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Litigation and Settlement under Court Error

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Litigation and Settlement under Court Error

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Abstract

Settlements are often considered to be welfare-enhancing because they save time and litigation costs. In the presence of court error, however, this conclusion may be wrong. Court decisions create positive externalities for future litigants which will not occur if a dispute is settled out of court. Focusing on private litigation, we examine the impact of court error on the deterrent effect of the strict liability rule. In an asymmetric information setup both, underdeterrence and overdeterrence are possible under court error. Moreover, court error increases the likelihood of out-of-court settlements which can offset the positive externality of litigation.

Keywords: litigation, settlement, asymmetric information, court error, strict liability rule.
JEL-Classification: K13, K41

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1 Introduction

Since the seminal paper by Becker (1968), it is well known that when private parties know exactly what behavior a legal rule requires, large penalties, combined with a sufficiently high probability that infringements will be penalized, create proper incentives to comply with the law. When, in addition, the legal authority observes individual risks and benefits, it is possible to establish a rule that deters those persons from engaging in an activity who cause large negative externalities. That is, under perfect information, an appropriate legal rule will ensure socially optimal behavior.

In reality, however, information is hardly ever perfect and legal standards are often vague. Many rules are formulated to prohibit things like "unreasonable behavior" or "substantial injury," and even when the language is more to the point, enforcement policies may be unknown or at least difficult to predict. What makes matters worse is that courts do make mistakes. This may imply that defendants who did not violate a legal rule are fined, while others who did violate the rule escape unpunished. The crucial point is that rules are phrased in terms of behavior that is difficult to observe: this is especially a problem when courts are dealing with an issue for the first time.

The aim of this paper is to examine the impact of court error on the deterrent effect of the law. We argue that court error creates legal uncertainty that can distort the incentives created by a legal rule in different ways: in some cases, court error may lead to more deterrence than is socially optimal; in other cases to less. Even though court error may never be eliminated completely, there is good evidence to suppose that the error rate will decrease with the number of cases: judges get better in observing and interpreting the legally relevant facts when they have dealt with a similar issue before. That is, litigation creates a positive externality for future litigants because the outcome of a trial is easier to predict if one can draw on a precedent decision. Such a decision, however, will only exist if a former case has been taken to court. Since the legal system often explicitly encourages the parties to settle out of court, this positive externality will not necessarily occur.

The literature on the economics of litigation and settlement generally considers settlement agreements to be welfare-enhancing because they offer a preferable alternative to the cost and uncertainty of litigation.[1] This conclusion is entirely true if liability and damage awards are not in doubt; in the context of court error, however, this conclusion may be misleading. Though it is undisputed that settlements save time and litigation cost in the short run, they can be detrimental to long-run expected welfare. Usually, the parties to a settlement contract do not disclose the details of their agreement. This deprives the public—and especially the court—of useful information for similar disputes in the future. Specifically, this means that out-of-court settlements are not helpful in reducing the uncertainty concerning the enforcement of a legal rule.

A Brief Overview of the Model. We consider a sequence of legal disputes on similar issues. At each point in time, a new potential injurer can engage in an identical activity generating a personal gain. This activity is likely to harm a victim who sues for damages. A lawsuit can either be settled out of court or go to trial. Damage awards in court may be affected by court error.

The activity may either cause low harm or high harm; injurers do not observe the true level of harm, but they know its distribution. There are two types of injurers: low-risk injurers, who mainly cause low harm, and high-risk injurers, who mainly cause high harm. The personal gain from the activity is the same for both types, but engaging in the activity is ex-ante only efficient for low-risk injurers. Since "risk" is not verifiable in court, it is ineffective to impose a ban on the activities of high-risk injurers; instead, strict liability should be applied.

Court error is modeled that a judge sometimes mistakes the true level of harm and thus awards high damages to a victim who has suffered low harm, or low damages to a victim who has suffered high harm. He is supposed to be the less likely to err, the more often he and other judges have dealt with the activity before.[2] That is, we assume that the risk of court error will decrease

[1] For an overview on the literature see the surveys of Daughety (2000) and Spier (2007).

[2] In general, the literature on settlements assumes that the judge learns the truth and, thus, makes damage awards equal to the true level of harm. In contrast, our model allows for court error. We assume that with an exogenously specified probability, the judge will learn the true level of harm and award adequate damages to the victim; with

with each additional dispute that is terminated by trial. In contrast, disputes that are terminated by settlement do not have an impact on court error.

Settlement negotiations are supposed to take the form of an ultimatum game where the injurer makes a take-it-or-leave-it offer to the victim. The victim decides whether to accept the offer and drop the case, or to reject it and go to trial. The minimum settlement offer that the victim will accept is his expected damage award in court.

It is quite obvious that in absence of court error the strict liability rule will provide the right incentives to high-risk injurers to refrain from the activity and—if legal costs are low enough—to low-risk injurers to engage in the activity. In presence of court error, however, this needs not to be true. We find that court error increases the expected damage award for low harm and decreases the expected damage award for high harm: as a result, high-risk injurers can expect to pay less in damages than the harm they will cause, while low-risk injurers must expect to pay more. Depending on the parameters of the model, strict liability may deter too little or too much activity. Underdeterrence turns out to be a problem when the personal gain from the activity is high; overdeterrence turns out to be a problem when the gain is low. High legal costs also promote overdeterrence.

Besides its distortionary impact on the deterrent effect of the strict liability rule, court error may also affect the settlement process. It is well known from the literature that asymmetric information may cause settlement negotiations to fail; court error, however, may increase the likelihood of settlements.[3]

The standard argument why asymmetric information may cause settlement negotiations to fail is as follows. The injurer does not observe the true level of harm and so must offer a high settlement amount (equal to the expected damage award for high harm) if he wants to be sure that the victim will not go to court; however, since this high offer exceeds the reservation

the complementary probability, however, he will mistake the true level and award wrong damages. The role of the court is entirely non-strategic and the learning effect from previous trials is exogenously given. In particular, we consider a non-Bayesian judge who does not form beliefs on the true level of harm.

[3]Seminal papers on settlement under asymmetric information are Bebchuk (1984) and Reinganum and Wilde (1986).

price of a low-harm victim, the injurer might probably be better off offering a low settlement amount (equal to the expected damage award for low harm) and risking a trial when the victim rejects. Typically, the first strategy is referred to as *pooling*, and the second strategy is referred to as *separating*.

Making a separating offer turns out to be the more profitable for the injurer the larger the difference between the expected damage awards, the smaller the probability that the activity has caused high harm, or the smaller the legal costs. As a result, we find that low-risk injurers are more likely to make a separating offer than high-risk injurers. However, if the expected damage award for low harm is only slightly lower than the expected damage award for high harm, then neither high-risk nor low-risk injurers should risk a trial. This is because in this case the surplus, which a low-harm victim is paid under the pooling offer, is low compared to the expected trial costs under the separating offer. That is, due to the fact that court error increases the expected damage award for low harm and decreases the expected damage award for high harm, we find that court error increases the attractiveness of pooling. As a result, both types of injurer should be the more likely to pool—and thus to strictly settle out of court—the more likely the judge is to make a mistake. This, however, means that court error has a positive impact on the likelihood of settlements.

To sum up, our model suggests that court error may have a distortionary impact on deterrence. Depending on the personal gain of the activity, we find that the strict liability rule may either deter too little or too much activity. Nevertheless, underdeterrence needs not to be a serious problem because—due to the positive externality of litigation—the risk of court error may decrease over time. For this to happen, however, it is necessary that some disputes are terminated by trial. This will only be the case if the initial court error is lower than a certain cutoff such that at least low-risk injurers make a separating settlement offer and, hence, will be brought to trial if their activity caused high harm.

However, while underdeterrence may disappear over time, the problem of overdeterrence does not disappear without regulatory intervention: if no injurer ever engages in the activity, it is impossible for the judge to learn from previous trials and so the error rate cannot decrease. Thus, if the strict liability rule deters too much activity in the short run, it will also deter too much activity in the long run.

Related Literature. This paper contributes to the broad literature on the economics of litigation and settlement. For an overview of the literature see the surveys of Daughety (2000) and Spier (2007).

Roughly speaking, the literature can be divided into two groups: the *differing perceptions*, or *optimism, models* and the *asymmetric information models*.[4] These two strands of literature provide different explanations for the existence of trials. Differing perception models suggest that trials result from differing opinions by the parties about the outcome of a trial: in particular, trials occur when litigants are too optimistic about their chances to prevail in court. In contrast, asymmetric information models imply that trials result from uncertainty of (at least) one party about the value of a trial to the other.

Furthermore, these two groups of models also differ in the way how the settlement amount is determined. Differing perceptions models typically involve a bargaining process in which the parties arrive at a settlement amount somewhere between their reservation prices; that is, the parties will share the settlement surplus. Asymmetric information models, in contrast, assume that the uninformed party chooses a settlement amount and offers it to the opponent on a take-it-or-leave-it basis; the opponent then either accepts the offer, in which case the parties settle, or rejects and goes to trial. Thus, there is no bargaining in asymmetric information models.

Our model is in the spirit of the asymmetric information approach by Bebchuk (1984). As a major difference, we allow for errors made by the court in assessing the true level of harm.[5] With this focus on court error, our analysis also adds to the debate on the social value of accuracy in adju-

[4]For models of the first group, see Landes (1971), Gould (1973) and Posner (1973); more recent analyses are by Shavell (1995) and van Velthoven and van Wijck (2001). For models of the second group, see Bebchuk (1984), Reinganum and Wilde (1986), Nalebuff (1987), and Schweizer (1989). For general comparisons of the two approaches see, e.g., Baird, Gertner, and Picker (1994), and Miceli (1997, 1998).

[5]A second difference is that we only allow for two possible levels of harm.

dication. Relevant contributions to this debate have been made by Cooter (1984), Shavell (1987), Kaplow (1994), and Kaplow and Shavell (1996); for a critical evaluation of these contributions see Kaplow (1998) and Arlen (2000).

Cooter (1984) argues that, when the court cannot accurately determine the true level of harm, a rule of negligence is superior to strict liability because under a negligence regime the injurers' behavior is less sensitive to court error than it would be under strict liability. In contrast, Shavell (1987) argues that possible error in the measurement of damages does not necessarily imply that the strict liability rule is inefficient. He shows that strict liability will provide efficient incentives if damage awards are accurate on average. Moreover, even when the judge errs on average, Kaplow and Shavell (1996) show that negligence needs not to be superior to strict liability. The reason is as follows. In order to determine due care, the judge must be able to calculate the average harm incurred by the victim. However, if the judge cannot accurately determine the damage awards under a strict liability rule then he will probably also fail to determine due care under a negligence rule. That is, any difficulty the judge faces in assessing damages should affect negligence liability as well as strict liability.

Our results support Shavell (1987). We find that for sufficiently small court error the strict liability rule will provide efficient incentives to both low-risk and high-risk injurers. A statement about the efficiency of the negligence rule, however, is not possible with our model.

Finally, since we assume that the risk of court error will decrease with each additional dispute that is terminated by trial, our analysis contributes also to the literature on the divergence between private and social incentives to litigate. Shavell (1997) argues that the incentives of private parties to use the legal system are typically different from what is optimal for the society as a whole. The resources wasted in litigation do not always have a corresponding social benefit: cost would be saved—and the proper ex ante incentives maintained—if the litigants settled for the average damage award instead. In contrast to the literature, our model points out that disputes may also be settled too often. Since out-of-court settlements deprive the judge of useful information for a more accurate damage assessment in the future, they make no contribution to better deterrence.

The remainder of the paper is organized as follows. In the next section we present the general framework. Section 3 focuses on a representative injurer and identifies conditions under which he is willing to engage in the activity. Section 4 presents the results which in the following section 5 are discussed. The final section 6 concludes.

2 The Model

Consider a model with an infinite number of periods. In each period there are three players: a potential injurer, a victim, and a non-strategic judge. The injurer can engage in an activity that generates a personal gain. This activity harms the victim who sues for damages. The legal rule is strict liability. All players are risk neutral and live for one period.

At the outset of period one, the first injurer decides whether or not to engage in the activity. If he engages in the activity, his personal gain is $G = \underline{x} + \beta$, with $\underline{x} > 0$ and $0 < \beta < 1$. The harm to the victim may either be low, $0 < \underline{x} < G$, or high, $\overline{x} = \underline{x} + 1 > G$. The Injurer does not observe the true level of harm, but he knows its distribution. Furthermore, it is common knowledge that the injurer may be of two types: a low-risk type, L, mainly causing $\underline{x}$, or a high-risk type, H, mainly causing $\overline{x}$. The probability that the injurer is of type L is μ. The injurer knows his risk type which is neither observable to the victim nor to the judge.

Formally, let A_i denote an injurer having type $i = L, H$. If he engages in the activity, he will cause $\overline{x}$ with probability $p_i > 0$ and $\underline{x}$ with probability $1 - p_i$, where $p_L < 1/2 < p_H$. Since $\overline{x} = \underline{x} + 1$, the expected harm of A_i's activity is

$$E[x|A_i] = \underline{x} + p_i. \tag{1}$$

Engaging in the activity is efficient for low-risk injurers and inefficient for high-risk injurers, meaning

$$E[x|A_L] < G < E[x|A_H], \tag{2}$$

which implies

$$0 < p_L < \beta < p_H < 1, \quad \text{with } p_L < 1/2 < p_H. \tag{3}$$

We assume that it is common knowledge that the victim prevails with certainty if he goes to court. Moreover, it is also common knowledge that the judge sometimes makes a mistake and awards high damages, $\overline{D}$, to a victim who has suffered $\underline{x}$, or low damages, $\underline{D}$, to a victim who has suffered $\overline{x}$. Since the true level of harm may only be $\underline{x}$ or $\overline{x}$, the strict liability rule implies that the judge will either award $\underline{D} = \underline{x}$ or $\overline{D} = \overline{x}$. The probability for a court mistake in period one is $\lambda_\circ > 0$. This probability is publicly known and shall henceforth be referred to as *initial court error*.

Legal costs are allocated according to the English rule. Following this rule, the loser in a trial not only has to pay the court costs and his own legal expenses, but also those of the winner. In our set-up, the losing party will be the injurer.[6] The sum of total legal costs is exogenously given by $C > 0$.

The timing of the game played in the first period can be summarized as follows. In a first stage, nature determines the risk type of the potential injurer. The injurer then decides whether or not to engage in the activity. If he engages in the activity, the second stage starts. The injurer chooses a settlement amount and offers it to the victim on a take-it-or-leave-it basis. The victim decides whether to accept the offer and settle out of court, or to reject it and go to trial. The victim accepts the settlement offer if he is indifferent between accepting the settlement and going to trial. We normalize the settlement costs to zero.[7]

The game played in the second period differs from the game played in the first period only in one aspect: namely, the probability with which the judge makes a mistake. If there has been no trial in period one, the probability for court error in period two is still $\lambda_\circ$. If, however, there has been a trial in period one then the judge in period two learns from the previous court decision and the probability for court error is $0 < \lambda_1 < \lambda_\circ$.

[6] Note that this assumption excludes the possibility of nuisance suit. The victim always expects a positive value of going to court and therefore fills suit if he is not offered a high enough settlement amount.

[7] This normalization is not crucial as long as the litigation costs exceed the settlement costs.

The same applies to the game played in period three. If there has been no trial in period one or period two, the court error is $\lambda_\circ$; in this case the game played in period three will be the same as in period one. If, however, there has been a trial either in period one or period two, the court error is $0 < \lambda_1 < \lambda_\circ$ and the game will be different. Similarly, if there has been a trial in period one and period two, the court error is $0 < \lambda_2 < \lambda_1 < \lambda_\circ$.

In general terms, the game played in period m is different from the game played in period $m-1$, if there has been a trial in period $m-1$. The probability for a court mistake in period m is λ_n. The subscript n, $0 \leq n < m$, denotes the number of previous cases that have been terminated by trial. The following conditions are satisfied:

$$\lambda_{n+1} < \lambda_n < 1/2 \text{ for all } n \in \mathbb{N}_0, \quad \text{and} \quad \lim_{n\to\infty} \lambda_n = 0. \tag{4}$$

The assumption that $\lambda_n < 1/2$ for all $n \in \mathbb{N}_0$ implies that in the majority of cases that go to court the judge will find out the true level of harm and award true damages to the victim. $\lambda_{n+1} < \lambda_n$ makes sure that the probability for a court mistake decreases with each additional case that is terminated by trial; this reflects the fact that judges learn from previous court decisions. Finally, $\lim_{n\to\infty} \lambda_n = 0$ guarantees that court error can disappear over time.

Remark. As it is evident, efficiency requires that high-risk injurers refrain from the activity. Henceforth, we will use the term *optimal deterrence* when the strict liability rule deters high-risk injurers from the activity, while low-risk injurers engage in the activity. In the next sections we will investigate under what conditions *optimal deterrence* is satisfied even in presence of court error. We solve for subgame-perfect equilibria in each period.

3 Analysis

We first consider the strategic interaction game between the m-th potential injurer A_i^m, $i = L, H$, and his victim B^m. The injurer decides whether or not to engage in the activity, knowing that n previous injurers have already been taken to court; $m, n \in \mathbb{N}_0$ and $0 \leq n \leq (m-1)$. We proceed by backward induction, beginning with the optimal choice of the settlement offer.[8] To simplify the notation, we will henceforth drop the superscript m and just refer to injurer A_i and victim B.

3.1 Trial vs. Settlement

First, assume that injurer A_i has caused harm to victim B. B then wants to hold A_i liable and considers whether or not to litigate. It is important to note that at this stage of period m, the victim can be of two types: a low-harm victim who has suffered $\underline{x}$, or a high-ham victim who has suffered $\overline{x}$; the probability that B has type $\overline{x}$ is given by p_i.

If B goes to court, the judge will correctly recognize the injurer's fault and decide on damages $D \in \{\underline{x}, \overline{x}\}$ to be paid to the victim. Court error will occur with probability λ_n and so the conditional expected damage awards are given by

$$\begin{aligned} E[D|\underline{x}] &= (1-\lambda_n)\underline{x} + \lambda_n \overline{x} = \underline{x} + \lambda_n \qquad \text{and} \\ E[D|\overline{x}] &= (1-\lambda_n)\overline{x} + \lambda_n \underline{x} = \underline{x} + (1-\lambda_n). \end{aligned}$$

Assumption (4) then implies that $\overline{x} \geq E[D|\overline{x}] > E[D|\underline{x}] \geq \underline{x}$ for all n. This means that in expectation the injurer will overcompensate for $\underline{x}$ and undercompensate for $\overline{x}$. In addition, he will also pay the costs of the trial. A_i's a priori (that is, before settlement bargaining) expected costs of litigation amount to

$$\begin{aligned} L_{A_i} &= (1-p_i)E[D|\underline{x}] + p_i E[D|\overline{x}] + C \\ &= \underline{x} + p_i + \lambda_n(1-2p_i) + C \end{aligned}$$

and B's expected net benefits of going to trial are given by

$$\begin{aligned} \underline{V} &= E[D|\underline{x}] = \underline{x} + \lambda_n && \text{if he is of type } \underline{x}, \text{ and} \\ \overline{V} &= E[D|\overline{x}] = \underline{x} + (1-\lambda_n) && \text{if he is of type } \overline{x}. \end{aligned}$$

[8] The structure of the analysis is in the spirit of van Velthoven and van Wijck (2001). Yet, in contrast to their model, our rationale why settlement negotiations might fail is not a differing opinion by the injurer and the victim about the outcome of a trial, but asymmetric information.

Note that—independently of his type—litigation has a positive value for B. This rules out the possibility that B will refrain from a trial even if gets no out-of-court payment from A_i. Therefore, injurer A_i should try to solve the dispute out of court.

It is quite obvious that B will only accept an out-of-court settlement that makes him at least as well off as a trial. Hence, A_i's settlement offer should at least be equal to $\underline{V}$ if B has type $\underline{x}$, and at least be equal to $\overline{V}$ if B has type $\overline{x}$.

However, since A_i cannot observe B's type, he must offer the high settlement amount $\overline{V}$ if he wants to be sure that the dispute will not go to trial. This offer exceeds the reservation price of a low-harm B; hence, A_i might be better off offering the low settlement amount $\underline{V}$ and letting the dispute go to trial if B has type $\overline{x}$. Hereafter, we will refer to an offer of $\overline{V}$ as *pooling offer* and to an offer of $\underline{V}$ as *separating offer*.[9] Injurer A_i's expected costs of pooling are then given by

$$L_{A_i}^{pool} = \overline{V} = \underline{x} + (1 - \lambda_n), \tag{5}$$

and his expected costs of separating are given by

$$L_{A_i}^{sep} = (1 - p_i)\underline{V} + p_i(\overline{V} + C) = \underline{x} + p_i(1 + C) + \lambda_n(1 - 2p_i). \tag{6}$$

The optimal choice between the pooling and the separating offer depends on a comparison of equation (5) and (6). The next lemma summarizes the results.[10]

Lemma 1. *Let* $\overline{\lambda^i} := \frac{1-p_i-p_iC}{2-2p_i}$ *for* $i = L, H$*; and assume that injurer* A_i *has harmed victim* B*.*

a) If the court error is smaller than this cutoff, $\lambda_n < \overline{\lambda^i}$*, then* A_i *will offer the settlement amount* $\underline{V} = \underline{x} + \lambda_n$ *(separating offer) which* B *will accept if he has suffered* $\underline{x}$*, and reject if he has suffered* $\overline{x}$*.*

[9] It is straight forward to show that A_i will offer either $\underline{V}$ or $\overline{V}$. Observe first that an offer of $V < \underline{V}$ will result in both possible types of B going to court, so it must be inferior to an offer of $\underline{V}$, which a low-harm B will accept. Second, an offer of $V > \overline{V}$ will induce both possible types of B to settle but will cost more than $\overline{V}$, which is also accepted by both types. Finally, any offer between $\underline{V}$ and $\overline{V}$ is inferior to $\underline{V}$ because only a low-harm B accepts either offer but receives more than his reservation price when $V > \underline{V}$.

[10] Lemma 1 implicitly assumes that A_i makes the pooling offer when he is indifferent between $\underline{V}$ and $\overline{V}$.

b) If the court error is larger than this cutoff, $\lambda_n \geq \overline{\lambda^i}$, then A_i will offer the settlement amount $\overline{V} = \underline{x} + 1 - \lambda_n$ (pooling offer) which is always accepted by B.

Corollary. *The dispute between injurer A_i and victim B may only enter a trial if $\lambda_n < \overline{\lambda^i}$; the probability for a trial is then given by p_i.*

Lemma 1 indicates that separating is preferred if $\lambda_n < \overline{\lambda^i}$. Since $\partial\overline{\lambda^i}/\partial C < 0$ and $\partial\overline{\lambda^i}/\partial p_i < 0$ this implies that the injurer is the more likely to make the separating offer, $\underline{V}$, the smaller the court error, the smaller the trial costs, or the smaller the probability that B has type $\overline{x}$. A lower court error makes the separating offer more attractive because it increases the difference between $\overline{V}$ and $\underline{V}$, and therefore increases the surplus that a low-harm B would receive from settling under the pooling offer. Lower trial costs and a lower probability that B has type $\overline{x}$ (i.e. a lower p_i) also promotes the separating offer because they reduce the expected costs of being taken to court. Since $p_L < p_H$, it follows that low-risk injurers are ceteris paribus more likely to separate than high-risk injurers.

Remark. The assumed bargaining procedure—a take-it-or-leave-it offer made by the injurer—gives the injurer a strong bargaining position. In fact, if the injurer knew the true level of harm, he could capture the whole surplus from the settlement. Therefore, the take-it-or-leave-it assumption is likely to lead to a settlement amount that is more favorable to the injurer (i.e. lower) than the settlement amount that would result from a more realistic bargaining procedure. However, the focus of this model does not lie on the absolute level of the settlement amount but on the impact of court error on the deterrent effect of the strict liability rule. There are no reasons to expect the quality of our results to be changed by an assumption that introduces a downward bias in the absolute level of the settlement amount but leaves the probability of a settlement unchanged.

3.2 The initial Question

We now return to the initial question, whether it is interesting enough for the m-th potential injurer to engage in the activity at all. The answer to this question does not only depend on the personal gain from the activity but also on the expected costs of paying damages to the victim: this costs will be different depending on whether the injurer makes a pooling offer or a separating offer.

If pooling is the least expensive option to solve the dispute between A_i and B, then the injurer's expected net benefit of engaging in the activity is

$$U_{A_i}^{pool} = G - L_{A_i}^{pool} = \beta - (1 - \lambda_n). \tag{7}$$

Alternatively, if separating is the least expensive option, then his expected net benefit is

$$U_{A_i}^{sep} = G - L_{A_i}^{sep} = \beta - p_i(1 + C) - \lambda_n(1 - 2p_i). \tag{8}$$

It is rather obvious that A_i will only engage in a profitable activity. This means that A_i will only engage in the activity if either $G > L_{A_i}^{pool}$ and/or $G > L_{A_i}^{sep}$. This leads to the following lemma.

Lemma 2. *Let* $\overline{\beta^i}(\lambda_n) := \min\{1 - \lambda_n,\ p_i(1+C) + \lambda_n(1-2p_i)\}$ *for* $i = L, H$. *Injurer* A_i *will then engage in the activity if* $\beta > \overline{\beta^i}(\lambda_n)$*, and he will refrain from the activity if* $\beta \leq \overline{\beta^i}(\lambda_n)$.

Corollary. *Low risk injurers are, ceteris paribus, more likely to engage in the activity than high-risk injurers because* $\overline{\beta^L}(\lambda_n) \leq \overline{\beta^H}(\lambda_n)$ *for all* $\lambda_n < 1/2$.

Using Lemmas 1 and 2, we can summarize the equilibrium outcome of period m in the next Lemma.

Lemma 3. *Given the cutoffs* $\overline{\lambda^i}$ *and* $\overline{\beta^i}(\lambda_n)$ *defined in Lemmas 1 and 2, the game between the m-th potential injurer* A_i, $i = L, H$, *and victim* B *has the following equilibrium outcome:*

a) Separating equilibrium: If $\beta > \overline{\beta^i}(\lambda_n)$ *and* $\lambda_n < \overline{\lambda^i}$ *then the injurer will engage in the activity and offer the settlement amount* $\underline{V} = \underline{x} + \lambda_n$. *The victim will accept this offer if he has suffered* $\underline{x}$ *and go to court if he has* *suffered $\overline{x}$. The expected net benefits are $U_{A_i}^{sep} = \beta - p_i(1 + C) - \lambda_n(1 - 2p_i)$, $U_{B|\underline{x}}^{sep} = \lambda_n$, and $U_{B|\overline{x}}^{sep} = -\lambda_n$.*

b) Pooling equilibrium: If $\beta > \overline{\beta^i}(\lambda_n)$ and $\lambda_n \geq \overline{\lambda^i}$ then the injurer will engage in the activity and offer the settlement amount $\overline{V} = \underline{x} + 1 - \lambda_n$ which the victim will accept. The expected net benefits are $U_{A_i}^{pool} = \beta - (1 - \lambda_n)$, $U_{B|\underline{x}}^{pool} = 1 - \lambda_n$, and $U_{B|\overline{x}}^{pool} = -\lambda_n$.

c) No-activity equilibrium: If $\beta \leq \overline{\beta^i}(\lambda_n)$ then the injurer will refrain from the activity. The expected net benefits are $U_{A_i}^{na} = U_{B|\underline{x}}^{na} = U_{B|\overline{x}}^{na} = 0$.

Remark. Due to the fact that $\overline{\beta^L}(\lambda_n) \leq \overline{\beta^H}(\lambda_n)$ for all $\lambda_n < 1/2$, it follows from Lemma 3 that in any period $m \geq 0$ the activity will either attract both possible types of injurers, only low-risk injurers, or no injurers at all. Moreover, since $\partial\overline{\beta^H}(\lambda_n)/\partial\lambda_n < 0$ and $\overline{\beta^H}(0) \geq p_H > \beta$ it is satisfied that high-risk injurers will definitely refrain from the activity when $\lambda_n \to 0$.

4 Results

4.1 Optimal Deterrence

Before characterizing the equilibrium outcome of the model, we will state a sufficient condition for an arbitrary court error λ_n to satisfy *optimal deterrence.* We begin with the following proposition.

Proposition 1. *Let $\widehat{\lambda} := \min\left\{1 - \beta, \frac{p_H - \beta + p_H C}{2p_H - 1}, \frac{\beta - p_L - p_L C}{1 - 2p_L}\right\}$. If the court error is smaller than this cutoff, $\lambda_n < \widehat{\lambda}$, then a potential injurer will engage in the activity if he is a low-risk type, A_L, and refrain from the activity if he is a high-risk type, A_H; that is, optimal deterrence is satisfied.*

Proof. According to Lemma 2, a high-risk injurer will refrain from the activity if $\beta < \min\{1 - \lambda_n,\ p_H(1 + C) + \lambda_n(1 - 2p_H)\}$ and a low-risk injurer will engage in the activity if $\beta > \min\{1 - \lambda_n,\ p_L(1 + C) + \lambda_n(1 - 2p_L)\}$; this yields the following conditions for optimal deterrence:

$$\lambda_n < 1 - \beta, \tag{9}$$

$$\lambda_n(2p_H - 1) < p_H - \beta + p_H C \qquad \text{and} \tag{10}$$

$$\lambda_n(1 - 2p_L) < \beta - p_L - p_L C. \tag{11}$$

Using the assumption that $p_L < 1/2 < p_H$, we can then centralize these conditions into the statement $\lambda_n < \min\left\{1 - \beta, \frac{p_H - \beta + p_H C}{2p_H - 1}, \frac{\beta - p_L - p_L C}{1 - 2p_L}\right\}$. ■

Remark. Proposition 1 gives a sufficient condition for optimal deterrence in the presence of court error. While this condition makes sure that a potential injurer will engage in the activity if and only if he is a low-risk type A_L, it is not guaranteed that a legal dispute will end in a settlement. The reason for this is as follows. For the strict liability rule to deter high-risk injurers from the activity it is necessary that neither pooling nor separating provides a positive expected net benefit to A_H. Pooling may then not provide a positive expected net benefit to A_L either, because the payoff of pooling is independent of the injurers' risk types. However, as under optimal deterrence low-risk injurers must have an incentive to engage in the activity, it must be the case that separating provides a positive payoff to A_L. This means that an A_L injurer makes the separating offer $\underline{V} = \underline{x} + \lambda_n$ which, according to Lemma 1, will be accepted if the realized harm is $\underline{x}$ and rejected if the realized harm is $\overline{x}$. This means that legal disputes are likely to end in a trial, even under optimal deterrence.

4.2 Convergence to Optimality

Note that the cutoff $\widehat{\lambda}$, defined in Proposition 1, is negative if $C \geq \frac{\beta - p_L}{p_L}$; this implies that optimal deterrence is impossible when legal costs are too high. Provided that $C < \frac{\beta - p_L}{p_L}$, however, there exists a threshold $\widehat{n} \geq 0$ such that $\lambda_n < \widehat{\lambda}$ for all $n \geq \widehat{n}$; this means that for "moderate" legal costs, optimal deterrence is satisfied if the number of previous cases that have been terminated by trial is greater or equal to $\widehat{n}$.

Nevertheless, cheap litigation is not a sufficient condition for long-run optimal deterrence: if no injurer ever engages in the activity—or if all injurers reach an out-of-court settlement—then no case will be terminated by trial and the judge learns nothing from previous court decisions. As a result, the risk of court error remains prohibitively large. For the strict liability rule to be optimal—at least in the long run—it must therefore be the case that A_L injurers engage in the activity and make the separating offer $\underline{V}$. Two sufficient conditions for this are

$$\lambda_\circ < \frac{\beta - p_L - p_L C}{1 - 2p_L}, \quad \text{and} \tag{12}$$

$$\lambda_\circ < \frac{1 - p_L - p_L C}{2 - 2p_L}. \tag{13}$$

These conditions motivate the next proposition.

Proposition 2. *Let* $\widetilde{\lambda} := \min\left\{\frac{\beta - p_L - p_L C}{1-2p_L}, \frac{1-p_L-p_L C}{2-2p_L}\right\}$.

a) If the initial court error is smaller than this cutoff, $\lambda_\circ < \widetilde{\lambda}$, *then the strict liability rule ensures long-run optimal deterrence.*

b) If the initial court error is even smaller than the cutoff defined in Proposition 1, $\lambda_\circ < \widehat{\lambda} \leq \widetilde{\lambda}$, *then the strict liability rule is optimal right from the beginning.*

Proof. In order to prove the first part of the proposition, we have to show that trials are possible when $\lambda_\circ < \min\left\{\frac{\beta - p_L - p_L C}{1-2p_L}, \frac{1-p_L-p_L C}{2-2p_L}\right\}$. Note that $\lambda_\circ < \frac{\beta - p_L - p_L C}{1-2p_L}$ implies $U_{A_L}^{sep} > 0$ for all n; that is, A_L injurers expect a positive payoff (at least) from separating and, therefore, engage in the activity. From $\lambda_\circ < \frac{\beta - p_L - p_L C}{1-2p_L}$ it then follows by Lemma 1 that $U_{A_L}^{sep} > U_{A_L}^{pool}$ for all n; accordingly, A_L makes the separating offer $\underline{V}$, which means that a dispute will go to court with probability p_L. The second part of the proposition follows from Proposition 1. ■

4.3 Equilibrium Characteristics

The previous analysis shows that the deterrent effect of the strict liability rule depends on the extent of the initial court error and on the magnitude of legal costs. The personal gain from the activity is another important factor: the qualitative impact of court error is different for high-gain activities

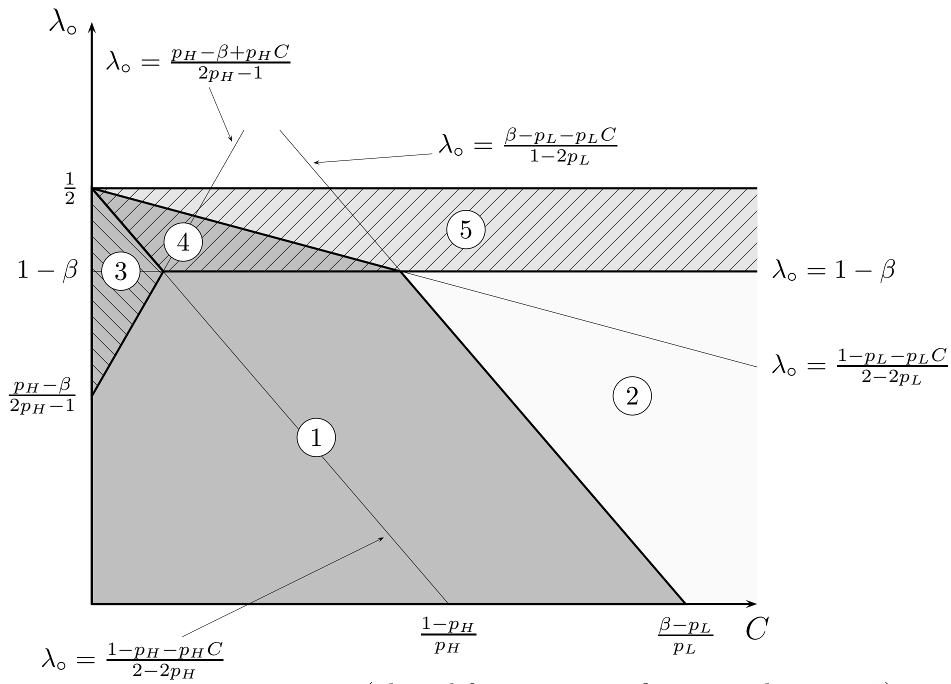
($\beta > 1/2$) than for low-gain activities ($\beta < 1/2$). Figures 1 and 2 characterize the equilibrium outcome of the model. The areas 1 to 5 represent the sets of parameter configurations $(C, \lambda_\circ)$ for which each of the following five equilibrium scenarios will materialize:

1. *Instantaneous optimal deterrence:* The first-period injurer—and any following injurer—will only engage in the activity if he is of type A_L. He makes a separating settlement offer which is accepted if the realized harm is $\underline{x}$ and rejected if the realized harm is $\overline{x}$; that is, A_L will be taken to court if the realized harm $\overline{x}$.

2. *Total deterrence:* No injurer will ever engage in the activity; thus, long-run optimal deterrence will not be accomplished.

3. *Long-run optimal deterrence (I):* The first-period injurer will engage in the activity whether he is of type A_L or A_H; he makes a separating offer and is taken to court if the realized harm is $\overline{x}$. Subsequent injurers

Figure 1: Deterrence under strict liability I; $\beta > 1/2$

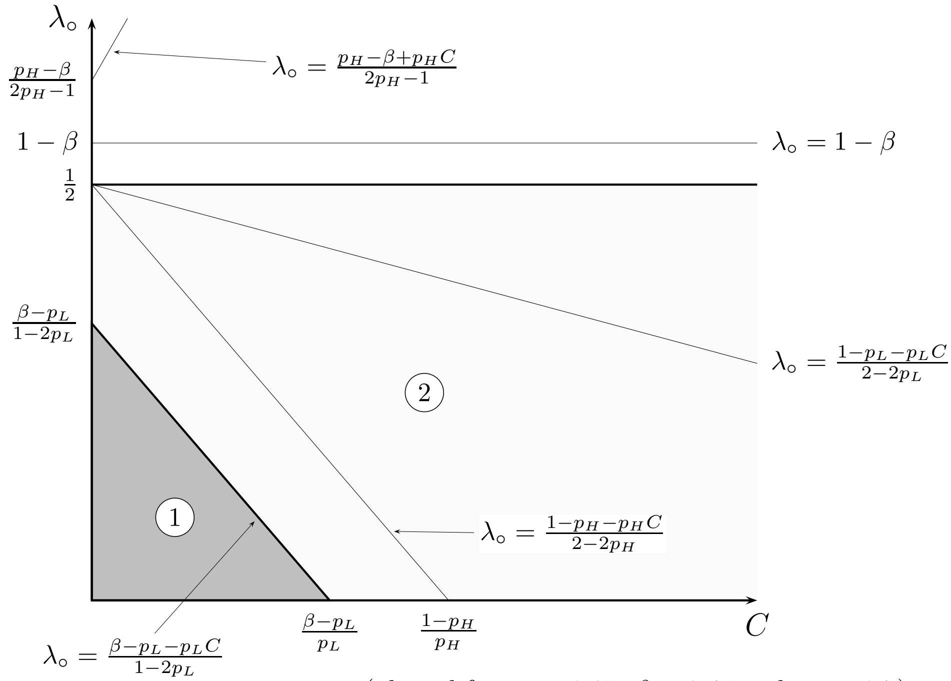


(plotted for $p_L = 0.35$, $\beta = 0.6$ and $p_H = 0.7$)

will definitely engage in the activity when they are of type A_L. When they are of type A_H, however, they will only engage in the activity if the number of precedent court decisions is lower than a critical value. That is, long-run optimal deterrence will be accomplished once enough periods have been terminated by trial.

4. *Long-run optimal deterrence (II):* The first-period injurer will engage in the activity whether he is of type A_L or A_H. When he is of type A_L, he makes a separating offer and is taken to court if the realized harm is $\overline{x}$. When he is of type A_H, however, he makes a pooling offer and is not taken to court. Like under scenario 3, subsequent injurers will engage in the activity when they are of type A_L; when they are of type A_H, they will only engage in the activity if the number of precedent court decisions is lower than a critical value. Again, long-run optimal deterrence will be accomplished after an initial time of underdeterrence.

Figure 2: Deterrence under strict liability II; $\beta < 1/2$.



(plotted for $p_L = 0.35$, $\beta = 0.45$ and $p_H = 0.7$)

5. *No deterrence:* The first-period injurer—and any following injurer—will engage in the activity whether he is of type A_L or A_H. He makes a pooling offer and settles out of court with certainty. As a result, long-run optimal deterrence will not be accomplished.

To sum up, Figures 1 and 2 indicate that long-run optimal deterrence will not occur if the initial parameter configuration $(C, \lambda_\circ)$ falls into area 2 or area 5. The reason is a lack of trials: while no injurer will ever engage in the activity in scenario 2, all legal disputes will be terminated by out-of-court settlements in scenario 5. In either case no judge gets a chance to deal with the activity and hence the probability of court error cannot decrease. Moreover, it is immediately clear from the absence of an area 3, 4, and 5 in Figure 2 that A_H injurers will never engage in a low-gain activity—not even if the initial court error is at its highest possible level. That is, for $\beta < 1/2$ the strict liability rule will either meet optimal deterrence right from the beginning (scenario 1), or permanently prevent any activity (scenario 2).

5 Discussion

The present model characterizes the strict liability rule as a legal rule that is robust against "moderate" risk of court error: if both the initial court error and legal costs are sufficiently small then the strict liability rule will—at least in the long run—deter high-risk injurers from the activity, while low-risk injurers engage in the activity (*optimal deterrence*); otherwise, the rule will either permanently deter both types of injurers (*total deterrence*), or not deter injurers at all (*no deterrence*).

In what follows, we discuss the welfare implication of court error and examine the question whether, and if so, under what conditions it is better not to enforce the strict liability rule. In the second part of the discussion we will focus on the impact of legal costs: we argue that under certain circumstances it can be welfare improving to waive the court fee. The discussion will be closed with a comment on the case where the judge is allowed to estimate the value of damages by incorporating not only the observed level of harm but also exogenous information such as the likelihood of court error.

Welfare analysis. Obviously, a fully informed social planner would simply impose a ban on the activities of high-risk injurers and obtain the first-best expected per-period welfare

$$W^* = \mu\left(\beta - p_L\right),$$

where μ denotes the proportion of A_L injurers.

The strict liability rule leads to a similar welfare result when the initial court error is sufficiently low and litigation costs are zero; i.e. iff $\lambda_\circ < \widehat{\lambda}$ and $C = 0$. However, litigation is costly and courts do make mistakes, so that we are in a second-best world where two types of welfare losses are possible. The first type of loss concerns the number of activities: it occurs if A_L injurers refrain from the activity (*overdeterrence*) or if A_H injurers engage in the activity (*underdeterrence*). The second type of welfare loss is the method of dispute resolution: when a dispute is terminated by trial, the legal costs involved imply a welfare loss.

Our results from the previous section suggest that overdeterrence applies to scenario 2 and underdeterrence to scenario 5; underdeterrence is initially also a problem under the scenarios 3 and 4, but it fades away over time. The second type of welfare loss (legal costs) applies to scenarios 1, 3, and 4.

Lemma 4. *Let $W_\circ^j$ and W^j denote the short- and long-run expected per-period welfare associated with scenario j. Social welfare under the strict liability rule may then be summarized as follows:*

1. *Instantaneous optimal deterrence:* $W_\circ^1 = W^1 = \mu(\beta - p_L - p_L C)$.

2. *Total deterrence:* $W_\circ^2 = W^2 = 0$.

3. *Long-run optimal deterrence (I):*
   $W_\circ^3 = \beta - (\mu p_L + (1-\mu)p_H)(1 + C)$ *and* $W^3 = \mu(\beta - p_L - p_L C)$.

4. *Long-run optimal deterrence (II):*
   $W_\circ^4 = \beta - \mu p_L - (1-\mu)p_H - \mu p_L C$ *and* $W^4 = \mu(\beta - p_L - p_L C)$.

5. *No deterrence:* $W_\circ^5 = W^5 = \beta - \mu p_L - (1-\mu)p_H$.

Since optimal deterrence is only possible if $C < (\beta - p_L)/p_L$, it is immediately clear that $W^1_\circ = W^1 = W^3 = W^4 > 0$. Comparing the five scenarios for the strict liability rule then implies that scenario 1 dominates scenarios 2–4.

The welfare comparison of scenarios 1 and 5, however, is not that clear-cut: the average expected welfare level under no deterrence may be lower, but also higher, than under optimal deterrence. This raises the question under what conditions it would be welfare improving not to enforce the strict liability rule. The following proposition suggests an answer.

Proposition 3. *Let* $\mu_1 := \frac{p_H - \beta}{p_H - \beta + p_L C}$ *and* $\mu_2 := \frac{p_H - \beta}{p_H - p_L}$.

a) Given that the initial parameter configuration $(C, \lambda_\circ)$ *is such that scenario 1 will materialize, the enforcement of the strict liability rule will reduce welfare if* $\mu \geq \mu_1$ *and improve welfare if* $\mu < \mu_1$.

b) Given that scenario 2 will materialize, the enforcement of the strict liability rule will reduce welfare if $\mu \geq \mu_2$ *and improve welfare if* $\mu < \mu_2$.

c) Given that scenario 3 or 4 will materialize, the enforcement of the strict liability rule will definitely reduce welfare if $\mu \geq \mu_1$*, and it might improve, reduce or have no effect on welfare if* $\mu < \mu_1$.

d) Given that scenario 5 will materialize, the enforcement of the strict liability rule will neither improve nor reduce welfare.

Proof. First, in the absence of liability both types of injurers will engage in the activity and so the expected per-period welfare must be given by $W' = \beta - \mu p_L - (1 - \mu) p_H$ which is the same value as under scenario 5; from this follows immediately part d) of the proposition. Second, for $\mu \geq \mu_1$ it holds true that $W' \geq W^1_\circ = W^1 = W^3 = W^4$ and $W' > W^4_\circ > W^3_\circ$; that is, the expected per-period welfare in absence of liability is larger than the expected per-period welfare under (long-run) optimal deterrence; this motivates part a) and c) of the proposition. Finally, note that W' turns positive if $\mu \geq \mu_2$ which implies part b) of the proposition. ■

Remark. Proposition 3 suggests that the strict liability rule should definitely not be enforced if the proportion of low-risk injurers is larger than a certain value; i.e. if $\mu \geq \max\left\{\frac{p_H-\beta}{p_H-\beta+p_LC}, \frac{p_H-\beta}{p_H-p_L}\right\}$. This expression is equivalent to the condition $(1-\mu)(p_H-\beta) \leq \min\{\mu p_L C, \mu(\beta-p_L)\}$ which states that the average welfare loss of not enforcing the strict liability rule is lower than both the average expected welfare loss under optimal deterrence and the average expected welfare loss under total deterrence. To get some intuition for this result, recall that for $\mu \geq \frac{p_H-\beta}{p_H-p_L}$ the proportion of high-risk injurers is low enough such that the expected per-period welfare is positive even if both possible types of injurer engage in the activity. Thus, enforcing the strict liability rule can only be welfare improving if the expected enforcement costs fall short of the enforcement gain, i.e. if $\mu p_L C < (1-\mu)(p_H-\beta)$, or $\mu \geq \frac{p_H-\beta}{p_H-\beta+p_LC}$.

The role of legal costs. The magnitude of legal costs is an important determining factor for the deterrent effect of the strict liability rule: this is true not only in the presence of court error, but also in general.

As mentioned earlier, the strict liability rule will only ensures long-run optimal deterrence if the initial court error is lower than the cutoff defined in Proposition 2, $\lambda_\circ < \widetilde{\lambda}$. This cutoff is a decreasing function in C and so its inverse, $\widetilde{C} = \min\left\{\frac{(1-p_L)(1-2\lambda_\circ)}{p_L}, \frac{\beta-p_L-(1-2p_L)\lambda_\circ}{p_L}\right\}$, can be interpreted as an upper bound for legal costs. That is, long-run optimal deterrence will not be accomplished if legal costs are larger than this cutoff, $C \geq \widetilde{C}$.

Legal costs consist of many different components, one of which is the court fee. Since the judge can directly determine the court fee to be borne by the injurer, he can (to a certain extent) influence the extent of the parameter C in our model. This, however, suggests that whenever $C \geq \widetilde{C}$ it may be welfare improving to waive the court fee for those injurers who are the first to decide on the activity. That is, if this temporary reduction in court costs pushes C below $\widetilde{C}$, then the risk of court error will decrease with each period that is terminated in trial and, as a result, the deterrent effect of the strict liability rule becomes optimal over time

Nevertheless, waiving the court fee does not always improve welfare. Note that for $\beta < p_L + (1-2p_L)\lambda_\circ$ the expected net benefit of engaging in the activity is negative for both A_H and A_L injurers; this means that even low-risk injurers would refrain from the activity if litigation was for free. Moreover, waiving the court fee is welfare reducing if $C \geq \frac{1-\mu}{\mu}\frac{p_H-\beta}{p_L}$. As mentioned in the pervious paragraph, in this case the expected per-period welfare is lower under optimal deterrence than under no deterrence and, therefore, the strict liability rule should not be enforced.

A more sophisticated fact-finding process. Court error in this paper has been modeled by the assumption that the judge sometimes mistakes the true level of harm and then awards high damages to a victim who has suffered low harm, or low damages to a victim who has suffered high harm. The implication of this approach is that court error will increase the expected damage award for low harm and decrease the expected damage award for high harm. This implies that a high-risk injurer can expect to pay less in damages than the average harm he will cause with his activity, while a low-risk injurer must expect to pay more. As a result, both too much and too little activity is possible.

So far, the focus of the analysis has been on the litigants' decisions rather than the decisions in court. What we have largely ignored is that a rational judge might anticipate potential court error. Following the concept of Rasmusen (1995), the judge's fact-finding process under court error should be divided into two steps: first, *measuring* the value of the damages given the evidence presented for the particular case, and, second, *estimating* the value of damages by incorporating not only the measured damage but also exogenous information such as typical damage levels and the likelihood of measurement error.

However, since in this model the effect of court error is not simply to bias damage awards upwards by an average amount ε, the judge cannot easily adjust his damage award by subtracting ε from his initial measurement. The problem in the present model is that the measurement bias in the case of low harm goes in the opposite direction than the measurement bias in the case of high harm. To make the expected damage award match the true level of harm as closely as possible, the judge should award less than $\underline{x}$ if he observes $\underline{x}$ and more than $\overline{x}$ if he observes $\overline{x}$. Specifically, the shifted awards should be

$$D(\underline{x}) = \underline{x} - \frac{\lambda_n}{1-2\lambda_n} \qquad \text{if the measured harm is } \underline{x}\text{, and}$$

$$D(\overline{x}) = \overline{x} + \frac{\lambda_n}{1-2\lambda_n} \qquad \text{if the measured harm is } \overline{x}.$$

Remark. Whether or not the judge should be permitted to go beyond measuring the harm level to estimate damages is a legal question that lies outside the scope of economic analysis. However, note that even in the case where the judge is allowed to go beyond measuring, he cannot optimally respond to large court error because $\lim_{\lambda_n \to 1/2} D(\underline{x}) = -\infty$ and $\lim_{\lambda_n \to 1/2} D(\overline{x}) = \infty$.

6 Conclusion

The present model examines the impact of court error on the deterrent effect of the strict liability rule. Our analysis demonstrates that depending on the personal gain of the activity, court error can cause both too little and too much activity. While underdeterrence may only be a problem in the context of high-gain activities, overdeterrence may be a problem in the context of high-gain and low-gain activities. We find that—due to positive externality of litigation—the problem of underdeterrence may disappear over time. For this to happen, however, it is necessary that some cases are decided by judges. Since court error increases the likelihood of an out-of-court settlement, this will not be the case if the initial error rate is too high. Moreover, if overdeterrence is the initial problem, then the strict liability rule will not become optimal. If no injurer ever engages in the activity, it is impossible for the judge to learn from previous trials and so the error rate cannot decrease. That is, if the strict liability rule deters too much activity in the short run, it will also deter too much activity in the long run. However, if the strict liability rule deters too little activity in the short run, it might still become optimal in the long run. As a result, we conclude that the strict liability rule is robust against "moderate" risk of court error. If both the initial error rate and legal costs are sufficiently small then the strict liability rule will—at least in the long run—provide efficient activity incentives to low-risk and high-risk injurers.

References

Arlen, J. (2000): "Tort Damages," in *Encyclopedia of Law and Economics*, ed. by B. Bouckaert, and G. De Geest. Edward Elgar Publishing Co.: Cheltenham.

Baird, D., R. Gertner, and R. Picker (1994): *Game Theory and the Law*. Harvard University Press.

Bebchuk, L. A. (1984): "Litigation and Settlement under Imperfect Information," *RAND Journal of Economics*, 15(3), 404.

Becker, G. S. (1968): "Crime and Punishment: An Economic Approach," *The Journal of Political Economy*, 76(2), 169.

Cooter, R. D. (1984): "Prices and Sanctions," *Columbia Law Review*, 84, 1523.

Daughety, A. F. (2000): "Settlement," in *Encyclopedia of Law and Economics*, ed. by B. Bouckaert, and G. De Geest. Edward Elgar Publishing Co.: Cheltenham.

Gould, J. P. (1973): "The Economics of Legal Conflicts," *The Journal of Legal Studies*, 2(2), 279.

Kaplow, L. (1994): "The Value of Accuracy in Adjudication: An Economic Analysis," *Journal of Legal Studies*, 23(1), 307.

——— (1998): "Accuracy in Adjudication," in *The New Palgrave Dictionary of Economics and the Law*, ed. by P. Newman. Macmillan.

Kaplow, L., and S. Shavell (1996): "Accuracy in the Assessment of Damages," *Journal of Law and Economics*, 39(1), 191.

Landes, W. M. (1971): "An Economic Analysis of the Courts," *Journal of Law & Economics*, 14(1), 61.

Miceli, T. J. (1997): *Economics of the Law*. New York: Oxford University Press.

——— (1998): "Settlement Strategies," *Journal of Legal Studies*, 27(2), 473.

Nalebuff, B. (1987): "Credible Pretrial Negotiation," *The RAND Journal of Economics*, 18(2), 198.

Posner, R. A. (1973): "An Economic Approach to Legal Procedure and Judicial Administration," *The Journal of Legal Studies*, 2(2), 399.

Rasmusen, E. (1995): "Predictable and unpredictable error in tort awards: The effect of plaintiff self-selection and signaling," *International Review of Law and Economics*, 15(3), 323.

Reinganum, J. F., and L. L. Wilde (1986): "Settlement, Litigation, and the Allocation of Litigation Costs," *The RAND Journal of Economics*, 17(4), 557.

Schweizer, U. (1989): "Litigation and Settlement under Two-Sided Incomplete Information," *Review of Economic Studies*, 56(2), 163.

Shavell, S. (1987): *Economic analysis of accident law*. Cambridge MA: Harvard University Press.

——— (1995): "Alternative Dispute Resolution: An Economic Analysis," *The Journal of Legal Studies*, 24(1), 1.

——— (1997): "The Fundamental Divergence between the Private and the Social Motive to Use the Legal System," *Journal of Legal Studies*, 26(2), 575.

Spier, K. E. (2007): "Litigation," in *Handbook of Law and Economics*, ed. by A. M. Polinsky, and S. Shavell. North Holland.

van Velthoven, B., and P. van Wijck (2001): "Legal cost insurance and social welfare," *Economics Letters*, 72(3), 387.