication process may influence how distant parties approach the bargaining problem.

6. Conclusions

In this article we have reviewed a number of models applying information economics to settlement bargaining, with consideration of various legal rules, asking who learns what in terms of revelation of private information about valuations. Contrary to what one might expect, precise revelation of private information about valuations due to such negotiation is surprisingly limited. When bargaining fails and the "threat" (trial) is employed, information about the private values of the bargainers (e.g., the level of damages suffered by a victim) is likely to become known beyond the immediate parties – that is, observable or inferable (at least in theory) by related or distant parties.[30] However, settlement agreements may mask information or, at the least, make inference by outsiders difficult. Encouraging settlement is a "prime directive" of much of the legal system;[31]when successful, it decentralizes activity, reduces congestion, and potentially protects privacy interests. As discussed in Section 3, a number of procedures and opportunities for investments in cases enhance the likelihood of settlement. Moreover, rules of evidence and of civil procedure may limit information to the bargaining parties (as discussed in Section 3.2) or may reduce or suppress the transmission of information to related parties (as discussed in Sections 4.2

[30] The traditional estimate is that only about 5% of cases proceed to trial. Eisenberg and Lanvers (2009) have recently shown, in a statistical analysis of data from cases in the Eastern District of Pennsylvania, that this does not imply a 95% settlement rate. They find an average settlement rate closer to 67%; procedural actions such as pretrial dismissal and default judgments also contribute to the difference between trial and settlement rates.

[31] See Resnick (2000), quoting a trial judge as stating, as a maxim, that "… a bad settlement is better than a good trial" (at 926), as well as other examples of the emphasis on settlement in the legal system.

and 4.3). Furthermore, recent developments in the funding of cases (see Section 3.3) may (if optimally implemented) reduce trials and the information they provide, as well as (essentially) eliminate the transmission of information, even between the plaintiff and the defendant.

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