Against Compromise: A Mechanism Design Approach*

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Abstract

We solve for the settlement mechanism and fee shifting rule that minimize the likelihood of litigation yet maintain substantive social goals as justice and deterrnece, prsecribed by substantive law, under the assumption that the main dispute between the parties is about the defendant's liability. The solution turns out to be surprisingly simple: let the defendant plead liable or not. Instruct a defendant who admitted liability to pay the plaintiff the entire sum of damages. Then, if the plaintiff decides to proceed to trial although the defendant pleads not liable, shift all litigation costs to the loser in trial (following the English fee-shifting rule). Using a mechanism design approach we demonstrate that no other mechanism can implement a lower rate of litigation without undermining deterrence. We discuss our result in the context of recent legal reforms in the U.S. and U.K.

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1. Introduction

There is a widespread perception that the administration of civil justice is severely compromised by high litigation costs and long delays. Going to court to claim or defend one's rights is becoming nearly impossible for people of limited means while for others justice may become so seriously delayed that it is at risk of being denied.[1] According to some commentators, the situation is already grave enough to be considered a crisis (Zuckerman, 1999).[2]

The recognition that increased incidence of out-of-court settlements may help save time, cut costs, and reduce existing backlogs, has led to the consideration of various ways for facilitating settlements. Two notable examples are the Civil Justice Reform Act (1990) (CJRA) in the U.S., and the new Civil Procedure Rules (1998) (CPR) in Britain. Both American and British rules of procedure seek to reduce the rate of litigation by encouraging early judicial involvement in pre-trial stages, promoting the use of Alternative Dispute Resolution (ADR) mechanisms such as arbitration, mediation, and early neutral evaluation, and by using offer-of-judgment fee-shifting rules that condition the allocation of litigation costs on early settlement offers as well as on the outcome of the trial. The purpose of these rules is to encourage litigants to resolve their disputes consensually by providing persistent support for settlement throughout the litigation process, from filing to trial.[3]

These procedural measures have been scrutinized both with respect to their effectiveness in cutting cost and delay, and with respect to their possible adverse effects on justice and deterrence. Empirical studies that have examined the effects of procedural changes on the rate of filing lawsuits, on the expected time from filing to termination, and on litigants' and administrative costs have shown that active judicial involvement in settlement negotiations and referral to ADR mechanisms had no significant effect on either one of these measures.[4] Theo-

[1] See Woolf Interim Report, 1995; the Federal Courts Study Committee Report, 1990; and the Brookings Report, 1989.

[2] Even those who avoid the term crisis agree that there is an increasing problem of cost and delay. See, e.g., Galanter (1983) and Posner (1985).

[3] See Woolf Final Report (1996), and references *supra*, note 1.

[4] The RAND Institute for Civil Justice has conducted an evaluation of the effects of the CJRA on various parameters in 20 pilot and comparison districts. The study has found that early judicial case management was associated with both significantly reduced time to disposition and significantly increased lawyer work hours. As for use of arbitration, mediation, and early neutral evaluation, no statistically significant effect was found over time to disposition or cost of litigation. See Kakalik et al. (1996a, 1996b).

retical research of other mechanisms, notably fee-shifting rules and strict pleading standards, has come up with no definitive conclusion with respect to the effects of such mechanisms on the rate of litigation and on the level of litigation costs.[5] In addition, concerns have been raised about the possible implications of such reforms on the substantive content of the law, namely, justice and deterrence. Settlement has been claimed to be normatively inferior to litigation (Fiss, 1984); managerial judging has been alleged to undermine inherent values of the judicial system (Resnik, 1982); and promotion of ADR has been questioned over its possible adverse effects on deterrence (Shavell, 1995; and Hay 1997).

That both procedural efficiency and substantive goals should be considered when procedural reforms are contemplated is apparent from the explicit requirement of Rule 1 of the American Federal Rules of Civil Procedure (FRCP) that the rules "shall be construed and administered to secure the just, speedy and inexpensive determination of every action", and from the overriding objective of the CPR, stated in Rule 1.1 "enabling the court to deal with cases justly". Yet, a comprehensive welfare analysis of procedural rules is still lacking (Shavell, 1997).

In this paper we attempt to bridge the gap between substantive and procedural goals while focusing on disputes over defendants' liability. That is, we assume that while the parties are in disagreement over the defendant's liability, the amount of damages is not contested. We ask what would be the settlement mechanism and fee-shifting rule that would realize the lowest possible rate of litigation yet maintain social goals subscribed by the law. We find the answer to this question surprisingly simple: let the defendant plead liable or not. Instruct a defendant who admitted liability to pay the plaintiff the entire sum of damages. Then, if the plaintiff decides to proceed to trial although the defendant pleads not liable, shift all litigation costs to the loser in trial (following the English fee-shifting rule).[6] Using a mechanism design approach we demonstrate that no other mechanism can implement a

[5]See, e.g., Miller (1986), Rowe and Vidmar (1988), Schwarzer (1992), Anderson (1994), Spier (1994), Anderson and Rowe (1995), Rowe and Anderson (1996), Chung (1996), Hylton (1996), and Farmer and Pecorino (2000).

[6]Note that the parties would not agree to settle at this stage. Because any offer to settle would be correctly interpreted by the plaintiff as an admission of liability, and because a liable defedant expects to pay the entire sum of damages plus total litigation costs if the case is litigated to trial, after the defendant denied her liability, the plaintiff would rationally refuse to settle for anything less than the entire sum of damages plus total litigation costs.

lower rate of litigation without undermining deterrence.[7]

Notably, the optimal mechanism does not lead the parties to compromise. Either the defendant pays the plaintiff's claim in full, or the plaintiff drops the suit. Otherwise, they litigate to judgment. No middle ground is sought. This surprising feature of the optimal mechanism is a consequence of its twofold objective of minimizing litigation together with preserving deterrence. Compromise dilutes deterrence because it narrows the difference between a liable and a non-liable defendant's liability. Such dilution may be offset by a higher rate of litigation, but at the price of frustrating the initial goal of maximizing the rate of settlement.

Furthermore, under the optimal mechanism all concessions qua settlements are made before pre-trial activity begins and before any litigation costs are incurred. To understand this result note that liable defendants who expect late settlements would prefer to deny their liability and refuse early settlement offers in the hope of obtaining better terms down the litigation road. The greater the risk of litigation, the higher the cost for refusing to settle, and the more intense is the pressure on litigants to settle early. Therefore, a commitment to litigate, although difficult to maintain in the face of an ex-post motivation to settle, may nevertheless facilitate an ex-ante lower rate of litigation.

In fact, the early settlement mechanism we identify minimizes not only the probability of litigation but also total litigation costs. Since under this mechanism all settlements are agreed upon before any litigation costs are incurred, this mechanism is the least costly among all possible mechanisms with the same overall probability of settlement. Any other mechanism that induces the same overall settlement rate, yet delays some settlements, involves some litigation costs which the proposed mechanism avoids. It is therefore the most "speedy and inexpensive" mechanism among all possible mechanisms that induce the same level of deterrence.

This paper's result also suggests that sophisticated fee allocation rules, based not only

[7]This optimal mechanism is immune to the famous "Wilson critique." Wilson (1985) who presumably was motivated by the fact that in "practical situations," little, if at all, is commonly known among the relevant agents, argued that good economic institutions must not rely on features that are common knowledge among the agents such as (in the context of litigation) the litigants' probability assessments (i.e., the prior), and the litigants' utility functions. Contrary to what one would expect given the broad appeal of Wilson's argument, mechanism design theory has not produced many mechanisms that are immune to his criticism.

on findings of liability on trial but also on early settlement offers (*offer of judgment* rules), such as Rule 68 of the FRCP and part 36 of the CPR, need not be employed if the rate of settlement is to be maximized subject to a deterrence constraint.[8] Indeed, the literature on *offer of judgment* rules (most notably Spier 1994), as well as case law, have concluded that such rules would not facilitate settlements when liability is the main issue to be decided on trial.[9,10] Yet, the possibility that there are other types of fee allocation rules that would

[8]According to Rule 68 of the FRCP a defendant may serve upon the plaintiff an offer of judgment that the plaintiff may accept within 10 days. An offer that is not accepted within this time is deemed withdrawn, and if the final judgment obtained by the plaintiff is less favorable than the offer, the plaintiff must pay the defendant all costs, except attorney fees, incurred after the making of the offer. In Britain, Order 22 of the Rules of the Supreme Court (1965) and Order 11 of the County Court Rules (1981), allowed a defendant in a debt or damages lawsuit to make a payment into court in respect of the claims made against her, serving as a settlement offer which the plaintiff could accept within 21 days. If the plaintiff does not accept the defendant's offer and eventual judgment is larger than the amount offered by the defendant, then the plaintiff has to pay the defendant all costs, including attorney fees, incurred after the time the offer was made. These rules were replaced by Part 36 of the CPR, which supplemented the above provision with a corresponding provision on the plaintiff's side. The plaintiff can now make a settlement offer which the defendant may accept within 21 days. If the defendant does not accept the offer and the eventual judgment is higher, then the defendant must pay an additional interest up to 10% over the judgment amount, including the plaintiff's costs.

[9]In *Delta Airlines v. August*, 450 U.S. 346, a plaintiff filed a complaint against a defendant, alleging she was discharged from her position as a flight attendant solely because of her race. The plaintiff sought reinstatement, approximately $20,000 in backpay, attorney's fees, and costs. A few months after the complaint was filed, the defendant made a formal offer of judgment to the plaintiff in the amount of $450. The offer was rejected, the case was tried, and the plaintiff lost. In refusing to apply Rule 68 the court reasoned that:

> "The purpose of Rule 68 is to encourage the settlement of litigation. In all litigation, the adverse consequences of potential defeat provide both parties with an incentive to settle in advance of trial. Rule 68 provides an additional inducement to settle in those cases in which there is a strong probability that the plaintiff will obtain a judgment but the amount of recovery is uncertain."

[10]Intuitively, if the amount that is awarded to the plaintiff when he prevails is fixed in advance, then a plaintiff's refusal to a settlement offer below this amount might trigger a change in the fee-shifting rule only in the event that the defendant prevails in trial. When the background rule is given by the *English* rule, the plaintiff must anyway reimburse the defendant when she prevails, so an *offer of judgment* rule cannot change the fee allocation nor the probability of settlement. When the background rule is given by the *American*

encourage settlement has not been ruled out. Our analysis shows that when the social goals of justice and deterrence, as prescribed by substantive law, are imposed as a constraint on the settlement mechanism, no fee allocation rule, complex as it may be, may possibly outperform the simple English fee-shifting rule accompanied by an effective ban on late settlements.

Finally, the literature on litigation and settlement under incomplete information has often suggested that the American fee allocation rule, according to which each party bears its litigation cost irrespective of the outcome on trial, induces a higher rate of settlement than the English rule (see Bebchuk, 1984, and Talley, 1995; but also Reinganum and Wilde, 1986, who argued the ranking is indeterminate). Some economic and legal scholars have investigated the welfare properties of different fee allocation rules,[11] and there is also some related literature on optimal damage awards when settlement is possible (see, e.g., Spier, 1994, and Polinsky and Rubinfeld, 1988) but none has tried to identify the optimal settlement mechanism and fee-shifting rule when *both* substantive social goals and litigation cost minimization are taken into account. As we show, substantive law imposes a binding constraint on the possible set of settlement mechanisms, with the consequence that litigation is minimized by the English, and not the American, fee-shifting rule.

In a related paper, Spier (1997) has analyzed the welfare implications of settlement and deterrence in a simple bargaining model where the probability that the defendant is liable is determined endogenously. She obtained mixed results about the English rule, and showed

rule, then any positive offer of judgment, be it small as it may, would change the fee allocation rule to a *Pro-Defendant* rule. A defendant would therefore rationally make such a *sham* offer, and as shown by Bebchuk (1984) the resulting *Pro-Defendant* rule would lead to a lower rate of settlement. See also Chung (1996). Farmer and Pecorino (2000) examined the effect of Rule 68 on the probability of settlement when the defendant holds private information concerning her liability and the actual judgment in case the plaintiff prevails is uncertain. This setting allows for judgment variability both on the liability and the damages issues. In this setting they show that Rule 68 may encourage settlement.

[11] Gravelle (1993) analyzes the effect of fee-shifting rules on both primary behaviour and litigation and settlement incentives. Yet, his model is based on a specific take-it-or-leave-it bargaining mechanism in a setting of mutual optimism (see Landes, 1971; Posner, 1973; Gould, 1973; and Shavell, 1982). His work does not account for information asymmetry nor for different bargaining mechanisms. Hylton (1993) discusses the welfare effects of fee-shifting rules under a negligence regime but does not construct a comprehensive model that accounts for both; Beckner and Katz (1995) discuss the welfare effects of fee-shifting rules when settlement is not available. In all these papers, the results about which fee-shifting rule is optimal are mostly inconclusive.

that reliance on damage multipliers would improve overall efficiency. This paper takes a different perspective: rather than asking what would be the "optimal" level of deterrence, we optimize given a specific level of deterrence which is determined by substantive law (the substantive law constraint). Furthermore, unlike Spier (1997), this paper assumes the plaintiff's threat to litigate must be credible in view of the information that is revealed in the pre-trial bargaining process (the credibility constraint). As we show, in the optimal mechanism both constraints must be binding.

The rest of the paper proceeds as follows. Section 2 presents the model and results, and Section 3 contains a discussion of the practical and normative implications of our findings. All proofs are relegated to the appendix.

2. The Model

We consider the following situation. A risk-neutral plaintiff sues a risk-neutral defendant for damages that are normalized to one. If the case proceeds to trial and the defendant is found liable she has to pay the plaintiff the entire sum of damages, whereas if she prevails she does not have to pay anything. Both the plaintiff and the defendant incur litigation costs, denoted $c^P, c^D \geq 0$, respectively. Total litigation costs are denoted by $c \equiv c^P + c^D$.

The defendant knows whether she is liable or not, and it is assumed that the defendant's liability can be *precisely* determined in trial. Yet, before the end of trial no one except the defendant herself knows for sure whether she is liable or not. We denote the (ex ante) probability that the plaintiff assigns to the defendant being liable by $0 \leq p \leq 1$. The plaintiff's belief, p, is assumed to be commonly known.

The plaintiff and defendant may settle the case before it goes to trial, and save at least part of their litigation costs. We are interested in the question of what combination of pre-trial bargaining procedure and fee-shifting rule, or mechanism, maximizes the (ex-ante) probability of settlement among all *credible* mechanisms that respect *substantive law*. We restrict attention to fee-shifting rules, assuming that the court may only divide the total costs of litigation between the defendant and the plaintiff. It cannot "punish" or "reward" the parties through any other means, and it cannot decouple its judgment so that the award to the plaintiff would be different from the defendant's payment.[12]

[12]Clearly, allowing the court to punish or reward the parties beyond fee-shifting would greatly enhance

Credibility is the name we give to the requirement that the plaintiff cannot be forced to litigate. He should always have the option to drop the case rather than proceed to trial. The importance of this constraint stems from the fact that because threatening a defendant who denies her liability with a high probability of trial would exert pressure on truly liable defendants to admit their liability, it is possible (but not practicable) to increase the ex ante likelihood of settlement by *forcing* the plaintiff to proceed to trial in some circumstances. The reason that credibility is imposed as a constraint is that even if the plaintiff were threatened to be fined unless he proceeds to trial, he could always hold a sham litigation, which would impose negligible costs on both litigants, thus avoiding litigation de facto.

Substantive law is taken into account through the requirement that the mechanism be such that the difference between a liable and a non-liable defendant's expected payment may not be lower than the amount of damages, one. Whether substantive law accounts for notions of corrective justice, just allocation or deterrence is of no importance to our analysis. Moreover, it is not necessary that the amount of damages subscribed by substantive law would equal the plaintiff's loss. We only require that by reading the law a potential defendant would know exactly how much it would cost him to break his legal duties.[13]

Clearly, the probability that the defendant is liable, p, is implied by the level of damages prescribed by substantive law, so it may well be that this level would be different than the plaintiff's loss in order to affect the level of deterrence. Indeed, Kaplow (1993) has suggested (in a model without settlement) that problems of under- and over-deterrence should be solved through adjustments in the amount of damages instead of through fee-shifting rules.[14] Still, whatever is the desired level of deterrence, or any other social goal, our model identifes the

its power to enforce settlement. Decoupling would also enhance the court's ability to promote deterrence and reduce administrative and litigation costs (see, e.g., Polinsky and Che, 1991). Yet, courts, as well as legislators, seem reluctant to implement such measures (***reference***). We therefore take the more restrictive (and, in our view, more realistic) approach of maximizing social welfare within an existing legal culture and framework.

[13]Notice that we do not require that a non-liable defendant's expected loss would be 0, and we also allow for the difference in expected loss between a liable and a non-liable defendant to be greater than 1. Yet, as it turns out, in the optimal mechanism a liable defendant's expected loss is exactly 1.

[14]The probability of taking care, which is exogenously given in our model, may not be 1 either because substantive law implements social goals other than deterrence, or due to various alternative reasons such as unobserved heterogeneity in defendants' costs of care, their inability to control their momentary level of care, or their mispercpetions and inherent cognitive biases (see Shavell, 1987).

litigation and settlement mechanism that would implement that goal with minimum total litigation costs.

Credibility and substantive law are the *only* constraints we impose on the mechanism. The class of mechanisms over which we optimize is thus very general and includes in particular mechanisms in which settlement is obtained, if at all, after some time has passed and the parties have incurred part of their litigation costs.[15] However, an additional important although implicit constraint is that before the conclusion of the trial, neither the plaintiff nor the court receive any signal about the defendant's liability that is *independent* of the defendant's actions.

We obtain the following main result.

Theorem. *If*

$$c < \frac{p}{1-p},$$

then the following mechanism minimizes both the likelihood of litigation and total litigation costs among all credible mechanisms that satisfy deterrence: The defendant is asked to plead whether she is liable or not. If the defendant admits her liability then the court enters a judgment against her in the amount of the plaintiff's loss. If the defendant denies her liability then the plaintiff is asked to choose between dropping the case and litigating to trial. If the plaintiff decides to proceed to trial, then the court decides the case on its merits and allocates the litigation costs according to the English (loser reimburses the winner) rule. The ex ante probability of litigation under this optimal mechanism is $1-p$.

The full proof of the Theorem is relegated to the appendix. Here we just sketch the main arguments. By the revelation principle (see, e.g., Myerson 1985), *any* equilibrium under *any* mechanism induces: (i) probabilities with which the two types of defendant settle, denoted q_N and q_L, respectively; (ii) expected settlements for each of the two types of defendant, denoted s_N and s_L, respectively; and (iii) expected shares of the total legal costs to be borne by the defendant depending on the defendant's report of her type and the outcome of the trial, denoted $\widehat{c}^D_{N,N}$, $\widehat{c}^D_{N,L}$, $\widehat{c}^D_{L,N}$, and $\widehat{c}^D_{L,L}$, respectively. The equilibrium where the ex ante probability of settlement is maximized among all equilibria under all credible mechanisms

[15] We do not model the passing of time explicitly; rather, a settlement that is reached after some litigation costs have already been incurred suggests that some time has passed.

that satisfy deterrence may thus be characterized as the solution to the following constrained optimization problem:

$$\max_{\left\{s_i, q_i, \widehat{c}^D_{i,j}\right\}_{i,j\in\{N,L\}}} pq_L + (1-p)\, q_N$$

subject to two incentive compatibility constraints for the two types of defendant that ensure that the obtained solution to the optimization problem is indeed induced by some equilibrium under some mechanism,

$$q_N\left(-s_N\right) + \left(1-q_N\right)\left(-\widehat{c}^D_{N,N}\right) \geq q_L\left(-s_L\right) + \left(1-q_L\right)\left(-\widehat{c}^D_{L,N}\right), \tag{ICN}$$

$$q_L\left(-s_L\right) + \left(1-q_L\right)\left(-1-\widehat{c}^D_{L,L}\right) \geq q_N\left(-s_N\right) + \left(1-q_N\right)\left(-1-\widehat{c}^D_{N,L}\right); \tag{ICL}$$

the credibility constraint, which requires that conditional on going to trial the expected payment to the plaintiff given his updated beliefs must be larger or equal than what the plaintiff is sure to get if he just drops the case, zero,

$$\frac{\left(1-p\right)\left(1-q_N\right)\left(-c^P_{N,N}\right) + p\left(1-q_L\right)\left(1-c^P_{L,L}\right)}{\left(1-p\right)\left(1-q_N\right) + p\left(1-q_L\right)} \geq 0 \tag{CR}$$

(where $c^P_{\cdot,\cdot}$ denotes the part of litigation costs borne by the plaintiff as a function of the defendant's report and the outcome of trial); the substantive law constraint that requires that the difference between the expected payoffs to liable and non-liable defendants be larger than or equal to the size of the damages, one,

$$q_N\left(-s_N\right) + \left(1-q_N\right)\left(-\widehat{c}^D_{N,N}\right) \geq q_L\left(-s_L\right) + \left(1-q_L\right)\left(-1-\widehat{c}^D_{L,L}\right) + 1; \tag{SL}$$

and finally, the constraints imposed by fee-shifting,

$$\begin{aligned} c^P_{i,j} &= c - \widehat{c}^D_{i,j}, \qquad \text{for every } i,j \in \{N,L\}, \\ 0 &\leq \widehat{c}^D_{i,j} \leq c \qquad \text{for every } i,j \in \{N,L\}. \end{aligned} \tag{Fee-Shifting}$$

In the proof we show that the solution to this problem is bounded from above by p and demonstrate that the unique equilibrium under the mechanism described in the theorem achieves an expected probability of settlement equal to p. Because this mechanism is itself credible and respects substantive law, it is thus optimal among all credible mechanisms that

respect deterrence. Furthermore, since all settlements are obtained at the pleadings stage, before any litigation costs are incurred, this mechanism is also the least costly among all credible mechanisms that respect substantive law.

The intuition for this result is the following. If it had been commonly known whether the defendant was truly liable or not, then under the optimal mechanism, the plaintiff and defendant would have settled with probability one, and because of the substantive law constraint, the difference between the high and low settlement amounts would have been equal to the sum of damages, one. Obviously, such a mechanism is not incentive compatible. In a world in which the defendant's true liability is not known to anyone but herself, a liable defendant has an incentive to pretend she is not liable so she can settle for less. It follows that an optimal mechanism must provide an incentive for liable defendants to admit their liability. Because the defendant's true liability can only be verified in court, the only way to do this involves going to court with a positive probability. And because going to court is costly, the probability of going to court has to be minimized under the optimal mechanism. Now, conditional on the case going to trial, it is easy to see that the English fee-shifting rule is the one that maximizes the difference between the expected payments of liable and non-liable defendants. Therefore, because the optimal mechanism should provide the "cheapest" possible incentives for being truthful, deterrence implies that it must rely on the English rule, because in this way it is possible to satisfy substantive law with the lowest possible probability of going to trial. The reason is similar to the well-known argument that efficiency requires setting very large fines for those caught violating the law, but very small probabilities of detecting offenders (Becker, 1968). To see why the high and low settlements are one and zero, respectively (we interpret the plaintiff dropping the suit as a settlement of zero), note that the optimal mechanism must also provide the plaintiff with sufficient encouragement to proceed to trial after the defendant denies her liability in order to ensure that the sanction against liable defendants is exercised with a sufficiently high probability. To achieve this aim, the settlement offered to the plaintiff after the defendant denies her liability is set equal to zero. This gives the plaintiff a strong incentive to proceed to trial after the defendant has denied her liability because by dropping the case he would get at most zero, which is equal to what he would get if he did not initiate the suit to begin with.

A few additional remarks are in order. First, when the condition specified in the Theorem

is not satisfied, that is, if $c > \frac{p}{1-p}$, then, under the English fee-shifting rule, the plaintiff's threat to sue is not credible. Consequently, the defendant would refuse to admit her liability, rationally expecting the plaintiff to drop the suit.[16] While substantive law would obviously not be satisfied in this case, the ex ante probability of settlement (which *includes* the case where the plaintiff drops the suit) would be one.

Second, although the optimal mechanism was not required to be renegotiation-proof, it nevertheless satisfies the following weak notion of renegotiation-proofness: whenever according to the mechanism the parties should proceed to court, there does not exist any settlement offer that both liable and non-liable defendants as well as the plaintiff, given his updated beliefs, all strictly prefer to proceed to trial.[17]

Finally, the optimal mechanism described in the theorem is robust to the introduction of "noise" in the following sense. Suppose that the court may err in deciding the defendant's liability: it may rule in favor of a liable defendant with probability $e_1 \geq 0$, and against a non-liable defendant with probability $e_2 < 1 - e_1$. It is possible to explicitly solve for the optimal mechanism in this case and show that if e_1 and e_2 are small, then the optimal mechanism is approximately equal to the mechanism that is described in the theorem.[18]

3. Positive and Normative Implications

The practicability of the optimal mechanism described in the theorem depends on whether the parties would be able to bypass it by settling either before or during the operation of the mechanism. It is straightforward to see that given that the court relies on the mechanism described in the theorem, the parties would not want to settle the case ex-ante. Because any positive offer to settle would be correctly interpreted by the plaintiff as an admission of liability, the plaintiff would rationally refuse to settle for anything less than the entire sum of damages, one, which he would win by litigating the case to trial. Because the expected

[16] In the case where $c = \frac{p}{1-p}$ there exists a multiplicity of equilibria. In these equilibria, defendants always deny their liability, and the plaintiff proceeds to trial with a probability $\pi \in \left[0, \frac{1}{1+c}\right]$. Among these equilibria, only the one where $\pi = \frac{1}{1+c}$ satisfies deterrence. This is also an optimal equilibrium in this case.

[17] A stricter notion of renegotiation-proofness may require that there does not exist a settlement offer that the plaintiff and *either* liable or non-liable defendants prefer to proceed to trial.

[18] For this approximation to hold, the credibility constraint has to be replaced by weak renegotiation-proofness. Details are available from the authors upon request.

payment of a liable defendant under the mechanism is equal to one, no settlement is possible at this stage.

The situation after the defendant pleads not liable is more delicate. Any positive offer to settle at this stage would still be correctly interpreted by the plaintiff as an admission of liability. However, now, while a liable defendant expects to pay $1 + c$ if the case is litigated to trial, the plaintiff only expects to win 1. The court must therefore be able to prevent any settlement lower than $1 + c$. It could do that by declaring any such settlement illegal and refusing to enforce it.[19] The plaintiff would not be precluded from filing the lawsuit again, forcing the defendant to litigate the same claim that was presumably already settled. Similarly, the defendant, for her part, may always refuse to perform her obligations according to the settlement agreement, as the plaintiff would not have any means for enforcing them, except for filing the suit again.[20] Although the parties may rely on non-judicial enforcement mechanisms, such mechanisms would usually be available only when the parties have continuous close relationships, in which case they would probably refrain from bringing their dispute to court in the first place (Ellickson, 1991; and Bernstein, 1992). Moreover, the court may supplement its refusal to enforce the settlement with a fine on one of the settling parties. This would expose her to extortion by the other party, further increasing the risk of unauthorized settlement.

Notice that the above argument does not contadict our assumption that the plaintiff cannot be forced to litigate the suit. As noted before, the plaintiff may always unilaterally hold a sham litigation, if forced to litigate, which is equivalent to dropping the case. This would not require any cooperation on the defendant's side. Yet, once cooperation is necessary, as is the case in any settlement, the litigants' adverse incentives, ex post, would eliminate the possibility of any agreement to opt out of the mechanism, ex ante.

Short of banning late settlements, courts can also use other, less extreme, means for discouraging such settlements. For one thing, courts may simply refrain from encouraging the parties to settle. Our results indicate that contrary to the common wisdom that guides recent procedural reforms, courts should not take an active role in facilitating settlements and should not encourage parties to use alternative means for resolving their disputes. Rather, managerial judging should concentrate on efficient use of judicial and lawyer time, and not

[19]Note on illegal contracts***

[20]For a general argument about the enforceability of renegotiated agreements see Jolls (1997).

on promotion of settlement. This consideration points to other means for substituting early for late settlements such as the setting of firm time tables, shortening the time between filing and trial, and front-loading litigation costs as closely as possible to the pleadings stage – all measures that could decrease the time available for renegotiation. Interestingly, Kakalik et al. (1996a, 1996b) which examined the implementation of the CJRA in 20 federal district courts found that early judicial management, including setting trial schedule and reduction of time to discovery had a statistically significant negative effect on time to disposition (although having no combined effect on lawyer work hours). Following this study, the judicial conference of the U.S. courts has recommended setting early and firm trial dates and shorter discovery periods in complex civil cases (Judicial Conference Report, 1996). Also notable is the use of pre-action protocols under the CPR, which aim to resolve or at least clarify a dispute before issuing a claim, thus focusing effort on early settlements. There is some empirical evidence that the number of filings as well as last-minute settlements has dropped whereas the rate of settlement has increased since adoption of the CPR.[21]

Normatively, the claim that compromise and (late) settlement should be discouraged must be distinguished from other claims against settlement. Previous literature has asserted that adjudication should be preferred to settlement whenever the latter dilutes the substantive goals of justice (Fiss, 1984) and deterrence (Shavell, 1997; Polinsky and Rubinfeld, 1988). In our model, the objective is to maximize the rate of settlement subject to maintaining substantive social goals as deterrence and justice. Our finding that compromise as well as late settlements should be discouraged is therefore a result of a welfare maximization exercise, in which both the satisfaction of substantive goals and the minimization of cost and delay are sought. The pursuit of alternative ways to encourage settlement throughout the litigation process may therefore be misguided because in view of the two tensions, between settlement and substantive law, and between early and late settlement, it is a ban on compromise and late settlement that would maximize social welfare.

Preference for the English rule in the optimal mechanism is another feature of the consideration of both substantive and procedural goals. Within the ongoing debate over which liability-based fee allocation rule is best, the English or the American, and whether *offer of judgment* rules indeed promote settlement, this paper supports the use of the English rule.

[21] See Emerging Findings: An Early Evaluation of the Civil Justice Reforms, March 2001, available from <http://www.lcd.gov.uk/civil/emerge/emerge.htm#part5d>.

It does not consider, however, effects of the English rule on litigation expenditure (see e.g. Katz, 1987; Plott, 1987), or on the set of lawsuits that are filed (see, e.g., Rosenberg and Shavell, 1985; and Katz, 1990), both of which may have substantial welfare consequences. Further research is thus called for, to extend the mechanism design framework to more comprehensive settings that would account for these and other implications of the litigation and settlement mechanism.

Appendix: Proof of the Theorem

The proof is divided into two parts. In the first part we show that the ex ante probability of settlement among all credible mechanisms that respect deterrence is bounded from above by p. Then, in the second part, we show that the unique equilibrium under the mechanism that is described in the statement of the Theorem induces an ex ante probability of settlement that is equal to p. It follows that this mechanism maximizes the likelihood of settlement among all credible mechanisms that respect deterrence.

1. Bounding the Probability of Settlement from Above by p

Step 1: Eliminate the constraint ICN. If the maximal value of the objective function in the relaxed problem is smaller than or equal to p, then a fortiori the value of the objective function in the original problem is smaller than or equal to p.

Step 2: Inspection of the constraints reveals that setting $\widehat{c}^D_{L,N} = \widehat{c}^D_{N,L} = c$, i.e., as high as possible, relaxes the constraints. Intuitively, "lying" is penalized. We may therefore simplify the constraints as follows:

$$q_N\left(1+c-s_N\right) \leq q_L\left(1+\widehat{c}^D_{L,L}-s_L\right)+c-\widehat{c}^D_{L,L} \tag{ICL}$$

$$\frac{\left(1-p\right)q_N\left(c-\widehat{c}^D_{N,N}\right)+\left(1-p\right)\widehat{c}^D_{N,N}+p\widehat{c}^D_{L,L}+p-c}{p\left(1+\widehat{c}^D_{L,L}-c\right)} \geq q_L \tag{CR}$$

$$q_N\left(s_N-\widehat{c}^D_{N,N}\right) \leq q_L\left(s_L-1-\widehat{c}^D_{L,L}\right)+\widehat{c}^D_{L,L}-\widehat{c}^D_{N,N} \tag{SL}$$

Step 3: Further inspection of the constraints reveals that under the optimal solution, ICL must be binding. Suppose it is not binding and the optimal solution is such that $q_N < 1$. Observe that it is then possible to increase q_N and decrease s_N slightly so that $q_N s_N$ remains constant. This change increases the value of the objective function and as can be readily verified, does not violate any of the other constraints. Suppose now that ICL is not binding and $q_N = 1$. Observe that it is possible to decrease slightly the value of s_N and increase slightly the value of q_L. This change increases the value of the objective function and as can be readily verified, does not violate any of the other constraints.

Step 4: We may assume, without loss of generality, that the left-hand-sides (LHS) of CR as it is written in step 1 is larger than or equal to zero. Otherwise, the problem is infeasible, which, as we establish below, is false. It can be verified that when this LHS is smaller than one, it is increasing in $\widehat{c}^D_{L,L}$, and when it is larger than one, it is decreasing in $\widehat{c}^D_{L,L}$. Since q_L cannot be larger than one anyway, replacing $\widehat{c}^D_{L,L}$ with c in the LHS of CR relaxes this constraint as much as possible. We may therefore replace CR with the following constraint

$$\frac{(1-p)\,q_N\left(c-\widehat{c}^D_{N,N}\right)+(1-p)\,\widehat{c}^D_{N,N}+pc+p-c}{p}\geq q_L. \tag{CR}$$

If the maximal value of the objective function in the relaxed problem is smaller than or equal to p, then a fortiori the value of the objective function in the original problem is smaller than or equal to p.

Step 5: ICL binding implies that SL may be rewritten as

$$q_N \leq \frac{c-\widehat{c}^D_{N,N}}{1+c-\widehat{c}^D_{N,N}} \tag{SL}$$

Step 6: Replacing q_L and q_N with their upper bounds from steps 4 and 5, respectively, we may bound the objective function by a function of $\widehat{c}^D_{N,N}$ alone as follows,

$$\begin{aligned} pq_L+(1-p)\,q_N &\leq (1-p)\,\frac{\left(c-\widehat{c}^D_{N,N}\right)^2}{1+c-\widehat{c}^D_{N,N}}+(1-p)\,\widehat{c}^D_{N,N}+pc+p-c \\ &\quad +\frac{(1-p)\left(c-\widehat{c}^D_{N,N}\right)}{1+c-\widehat{c}^D_{N,N}} \\ &= (1-p)\left(c-\widehat{c}^D_{N,N}\right)+(1-p)\,\widehat{c}^D_{N,N}+pc+p-c \\ &= p. \end{aligned}$$

2. The Probability of Settlement in the Unique Equilibrium Under the Mechanism Described in the Theorem is Equal to p

Consider the mechanism that is described in the statement of the Theorem. We describe the unique equilibrium under this mechanism and demonstrate its optimality through the following series of lemmas.

Lemma 1. *In equilibrium, a non liable defendant always truthfully denies her liability.*

Proof. Admitting liability implies the defendant has to pay one. Denying it, implies that a non-liable defendant doesn't have to pay anything because she will win in trial and costs are allocated according to the English rule. ■

Lemma 2. *In equilibrium, a liable defendant denies her liability with a probability* $d \in (0,1)$ *that is strictly between zero and one.*

Proof. Suppose that a liable defendant always admits her liability. In equilibrium, it must be then that a defendant that denies her liability is indeed not liable, and the plaintiff, realizing this, would decline to proceed to trial following the defendant's denial of liability because he will lose and will have to incur the litigation costs c. But if the plaintiff does not litigate upon a denial of liability, liable defendants will benefit from denying their liability, contradicting the assumption that they are truthful with probability 1. Suppose now that a liable defendant never admits her liability. It follows that the plaintiff proceeds to trial with probability one because doing so yields $p(1) + (1-p)(-c)$ which for $c < \frac{p}{1-p}$ is more than what the plaintiff would get by dropping the case which is zero.[22] But then a liable defendant is better off pleading liable and paying one than losing $1+c$ at trial. A contradiction. ■

Lemma 3. *In equilibrium, after the defendant denies her liability, the plaintiff proceeds to trial with probability*

$$\pi = \frac{1}{1+c}.$$

Proof. The previous Lemma implies that the probability that the plaintiff proceeds to trial after the defendant denies her liability must be such that a liable defendant is indifferent between admitting or denying her liability, namely,

$$-1 = -(1-\pi)\cdot 0 - \pi(1+c).$$

Solving for π yields the result. ■

Lemma 4. *In equilibrium, a liable defendant denies her liability with probability*

$$d = \frac{c(1-p)}{p}.$$

[22] The analysis below still follows in case $c = \frac{p}{1-p}$ and the plaintiff proceeds to trial with probability srictly less than one.

Proof. The previous lemma implies that in equilibrium, the plaintiff must be indifferent between proceeding to trial and dropping the case after the defendant has denied her liability. Bayesian updating implies that it must be that,

$$\frac{pd\,(1)+(1-p)\,(-c)}{pd+1-p}=0.$$

Solving for d yields the result. ■

Lemma 5. *The ex ante probability of settlement in the unique equilibrium of the mechanism described in the statement of the theorem is p.*

Proof. Lemma 3 implies that the probability that a non-liable defendant settles (we interpret the plaintiff dropping the suit as a settlement of zero) under the unique equilibrium is given by

$$1-\pi=\frac{c}{1+c}.$$

The probability that a liable defendant settles under the unique equilibrium is given by

$$1-d+d\,(1-\pi)=\frac{p-c+2pc}{p\,(1+c)}.$$

The ex ante probability of settlement under the mechanism is therefore given by

$$p\cdot\frac{p-c+2pc}{p\,(1+c)}+(1-p)\cdot\frac{c}{1+c}=p.$$

■

Finally, we verify that the mechanism described in the Theorem satisfies credibility and substantive law. Credibility follows immediately from the fact that the plaintiff may refuse to proceed to litigation if he so wishes, and substantive law follows from the fact, as can be immediately verified, that the expected payments of liable and non-liable defendants are one and zero, respectively.

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