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SETTLEMENT BARGAINING AND THE DESIGN OF DAMAGE AWARDS

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ABSTRACT

An injurer undertakes precautions to reduce both the probability and the severity of an accident. The damages that the victim suffers are privately observed, and will be verified at a cost if the case is litigated. While finely-tuned damage awards induce the injurer to take appropriate precautions *ex ante*, they increase the probability that the litigants will disagree about the case, and thereby aggravate the settlement process. Flat damage awards reduce the level of costly litigation, but do not induce prudent precaution taking. We show that when litigation costs are small the optimal award is finely tuned to the actual damages, and when litigation costs are large the optimal award is a flat penalty. Applications to scheduled damages and workers' compensation are discussed.

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INTRODUCTION

While deterrence has been the primary focus in economic analyses of optimal penalties, administrative and procedural issues are often at the center of the debate over legal reform. Since the court dockets are overflowing with lawsuits, all else equal, litigants should be encouraged to resolve their disputes privately through out-of-court settlement. This paper explores an inherent tension between the social objectives of *ex ante* deterrence and *ex post* administrative efficiency. Although finely-tuned rules may provide individuals with strong incentives to take appropriate actions *ex ante*, they may also increase the probability that the litigants will disagree about the case, and thereby aggravate the dispute resolution process. If the costs of litigation are large, then a simple rule may outperform a finely-tuned one.[1]

In the formal model, the injurer undertakes (unobservable) precautions to reduce both the probability and the severity of an accident. The damages that the victim suffers from an accident (if one occurs) are privately observed by the victim prior to the trial and are verified at a cost if the case is litigated rather than settled. We show that the optimal damage award necessarily takes one of two forms: it is either "finely-tuned," equal to the victim's actual damage level, or "flat," equal to the victim's expected damage level.[2] If the court's policy is to base the award upon the victim's actual damages, then in equilibrium the injurer will undertake a prudent level of precautions but victims with high damages will reject settlement offers and go to trial. The flat damage award reduces the costs of litigation by encouraging cases to settle out of court, but generates underinvestment in precautions. The tradeoff is clear: when litigation costs are small then an award based upon the actual damages is preferred, and when litigation costs are large the flat award is preferred.

[1] A finely-tuned rule is interpreted as one that makes the award contingent upon the state of nature, while a simple rule is insensitive to the underlying state. Asymmetric information between the litigants concerning the state of nature presents an obstacle in the bargaining process.

[2] These penalties also include adjustments for litigation costs.

One of several applications of this tradeoff is the "scheduling" of damages, or standardizing awards for injuries that fall into particular categories. Although this is the typical method of assessing damages for personal injuries and death in Great Britain (Munkman, 1985), judges and juries in the United States are not typically bound by rigid schedules.[3] An interesting exception in the United States is the separation of employer responsibility for job-related injuries from the law of torts. Under state and federal workers' compensation laws, an injured employee is entitled to prompt coverage of medical expenses and a proportion of lost wages under a fixed schedule, while waiving the right to sue his employer for full damages.[4] For example, the Longshoremen and Harbor Workers' Compensation Act includes very specific guidelines for determining damages for death, the loss of a limb, etc.[5] Legal scholars have suggested that scheduled damages be applied more widely, especially because the huge variability in jury awards aggravates the settlement process (Bovbjerg et. al., 1989, Blumstein et. al., 1991).[6]

Previous theoretical studies of legal complexity and the accuracy of damage assessment have largely ignored the settlement process. Rather, they have emphasized the cost to individuals of learning more about the harmfulness of their actions, and the cost of learning information *ex post*

[3] According to Atiyah (1987), consistency in awards "is important for the smooth running of the tort system because, ..., most tort claims are settled by negotiations out of court; and without some consistency in the level of awards, there would be much more difficulty in predicting the outcome of a case and hence more difficulty in negotiating a settlement." p. 186.

[4] Darling-Hammond and Kniesner (1980).

[5] A stated purpose of this act is to "minimize the need for litigation as a means of providing compensation for injured workmen." (22 U.S.C. 901-950, 1986, p. 12.)

[6] The primary motivation behind no-fault accident insurance is also the saving of administrative costs. "The resolution of disputes over relative fault and over the amount of noneconomic loss someone suffered increases the overall costs of the system, is an inefficient use of money, and slows the delivery of compensation." (Carroll et. al., 1991, p.2).

to implement the more complicated rule (Kaplow, 1991, and Kaplow and Shavell, 1992a, 1992b).[7] In our context, the cost of complexity is endogenous: the litigants have the opportunity to completely avoid the costs of litigation through settlement bargaining. However, information asymmetries when combined with legal complexity present an obstacle to efficient dispute resolution.[8]

This paper is not the first to consider the impact of settlement on deterrence. P'ng (1987) explores the impact of strategic settlement negotiations on *ex ante* behavior while taking the penalty structure (the negligence rule) as given. Polinsky and Rubinfeld (1988) analyze the social desirability of settlement under a strict liability rule, weighing both deterrence properties and administrative costs. While Polinsky and Che (1991) derive optimal penalties, they abstract from strategic settlement issues and focus instead on the plaintiff's incentive to bring suit.[9] Here, we explore the relationship between legal complexity and asymmetric information between the litigants prior to the trial, and derive optimal penalties for the court.

Section I presents the formal model and its assumptions. Section II characterizes the equilibrium of the pretrial negotiation game. The Section III characterizes the penalties that maximize social welfare. Concluding remarks follow.

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[7] Among other things, Kaplow and Shavell (1992b) consider the incentives of litigants to establish their information in court (at a cost), and show that private incentive to reveal information tends to be too large. In our framework, it is shown that when the costs of litigation are sufficiently large, the private incentive to litigate under a strict liability regime tends to be too large. The court can remedy this by making penalties flat.

[8] Similar issues are explored in a contractual framework by Spier (1992b). Incompleteness in the contractual framework is analogous to flat penalties in the tort framework.

[9] In Polinsky and Che's model, holding the plaintiff's award fixed, as the plaintiff's litigation cost rises then his incentive to bring suit falls. Although this has adverse consequences for deterrence, raising the penalty that the defendant suffers can align the private and social incentives to sue. Here, when the cost of litigation is sufficiently large, strict liability induces too large an incentive to litigate. Flattening the penalty aligns the private and social incentives to settle.

I. THE MODEL

There are two players: an injurer and a victim. The injurer may take precautions (or exert effort) to reduce the probability and severity of an accident: e_1 denotes the level of precautions taken to reduce the probability of an accident, and e_2 denotes the level of precautions taken to reduce the accident's severity. Both e_1 and e_2 are constrained to be nonnegative.[10] The injurer's cost of taking these precautions is a differentiable function $C(e_1, e_2)$, and we let $C_i(e_1, e_2)$ denote the partial derivative with respect to e_i. We assume that $C_i(e_1, e_2)$ is strictly positive for all e_1 and e_2, i.e. the injurer incurs greater costs when he takes more precautions, and that $C_1(0, e_2)$ and $C_2(e_1, 0)$ are finite. Although the levels of precautions are known to the injurer and possibly the victim, they are not verifiable in a court of law.[11] In other words, penalties cannot be directly conditioned upon the injurer's precautions.[12] They may, however, be sensitive to the victim's damages.

The accident may be mild, causing a harm level $x_L > 0$ to the victim, or severe, causing a harm level $x_H > x_L$. The probability of an accident, $\pi(e_1) \in (0,1]$, is differentiable and decreasing in e_1. A higher level of precautions of type 1 reduces the probability of an accident but cannot eliminate the possibility entirely. If an accident occurs, the conditional probability that the accident is mild is denoted $p_L(e_2)$ and the conditional probability that it is severe is denoted $p_H(e_2)$, where

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[10] This specification is related to Hölmstrom and Milgrom's (1991) analysis of multitask principal-agent problems, and to Shavell's (1987) analysis where the injurer chooses an activity level and a level of care to reduce the damages of an accident. Similar results would be obtained in Shavell's framework.

[11] In our context, it does not matter whether the victim observes the injurer's precautions or not. As will be apparent later, the victim's decision to accept a settlement offer depends only on his damages and not upon the injurer's precautions.

[12] In other words, this paper does not consider negligence rules. We also do not allow randomization by the court to dismiss cases while applying a multiplier to the damage award for litigated cases, and direct-revelation mechanisms where the litigants announce their information to the court and the litigants are punished if their announcements conflict.

$p_L(e_2) + p_H(e_2) = 1$.[13] These functions are differentiable and satisfy $p_L'(e_2) > 0$ and $p_H'(e_2) = -p_L'(e_2) < 0$. In other words, a higher level of precautions of type 2 corresponds to a lower conditional probability of a severe accident, and a higher conditional probability of a mild accident. Finally, for technical reasons we assume that $\pi'(0) = p_H'(0) = -\infty$.[14] The first best cannot be obtained in this model through a flat penalty because such a rule would not induce the injurer to undertake severity-reducing precautions, e_2. The "best" flat penalty would lead to underinvestment in e_2 while inducing a more appropriate level of e_1.

Although occurrence of an accident is assumed to be observable to both the victim and the injurer, the level of harm is not. The victim privately observes his damages, $x \in \{x_L, x_H\}$, while the injurer must rely on his prior beliefs (which are conditioned upon his effort level). The court is assumed to be able to observe and verify both the occurrence of an accident and the level of damages; however, the use of the court is costly for the litigants.

After an accident has occurred, the players attempt to resolve their dispute privately through an out-of-court settlement. The negotiations are assumed to take a simple form: the injurer makes a single take-it-or-leave-it offer, s, to the victim. If the offer is accepted then the game ends and if it is rejected then the case proceeds to trial.[15] The court verifies the precise value of the victim's harm, and enforces a transfer or award from the injurer to the victim; since the award may be contingent upon the severity of the accident, we denote the penalty structure $\langle d_L, d_H \rangle$, where d_L

[13] If only one effort level were specified that influenced both the likelihood and severity of the accident, then a high flat penalty could induce efficient effort.

[14] This, combined with the boundedness of $C_i(e_1, e_2)$, $i = 1, 2$, is sufficient to guarantee an interior solution for e_1 and e_2 under the strict liability doctrine.

[15] This timing and informational structure are similar to Bebchuk (1984). Allowing the informed player (the victim) to make a final offer introduces signalling elements (Reinganum and Wilde, 1986) and their associated multiple equilibria. A more complicated model with offers and counter-offers would lead to the same bias in the types of cases that proceed to court. See Spier (1992a), and the surveys of Cooter and Rubinfeld (1989) and Kennan and Wilson (forthcoming).

corresponds to the penalty when damages are low, x_L, and d_H corresponds to the penalty when damages are high, x_H. To simplify the exposition we maintain the assumption throughout the paper that $d_H \geq d_L$.[16] Finally, the injurer's private cost of litigation is denoted k_I, and the victim's cost is denoted k_V.[17] The sum of these private costs is given by k.[18]

The court's problem is to choose a penalty structure $\langle d_L, d_H \rangle$ to maximize social welfare, or equivalently to minimize social cost (which includes the damages from the accident, litigation costs, and costs of precaution taking). To construct the optimal penalty, we will work backwards. Taking $\langle d_L, d_H \rangle$ and the effort levels as given, Section II characterizes the outcome of the pretrial bargaining game. It is shown that, whenever $d_L < d_H$, if the costs of litigation are sufficiently small then there is a separating outcome: the low types settle out of court and the high types go to trial. If the costs are sufficiently large, then a pooling outcome results. In Section III we partition the set of all penalties into two categories: those penalties that ultimately lead to separation in the pretrial bargaining game, and those that lead to pooling. We then characterize the most preferred penalty within each set. A comparison of the two gives the main result.

II. THE PRETRIAL NEGOTIATION STAGE

Imagine that an accident has occurred and that the victim and injurer are negotiating a settlement in the shadow of a trial. Given the penalty structure, $\langle d_L, d_H \rangle$, we can represent the victim as one of two "types," d_H or d_L, corresponding to his private information about the court's award. Given a settlement offer, s, rationality dictates that the victim of type d_i will accept if and only if s

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[16] This is without loss of generality, for $d_H < d_L$ would never be optimal.

[17] The careful reader will notice that we have abstracted from the victim's incentive to bring suit. Assuming that $x_L - k_V > 0$ is sufficient to assure that the victim would never want to drop a case prior to trial.

[18] The analysis abstracts from the public-good nature of the court; in reality, there are other costs of maintaining a court system that are not borne by the litigants.

$\geq d_i - k_V$, i.e. the settlement offer is greater than the amount the victim will receive in court minus his litigation costs.[19] It is easy to verify that only two settlement offers are possible in equilibrium: $d_H - k_V$ or $d_L - k_V$. To see this, imagine that $s > d_H - k_V$. Since both types of victim strictly prefer to accept the offer than go to trial, the injurer's payoff is higher when the offer is slightly reduced. If $s \in (d_L - k_V, d_H - k_V)$, the low harm type strictly prefers to accept the offer (while the high harm type prefers to reject the offer and go to trial), and the injurer could certainly increase his payoff by lowering his offer slightly. If $s < d_L - k_V$, neither type accepts. By choosing $s = d_L - k_V$, the injurer induces the low type of victim to accept the offer and saves his own litigation cost, k_I, with probability $p_L(e_2)$.

The injurer's choice of s depends upon d_L and d_H, as well as upon his subjective beliefs about the victim's type which are conditional upon his own effort level: $p_H(e_2)$ and $p_L(e_2)$. If the injurer sets $s = d_H - k_V$, both types of victim accept and the injurer's payoff is simply $- d_H + k_V$. If $s = d_L - k_V$, the low type accepts and the high type opts for a trial, giving the injurer an expected payoff of $- p_L(e_2)(d_L - k_V) - p_H(e_2)(d_H + k_I)$. Comparing these payoffs, we may easily characterize the optimal strategy for the injurer. When the litigation costs, $k = k_I + k_V$, are small, the injurer prefers to offer $d_L - k_V$, and therefore litigates the case when damages are high. When the costs are small, the benefit to the injurer of discriminating between the two types exceeds the cost. When the litigation costs are sufficiently large, however, the injurer prefers to offer $d_H - k_V$ and settle with both types of victim. The equilibrium of the pretrial bargaining game is summarized in the following lemma:

Lemma 1: Given a penalty structure $\langle d_L, d_H \rangle$ and an effort level e_2, two types of equilibria can occur following an accident:

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[19] When $s = d_i - k_V$, the victim is actually indifferent. We adopt the convention that when indifferent, the victim accepts the offer.

(1) If $k_I + k_V < [p_L(e_2)/p_H(e_2)](d_H - d_L)$ then the equilibrium is separating. The injurer offers $s = d_L - k_V$, the low type of victim accepts the offer and the high type rejects it and goes to trial.

(2) If $k_I + k_V \geq [p_L(e_2)/p_H(e_2)](d_H - d_L)$ then the equilibrium is pooling. The injurer offers $s = d_H - k_V$ and both types of victim accept the offer.

III. OPTIMAL PENALTIES

The injurer's strategy may be represented by the vector (e_1, e_2, s); the injurer chooses precaution levels and a settlement offer to be made in the event of an accident.[20] The result from the previous section allows us to divide the set of all penalty structures, $\langle d_L, d_H \rangle$, into two categories: those that ultimately lead to separating outcomes in the pretrial bargaining game, and those that ultimately lead to pooling outcomes. Let $D_S(k)$ denote the former set (the subscript denotes "separation") and let $D_P(k)$ denote the latter set (the subscript denotes "pooling").[21]

The social cost associated with any element of $D_S(k)$ is:

$$\pi(e_1)[p_L(e_2)x_L + p_H(e_2)(x_H + k_I + k_V)] + C(e_1,e_2). \tag{1}$$

When the accident is mild, the case settles out of court and the only social cost is the damage caused by the accident. When the accident is severe, the case is litigated and the litigation costs k_I and k_V are included in the social cost. The effort levels that minimize the expected social cost, which we denote by (e_1^*, e_2^*), must satisfy the first-order conditions:

$$\pi'(e_1^*)[p_L(e_2^*)x_L + p_H(e_2^*)(x_H + k_I + k_V)] + C_1(e_1^*,e_2^*) = 0, \tag{2}$$

$$\pi(e_1^*)[p_L'(e_2^*)x_L + p_H'(e_2^*)(x_H + k_I + k_V)] + C_2(e_1^*,e_2^*) = 0. \tag{3}$$

[20] Note that this strategy is time consistent. No new information is learned about the damages after the accident occurs and the injurer has no reason to change his choice of settlement offer at the pretrial bargaining stage.

[21] From Lemma 1 we know that the type of equilibrium (pooling or separating) of the pretrial bargaining game depends upon the total litigation costs, $k = k_I + k_V$.

Generally speaking, the precautions chosen by the injurer will not correspond to those that a social planner would choose. If $\langle d_L, d_H \rangle \in D_S(k)$, then the injurer's optimal strategy must specify a low settlement offer, i.e. $s = d_L - k_V$, and precaution levels e_1 and e_2 that solve the following minimization problem:

$$\min_{e_1,e_2} \; \pi(e_1)[p_L(e_2)(d_L - k_V) + p_H(e_2)(d_H + k_I)] + C(e_1,e_2). \tag{4}$$

When the accident is mild the case settles out of court for $s = d_L - k_V$ and no costs are incurred; when the accident is severe the case fails to settle and the defendant incurs cost k_I. The first-order conditions for this program are given by:[22]

$$\pi'(e_1)[p_L(e_2)(d_L - k_V) + p_H(e_2)(d_H + k_I)] + C_1(e_1,e_2) = 0, \tag{5}$$

$$\pi(e_1)[p_L'(e_2)(d_L - k_V) + p_H'(e_2)(d_H + k_I)] + C_2(e_1,e_2) = 0. \tag{6}$$

Although these conditions do not generally correspond with those for the social optimum, (2) and (3), under a strict liability doctrine with $\langle d_L, d_H \rangle = \langle x_L + k_V, x_H + k_V \rangle$, if $\langle x_L + k_V, x_H + k_V \rangle \in D_S(k)$ then the injurer's choice of e_1 and e_2 will correspond precisely to the socially optimal levels (for the class of penalty structures that lead to separating outcomes). This penalty structure forces the injurer to fully internalize the externality generated by his actions.

Finally we can easily verify that no other penalty structure $\langle d_L, d_H \rangle \in D_S(k)$ will lead the injurer to choose e_1^* and e_2^*. (3) and (6) imply that $x_L - d_L = x_H - d_H$ (since $p_L'(e_2^*) = -p_H'(e_2^*)$), and setting (2) and (5) equal gives us that $d_H = x_H + k_V$ and $d_L = x_L + k_V$.

<u>Lemma 2</u>: If the penalty structure $\langle x_L + k_V, x_H + k_V \rangle$ leads to a separating outcome, i.e. $\langle x_L + k_V, x_H + k_V \rangle \in D_S(k)$, then this penalty structure is strictly preferred to any other penalty structure in the set $D_S(k)$.

[22] Since $\pi'(0) = p_H'(0) = -\infty$ and $C_1(0, e_2)$ and $C_2(e_1, 0)$ are finite, this program will have an interior solution.

Within the class of penalty structures that lead to separation in the pretrial bargaining game, the best structure (from a social perspective) specifies a simple markup of k_V over the victim's actual damages. Note that this is equivalent to awarding actual damages with an English rule for allocating legal costs (since the victim always "wins"). This result is sensitive to the assumption that the defendant has all of the bargaining power. If the victim had some bargaining power, too, then the injurer would settle out of court for a greater amount. With more equal bargaining power, the optimal penalties would tend to be scaled downward.

The following lemma establishes that the (weakly) preferred penalty structure among those that lead to pooling outcomes in the pretrial bargaining game is flat, or insensitive to the actual damages. The intuition is straightforward: any penalty structure $\langle d_L, d_H \rangle \in D_P(k)$ is equivalent to a flat penalty structure that specifies d_H be paid regardless of the true damages: $\langle d_H, d_H \rangle$. Moreover, any penalty structure in the set $D_P(k)$ will lead to underinvestment in accident severity-reducing activities: $e_2 = 0$. The reason is clear: if the injurer is determined to make an offer corresponding to high damages, then there is no incentive for him to take care to reduce the expected damages. The optimal flat penalty will specify an award equal to the expected harm from an accident, conditional upon an accident occurring and $e_2 = 0$, plus the victim's litigation costs.

<u>Lemma 3</u>: A penalty that specifies a flat damage payment, $d_H = d_L = p_L(0)x_L + p_H(0)x_H + k_V$, regardless of the accident's actual severity is weakly preferred to any other penalty structure that leads to pooling in the pretrial bargaining game, $\langle d_L, d_H \rangle \in D_P(k)$.[23]

[23] This flat penalty is not *strictly* preferred in the class $D_P(k)$. On the contrary: a penalty structure with $d_H = p_L(0)x_L + p_H(0)x_H + k_V$ and $d_H - d_L$ sufficiently small will be observationally equivalent.

Proof: First, for any $\langle d_L, d_H \rangle \in D_P(k)$, the settlement offer, s, must equal $d_H - k_V$. Second, any penalty structure belonging to the set $D_P(k)$ will lead the defendant to choose $e_2 = 0$. Suppose not: $e_2 > 0$; by reducing e_2 and leaving the settlement offer, $s = d_H - k_V$, unchanged, the injurer increases his payoff. Therefore, we can represent the social cost associated with any element of $D_P(k)$ as:

$$\pi(e_1)[p_L(0)x_L + p_H(0)x_H] + C(e_1,0). \tag{7}$$

If $d_H = d_L = p_L(0)x_L + p_H(0)x_H + k_V$, then the injurer offers $p_L(0)x_L + p_H(0)x_H$ in settlement and will choose e_1 to minimize this social cost. ■

Given the previous two lemmas, we now state our main result:

Proposition: There exists $\tilde{k} > 0$ such that when the total litigation costs exceed this value, $k_I + k_V \geq \tilde{k}$, the court can do no better than specify a flat penalty, $d_H = d_L = p_L(0)x_L + p_H(0)x_H + k_V$, that is insensitive to the victim's actual damages and all cases settle out of court. When the litigation costs are below this value, $k_I + k_V < \tilde{k}$, the unique optimal penalty structure is based upon the victim's actual damages, $\langle d_L, d_H \rangle = \langle x_L + k_V, x_H + k_V \rangle$, and the case proceeds to trial if and only if $x = x_H$.

Proof: Define $\tilde{k}$ by:

$$\min_{e_1,e_2} \pi(e_1)[p_L(e_2)x_L + p_H(e_2)(x_H + \tilde{k})] + C(e_1,e_2) \tag{8}$$
$$= \min_{e_1} \pi(e_1)[p_L(0)x_L + p_H(0)x_H] + C(e_1, 0).$$

It is easy to verify that $\tilde{k}$ is uniquely defined since the right hand side of (7) is constant and the left hand side is strictly increasing in $\tilde{k}$. To see this, imagine a small decrease in $\tilde{k}$. Holding e_1 and e_2 constant, the left hand side clearly falls. Since the injurer optimizes over e_1 and e_2, the value of the left hand side may fall even further. Also, $\tilde{k}$ is strictly positive since we know that $e_2^* > 0$. (This follows from the assumption that $\pi(e_1)$ is bounded away from 0 and $p_H'(0) = -\infty$.) When $k_I + k_V \geq \tilde{k}$, the right hand side (which represents the social cost of the best flat penalty) is smaller than the social cost of strict liability (assuming that strict liability leads to separation in the bargaining game). However, by lemma 1, when $k_I + k_V \geq \tilde{k}$, the flat penalty outperforms any element of $D_S(k)$. Therefore a flat penalty is adopted when $k_I + k_V \geq \tilde{k}$.

It remains to be shown that when $k_I + k_V < \tilde{k}$, strict liability outperforms the flat penalty. It is sufficient to show that if $k_I + k_V < \tilde{k}$, then $\langle x_L + k_V, x_H + k_V\rangle \in D_S(k)$. To do this, we will first show that there exists a $\hat{k}$ such that if $k_I + k_V \geq \hat{k}$ then strict liability leads to a pooling outcome, and if $k_I + k_V < \hat{k}$ then strict liability leads to a separating outcome. Second, we will show that $\tilde{k} < \hat{k}$, which will establish the result.

Define a separating strategy to be one with $s = x_L + k_V$, and a pooling strategy to be one with $s = x_H + k_V$. Under the penalty structure $\langle x_L + k_V, x_H + k_V\rangle$, the best separating strategy that the defendant could adopt minimizes expression (4). The best pooling strategy minimizes $\pi(e_1)x_H + C(e_1, e_2)$, and as before it is clear that $e_2 = 0$. Let $\hat{k}$ be defined as the litigation cost that makes the defendant indifferent between the best separating and the best pooling strategies:

$$\min_{e_1,e_2} \pi(e_1)[p_L(e_2)x_L + p_H(e_2)(x_H + \hat{k})] + C(e_1,e_2) = \min_{e_1} \pi(e_1)x_H + C(e_1,0). \tag{9}$$

The right hand side of (9) exceeds the right hand side of (8) since $x_H > p_L(0)x_L + p_H(0)x_H$. The left hand sides of (8) and (9) are identical. Since the left hand side is monotonically increasing in $\hat{k}$, we conclude that $\hat{k} > \tilde{k}$. ■

The general intuition for this result is straightforward: although flat penalties provide poor incentives for the injurer to take precautions to reduce the severity of an accident, they are desirable in that they minimize the administrative costs. While penalties that are sensitive to the true level of damages lead to more disagreement during settlement negotiations (and hence to greater administrative costs), they provide better incentives for care. When the administrative and litigation costs are small, penalties that are based on the true level of damages outperform flat penalties, while if the costs are large then the reverse is true.

CONCLUSION

Although characterization of the optimal penalties derived here may be sensitive to the particular assumptions of the model, the result that a finely-tuned penalty structure is preferred when the litigation costs are small is robust to generalizations on the distribution of damages and the sequence of offers in the pretrial bargaining game. It is clear that when the costs of litigation are very small, then awarding true damages will force the injurer to bear costs that are close to the actual damages suffered by the victim. In the extreme case where $k = 0$, he bears precisely these costs (since the settlement will be accurate) and awarding true damages induces the appropriate effort in severity-reducing activities. However, when the litigation costs are large then the costs of disagreement will outweigh these beneficial incentives. Generally speaking, finely-tuned rules combined with asymmetric information present an obstacle in the settlement process, and force greater resources to be incurred. Although simple flat penalties reduce the level of costly litigation, they may not induce a prudent level of *ex ante* precaution-taking by the injurer.

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