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Information Costs and the Civil Justice System

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Litigation is costly because information is not free. Given that information is costly and perfect information prohibitively costly, courts will occasionally err. Finally, the fact that information is costly implies an unavoidable degree of informational asymmetry between disputants. This paper presents a model of the civil justice system that incorporates these features and probes its implications for compliance with the law, efficiency of law, accuracy in adjudication, trial outcome statistics, and the evolution of legal standards. The model’s claims are applied to and tested against the relevant empirical and legal literature. (JEL: D74, K10, K13, K41)

1. Introduction

Because the gathering and provision of information are costly, disputants must incur legal expenses to present information to courts. Litigation is costly because information is not free. Moreover, given that information is costly and perfect information prohibitively costly, courts will occasionally err in determining innocence or guilt. Finally, the fact that information is costly implies an unavoidable degree of informational asymmetry between disputants.

This paper presents a model of the civil justice system that incorporates these features of the real world and probes its implications for compliance with the law, trial outcome statistics (e.g., plaintiff trial win rates), efficiency of law, accuracy in adjudication, and the evolution of legal
standards. Obviously, these implications address some longstanding issues in the law and economics literature.

One such issue is the difference between efficiency as understood in the law and economics literature analyzing legal doctrine and efficiency as understood more generally. *Doctrinally efficient* rules would be efficient if followed in the course of ordinary social interaction by potential plaintiffs and defendants. Much of the economic analysis of law literature explains why common law rules appear to be doctrinally efficient (Posner, 2011). However, doctrinally efficient rules are not necessarily operationally efficient.¹ *Operationally efficient* legal rules seek to generate efficient compliance levels given the costs of operating the legal system, which are primarily due to imperfect information. In some circumstances, information costs prevent courts from implementing doctrinally efficient standards, and compel them to alter standards in light of such costs.

Another longstanding issue addressed here is the social value of judicial accuracy. In this framework, some degree of error may be socially desirable, and more error may be preferable to less. In the absence of error, a regime of perfect legal compliance would be unlikely, because no complainant would incur costs to sue when the compliance rate is perfect (Ordover, 1978).² The risk of error makes the threat to sue credible even when the compliance rate is perfect (Hylton, 1990).

Another issue is the effect of informational asymmetry in litigation on trial outcome statistics. This matter was addressed in Hylton (1993), which proposed the asymmetric information hypothesis as an explanation of the patterns reflected in the data on trial win rates for plaintiffs. The most common theory of trial outcome statistics is due to Priest and Klein (1984), who hypothesized that win rates will tend toward 50% in the absence of a substantial disparity in stakes—because only the most uncertain cases proceed to judgment. However, in a setting of asymmetric information, trial win rates are unlikely to meet the 50% conjecture of Priest and Klein. On the other hand, trial win rates, I argue, are not unpredictable, as suggested by Shavell (1996). Trial win rates are associated with legal compliance rates in a predictable manner (Hylton, 2002; Wickelgren, 2013; Klerman

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¹ The operational efficiency test was introduced in the law and economics literature by Guido Calabresi (1970).

² Extending this concept to settlement negotiations, see Spier (1997).
and Lee, 2014). Indeed, win rates are anchored by compliance rates. I show that several puzzles and anomalies in the statistics on trial outcomes—such as the low plaintiff win rates in medical malpractice litigation—are consistent with the asymmetric information hypothesis.3

Lastly, I address legal evolution. How does information get embedded in legal rules? This model provides an explanation for how legal rules evolve over time. Informationally advantaged litigants tend to prevail, especially on appeal, and this tends to drive the menu of issues in appellate courts and the rules generated by those courts. Legal standards are enhanced, toward efficiency, as courts incorporate the private information of litigants (Cooter, Kornhauser, and Lane, 1979; Hylton, 2006).4 On the other hand, it is possible to have evolution away from efficiency—and against “the rule of law”—if the informational advantage consists of superior access to information on judicial biases or errors. Evolution of this sort, toward class-biased rules, is consistent with Bentham’s account of the common law (Postema, 1986).

The model here builds mostly on two papers, Hylton (1990, 1993). Most important for my purposes, this model provides a tidier and simpler framework while extending claims from these earlier papers. My goal is to address seemingly disparate questions in the law and economics literature within a simple model of the civil justice process. The emphasis here is not on theory but on the derivation of empirically testable propositions. I have incorporated discussions of the relevant empirical and legal literature as tests of the model’s claims.

Section 2 presents the basic model. Although this is a model of civil liability, I will use the terms “guilt” and “liability” interchangeably for ease of expression. Section 2.6 concludes Section 2 by presenting the implications of the model for compliance with the law and for the social value of error. Section 3 addresses conflicting concepts of efficiency of law (doctrinal versus operational). Section 4 examines the litigation and settlement process, and uses the model to examine some of the data on trial outcomes. Section 5 addresses the evolution of common law rules.

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3. Many of the empirical puzzles I address here were uncovered in articles by the late Professor Theodore Eisenberg and coauthors (Eisenberg, 1990; Clermont and Eisenberg, 1992, 1998, 2001; Eisenberg and Heise, 2009).

2. Model

The basic model consists of injurers and victims, all risk neutral. I will use the terms injurer, actor, and defendant interchangeably. Similarly, I will treat the terms victim and plaintiff as the same. Although I use the term injurer, this is not a model limited to accidental and intentional physical injuries. The injurer could be a violator of the antitrust laws, or a party who breaches a contract or fails to meet a regulatory standard of conduct.

2.1. Injurers

2.1.1. Taking care. The injurer has a choice to take care or not to take care. To “take care” means taking an action that reduces the foreseeable harm to the victim. This notion applies to many areas of law. In the negligence setting, taking care means taking an action that reduces the likelihood of harm to the victim or refraining from an action that increases the likelihood of harm. In the intentional torts or crime setting, taking care means forgoing the perceived profit from an intentionally harmful act. For example, in the antitrust setting, a firm can take care by refraining from monopolizing its market. In the contracts setting, an actor might take care by refraining from breaching the contract or by expending effort in clarifying the contract’s terms.

If the injurer takes care, he suffers a burden of care $x > 0$, distributed according to $G$, with corresponding density $g$. The injurer knows his care burden, though it is unobservable to victims. However, the burden of care at the time of the accident is to some degree discoverable (subject to error) by the court.

If the injurer chooses not to take care, the victim will suffer a loss with probability $p$. If the injurer chooses to take care, the victim will suffer a loss with probability $q$, where $p > q > 0$.

2.1.2. Compliance. Given the foregoing, I will say that the injurer complied with the law if he took care when taking care was required by the legal standard, and that he failed to comply if he did not take care even though taking care was required by the standard. It follows that perfect compliance exists when those injurers and only those injurers who are required by the law to take care do so. Undercompliance exists when there...
are injurers who fail to take care even though the law requires them to do so, and overcompliance exists when there are injurers who take care even though the law does not require them to do so.

2.2. Victims

In the event of an injury, the victim’s loss is $v$, observed by all parties, where $v$ has the distribution function $H$ with corresponding density $h$, so that

$$E(v) = \int_0^{\infty} vh(v) dv.$$ 

2.3. Courts

Courts decide cases on the basis of information (evidence) brought before them by the litigating parties. Litigation is costly for both parties because it is costly to bring evidence to court. The plaintiff’s (victim’s) cost of litigating is $c_p > 0$; the defendant’s (injurer’s, actor’s) cost of litigating is $c_d > 0$.

Since perfect information requires infinite resources, courts make mistakes in determining liability. A court may erroneously fail to hold a guilty defendant (i.e., a defendant who has failed to comply with the law) liable with probability $\theta_1$, which I will refer to as the probability of type-1 error, or the probability of a false acquittal. Similarly, the court may erroneously hold an innocent defendant (i.e., a defendant who has complied with the law) liable with probability $\theta_2$, which I will refer to as the probability of type-2 error or the probability of a false conviction. Victims and injurers know $\theta_1$ and $\theta_2$, and the courts are reasonably accurate, such that $1 - \theta_1 - \theta_2 > 0$.

5. Type-1 error is erroneously rejecting the null hypothesis. If we treat the null hypothesis as guilt, then type-1 error here means erroneously finding innocence. Arguably, this is an undesirable premise because of the presumption of innocence in criminal law. But since this is a model of civil liability, the importance attached to the initial presumption is less clear. For convenience, I follow much of the literature in the implicit assumption of guilt as the null hypothesis, see Polinsky and Shavell (1990). On estimates of error rates (based on a sample of criminal case verdicts), see Spencer (2007) (finding false conviction rate of 0.25, and false acquittal rate of 0.14).

6. In words, this implies that the probability of an accurate finding of liability (nonliability) is greater than the probability of an inaccurate finding of liability (nonliability). A court that decided cases by a coin toss would violate the requirement.
2.4. The Legal Standard

If a dispute comes to court, the court will attempt to determine, subject to error, whether the injurer violated the legal standard. In the absence of error, a court would find that the defendant violated the legal standard if (1) the defendant’s care or forbearance was required by the legal standard under the circumstances and (2) the defendant did not take care or forebear as required by the standard. Virtually every legal standard fits this description (Craswell, 1999, p. 2217–2219). For example, in the torts setting, a defendant should be found negligent if\[ x < (p - q)E(v) \] and he failed to take care. A similar legal standard holds in contract law.7 Similarly, in antitrust, courts use the rule of reason test, which compares efficiencies with anticompetitive effects.8 The test in antitrust is equivalent to a comparison of the profits of the defendant to the loss borne by consumers.9 Even in intellectual property a legal standard similar to the general one described appears to apply.10

Summing up, the legal standard is an inquiry into conduct (did the injurer take care when care was required?) coupled with an inquiry into whether the burden of taking care is less than some measure of the incremental social loss, where social loss is a function of the expected victim loss:

7. On “fault” in contract law, see Posner (2009) and Hillman (2014). The general similarity between the objective standards of tort law and the standards of contract law was explained in Lectures VIII and IX of Holmes (1881). Consider something as simple as determining whether a defendant breached a contract whose terms were not clear. Under the objective reasonableness approach, a court would determine whether the burden of complying with the strict interpretation is reasonable in light of the potential harm to the promise. This is equivalent to a negligence inquiry.


9. In a simple model of monopolization, with constant average and marginal cost, the gain to the monopolist (from monopolizing) is the sum of the profit and the efficiency gain. The loss to consumers is the sum of the consumer wealth transfer and the deadweight loss. If the profit is equal to the transfer, then the comparison of the efficiency gain to the deadweight loss is equivalent to comparing the profit to the total consumer loss.

10. Although patent infringement liability is purportedly strict, the question whether compliance (noninfringement) was required under the circumstances depends on an analysis of the patent’s validity and scope. This analysis is at bottom a balancing test comparing static and dynamic costs of protecting the particular innovation from competing with a substitute (Merges and Nelson, 1990; Cass and Hylton, 2013). The static cost of intellectual property is the social burden of forgoing infringement. The social loss from infringement (reduction in incentives) typically correlates with the loss suffered by the patentee.
If this condition holds for a particular actor, then that injurer is legally culpable for failing to comply. If, on the other hand, for a particular actor \( x > (p - q)\Psi(E(v)) \), then the actor is not legally culpable. Such an actor is legally immune from liability. Of course, given the possibility of judicial error, legal immunity does not imply actual immunity from liability.

Again, torts and antitrust provide illustrations. In torts, \( x \) is the burden of taking care and \( \Psi(E(v)) = E(v) \).\(^{11}\) In antitrust, \( x \) is the forgone profit from refraining from a monopolizing act, and \( \Psi(E(v)) \) is the expected harm suffered by consumers (monopoly transfer plus deadweight loss).\(^{12}\)

2.5. The Legal Process and the Incentive to Comply with the Law

If the court decides in favor of the plaintiff, it will award the plaintiff the value of his loss \( v \).\(^{13}\) A victim will file a lawsuit when \( w_{e}v > c_{p} \), where \( w_{e} \) is the equilibrium probability that the court will find that the injurer violated the legal standard, given that an injury has occurred. The probability that a suit will be filed after an injury is therefore \( 1 - H(c_{p}/w_{e}) \).

Consider the incentive to comply for a legally culpable injurer. In the case where the injurer has complied with the legal standard, and the resulting probability of harm is \( q \), the probability of liability, conditional on harm, is only \( \theta_{2} \). In the case where the injurer has not complied, and the resulting probability of harm is \( p \), the probability of liability, conditional on

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\(^{11}\) At first, this is difficult to reconcile with the reasonable person standard in tort law, which looks to the burden of care on the average person, not the individual. However, the negligence assessment is individualized when the defendant’s burden can be objectively assessed (physical injury, blindness, etc.), see, for example, Fletcher v. City of Aberdeen, 338 P.2d 743 (Wash. 1959). This model assumes that the actor’s burden of care can be discovered, subject to error, through the litigation process.

\(^{12}\) To illustrate, if \( p_{c} \) and \( q_{c} \) represent competitive price and output respectively, \( p_{m} \) and \( q_{m} \) the monopoly outcomes, then in the case of linear demand and constant marginal cost the total harm to consumers is \( (p_{m} - p_{c})(3/2)q_{m} = (3/2)(\text{victim harm}) \).

\(^{13}\) To simplify, I assume the award is not enhanced by a multiplier, though it would be straightforward to modify the model to include a multiplier. For a model that incorporates a multiplier, see Hylton and Miceli (2005).
harm, is $1 - \theta_1$. Thus, given the threat of liability, a legally culpable injurer will take care when

$$x < [1 - H\left(\frac{c_p}{w_e}\right)] \{\frac{1}{2}(1 - \theta_1) - q\theta_2\} E(v|v > \frac{c_p}{w_e}) + (p - q)c_d\},$$

where

$$E(v|v > \frac{c_p}{w_e}) = \frac{\int_{\frac{c_p}{w_e}}^{\infty} vh(v)dv}{1 - H\left(\frac{c_p}{w_e}\right)}.$$

Now consider the incentive to take care for an actor who is not legally culpable. Such an actor will be held liable only if type-2 error occurs with probability $\theta_2$. The risk of such an error occurring could lead an actor who is not legally culpable to take care if

$$x < [1 - H\left(\frac{c_p}{w_e}\right)] \{(p - q)\theta_2 E(v|v > \frac{c_p}{w_e}) + c_d\}.$$

Given the possibility of judicial error, the probability of finding a legal violation conditional on an injury is a function of the error probabilities. Specifically, if $r$ is the probability that the injurer violated the legal standard given an injury, then in a rational expectations equilibrium,

14. Although this model does not incorporate settlement of disputes (I consider settlement explicitly later), it can easily be interpreted to include settlements. To do so, simply interpret the litigation costs as averaging over the settled and nonsettled cases, and the expected harm as averaging over both types of dispute as well. The error rates would also average over the settled and nonsettled cases. For example, the “false-acquittal probability,” under this interpretation, would incorporate the case of a settlement payment or of a court judgment when the defendant is innocent. This is the approach to calculating the error rate in compensation in Studdert et al. (2006).

15. Note that this condition assumes that the probability of false conviction, for the legally immune actor, is the same whether he complies or does not comply. It is plausible that the probability of false conviction is lower if the actor complies. If the probability is zero when the immune actor complies, then the risk of overcompliance increases. Grady (1983) shows that causation doctrine in negligence law dampens the overcompliance incentive in this scenario.
\[
\begin{align*}
w_e &= r (1 - \theta_1) + (1 - r) \theta_2, \\
r &= \frac{p \int_{L_c}^{\infty} \{ (p-q) \Psi(E(v)) \} g(x) dx}{G(L_c) q + (1 - G(L_c)) p}
\end{align*}
\]

and where \( L_c = [1 - H \left( \frac{\omega}{w} \right)] \{ \{ p(1 - \theta_1) - q \theta_2 \} E(v|v > \frac{\omega}{w}) + (p - q) c_d \} \) is the incremental liability for the culpable actor. If \((p - q) \Psi(E(v)) < L_c\), then all legally culpable actors take care and the probability of a legal violation, \( r \), is equal to zero. 16

I will refer to \( r \) as the noncompliance rate. Undercompliance exists when there are actors for whom \( x < (p - q) \Psi(E(v)) \) and the expectation of liability is insufficient to lead them to comply with the legal standard. Overcompliance exists when the expectation of liability causes some actors for whom \( x > (p - q) \Psi(E(v)) \) to take care. Perfect compliance is observed when only those actors for whom \( x < (p - q) \Psi(E(v)) \) are led by the expectation of liability to take care.

Notice that the noncompliance rate, \( r \), is a function of the probability of plaintiff victory, \( w \). Thus, the equilibrium probability of plaintiff victory, \( w_e \), solves the fixed-point problem \( w = f(w) \), where \( f(w) = r(w)(1 - \theta_1) + (1 - r(w)) \theta_2 = r(w)(1 - \theta_1 - \theta_2) + \theta_2 \). Such an equilibrium probability exists and is unique because \( r'(w) < 0 \) — because an increase in the win probability reduces noncompliance, as shown in Figure 1.

2.6. Implications

Here are the key implications of this model.

2.6.1. Deterrence. As long as courts are reasonably accurate (i.e., the sum of false acquittal and false conviction probabilities is less than one),

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16. If, on the other hand, \((p - q) \Psi(E(v)) > L_c\), then only legally culpable actors will take care—the legally immune will not take case—as shown in the next part. Hence, there is no need in the denominator of the \( r \) function to take into account the conduct of the legally immune.
the expectation of liability will have a deterrent effect on legally culpable actors (sufficiency). Reasonable accuracy is both necessary and sufficient to ensure that the increase in liability that results from failing to take care is greater for a legally culpable actor than for one who is legally immune. It follows that reasonable accuracy is necessary and sufficient to rule out an equilibrium of simultaneous undercompliance and overcompliance.

For the first claim, note that liability has a deterrent effect as long as the marginal increase in expected liability from failing to comply is positive. The reasonable accuracy requirement is sufficient for this to hold. For the second claim, note that for any given actor, either $x < (p - q)\Psi(E(v))$ or $x > (p - q)\Psi(E(v))$. Suppose in equilibrium there exist actors who are legally culpable but do not find it privately optimal to take care (undercompliance). For such actors,

$$ (p - q)\Psi(E(v)) > x > [1 - H\left(\frac{c_p}{w_e}\right)]\{[p(1 - \theta_1) - q\theta_2]E(v|v > \frac{c_p}{w_e})$$
$$+ (p - q)c_d\}. $$

Figure 1. Equilibrium Plaintiff Win Probability.
For overcompliance to also exist, then there must be actors for whom

\[(p - q)\Psi(E(v)) < x < [1 - H\left(\frac{c_p}{w_e}\right)](p - q)\theta_2[E(v|v > \frac{c_p}{w_e}) + c_d].\]

For this to be true, \(p(1 - \theta_1) - q\theta_2 < (p - q)\theta_2\) must hold, which requires \(1 - \theta_1 - \theta_2 < 0\), contradicting the reasonably accuracy requirement.\(^{17}\)

This first implication identifies the reason liability serves as a deterrent even when courts make mistakes in determining compliance. Legally culpable actors pay a price if they fail to comply and that price is higher for them than for the legally immune as long as courts are reasonably accurate. In a study of medical malpractice liability and deterrence, White (1994) (at 82, exhibit 3), relying on an empirical analysis in Farber and White (1991), estimates that the marginal increase in liability to a physician for failing to take care is on average roughly equal to $5,000. White also finds that false acquittal and false conviction error rates for medical malpractice are roughly 15%.\(^{18}\) In an empirical study of medical malpractice litigation, Iizuka (2013) confirms the deterrence findings of Farber and White.

The deterrence result here should be compared with Craswell and Calfree (1986), who show that undercompliance and overcompliance can exist simultaneously. Their result could hold in this model if it were modified to permit the reasonable accuracy condition to fail over some range of \(x\). Specifically, if the false conviction rate increases near the threshold of legal culpability, then the reasonable accuracy condition could fail to hold near the threshold, generating both incentives to undercomply and to overcomply.\(^{19}\)

\(^{17}\) For the remaining claims, see Hylton (1990).

\(^{18}\) A related study reports considerably higher error rates close to 25%, see Studdert et al. (2006). However, the estimates in Studdert et al. use data both on settlement payments and court judgments. As noted earlier, this model could be modified to include both settlements and court judgments, and applied to Studdert et al.’s study estimates. This would require distinguishing the average payments in the two events (where settlement payouts are on average less than court judgments). In a suitably modified version of this model, the implied error rates would be less than the levels reported in Studdert et al.

\(^{19}\) To return to Grady (1983) (see note 17), if the risk of false conviction for the legally immune depends on whether the actor complies, then this sort of distortion is plausible. Under this assumption, the marginal increase in liability from false conviction is especially high for the legally immune, generating the discontinuity that Grady describes.
2.6.2. **Expectation of Liability.** Equilibrium requires that the probability of finding noncompliance (guilt) be positive in a civil justice system. Thus, there must always exist some actors who expect to be found guilty of failing to comply with the legal standard. More specifically, there must always exist (1) some legally culpable actors who fail to comply with the law or (2) actors who are legally immune and who nonetheless expect to be erroneously found guilty.

The essential reason for this was first articulated in Ordover (1978), though the proposition here is broader and the model broader in scope. The basic intuition is that if there are no actors at risk of being found liable—that is, if everyone is completely free of any chance of being found in violation of the law—then no victims would have an incentive to bring a legal action in response to an injury. But then no actor would have an incentive to comply with the law. Thus an outcome in which the probability of finding noncompliance is zero cannot be an equilibrium. Because of information costs, a Nirvana where everyone complies with the law and no one sues cannot exist.

2.6.3. **Compliance.** Three types of compliance equilibrium are possible in a civil justice system: (1) one in which the probability of a guilty (liability) verdict exceeds the probability of false conviction and there is undercompliance; (2) a second in which the probability of a guilty verdict is equal to the probability of false conviction and there is perfect compliance; and (3) a third in which the probability of a guilty verdict is equal to the probability of false conviction and there is overcompliance.

Thus, although the probability of a guilty verdict must be positive in equilibrium, this does not mean that a perfect (or over) compliance equilibrium cannot exist. If everyone who is legally culpable complies, plaintiffs will still have an incentive to sue if false convictions are possible.

It may seem to be a paradox that a perfect or an overcompliance equilibrium could exist, given public knowledge of variables such as the judicial error probabilities and the equilibrium compliance rate. For example, one might think that if courts know that the equilibrium is
one of perfect compliance, they would exonerate any defendant of guilt (liability) on the basis of general information that the equilibrium is one of perfect compliance. However, courts do not determine guilt or innocence solely on the basis of statistical generalities. Courts determine guilt based on information brought before them by the parties involved in the transaction that injured the plaintiff. Thus, even if the equilibrium is one of perfect or overcompliance, courts will still examine the evidence brought before them and may erroneously conclude that the defendant violated the law.

2.6.4. Social value of error. A perfect (or over-) compliance equilibrium requires a positive probability of false conviction.

It follows that judicial error is not necessarily detrimental to deterrence. Indeed, error in the form of a positive false conviction risk appears to be necessary to have a perfect compliance equilibrium.

This result requires some reconciliation with standard “accuracy in adjudication” arguments (Kaplow, 1994; Posner, 2001, p. 336–379). Returning to the first point above, deterrence generally improves with accuracy. If, for example, accuracy could be enhanced by investing in some technology, then an increase in such investment would cause the marginal increase in liability due to noncompliance to increase. Thus, in the standard analysis of accuracy, improving accuracy enhances deterrence, and social welfare, as long as the marginal gain from enhanced deterrence exceeds the cost of improving accuracy. However, the analysis here shows that the relationship between accuracy and deterrence is more complicated when one explicitly incorporates the costs of providing information to courts. A biased approach to enhancing accuracy that aims at reducing false acquittals more than

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20. Admittedly, statistical generalities will affect the way a court interprets case-specific evidence. A court may use a combination of both types of evidence. However, as long courts put significant weight on case-specific evidence, which they generally do and are required to do under the law, then the possibility of an overcompliance equilibrium remains.

21. The change in \( p(1 - \theta) - q\theta \) is \(-(pd\theta/dz + qd\theta/dz)\), which is positive under the assumed effect of the technology.
reducing false convictions may enhance welfare more than either a neutral approach or an approach that focuses on reducing false convictions.22

3. Legal Standards and Efficiency

In much of the literature, the legal standard is argued to be efficient (Posner, 2011). For example, in the torts context, the Hand Formula, $x < (p - q)E(v)$, encourages the potential tortfeasor to take care when and only when care is efficient. However, when litigation costs and judicial error probabilities are taken into consideration, compliance with the legal standard may no longer be efficient.

The inconsistencies between these two approaches illustrate the conflict between “doctrinal efficiency” and “operational efficiency.” Analysis of common law efficiency tends to focus on the question of doctrinal efficiency. Operational efficiency, by contrast, would consider whether a given legal standard is efficient in light of the actual operation of the law.

The case for operational efficiency as the objective, rather than doctrinal efficiency, would appear to be obvious. Society should concern itself with efficiency in operation, not efficiency in theory. However, even recognizing this, an argument for examining doctrinal efficiency can still be advanced. If legal doctrine serves mostly as a set of instructions to guide conduct, and if it is in this role that it has its most important effect on behavior, then society should concern itself with doctrinal efficiency as much or perhaps more than operational efficiency. For example, if once a legal norm is established it operates independently of the threat of liability, then the efficiency of that norm in isolation should be of central if not primary interest (Shavell, 2002).

It should be clear that this analysis points to a link between operational efficiency, norms (Cooter, 1994; McAdams, 1997; Posner, 2000), and doctrinal efficiency. Doctrinal efficiency deserves to be a central social

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22. This contradicts the theory commonly accepted in criminal procedure that reducing false convictions is socially preferable to reducing false acquittals (In Re Winship, 397 U.S. 358, 1970). Of course, criminal procedure is different from the civil justice system considered here. The basis for the bias endorsed in Winship is a concern for the social costs of imprisonment and the incentives of public enforcement agents.
welfare concern only if society adopts rules established by courts, or rules that would be discovered or established by courts (Blackstone, 1979, p. 63–92), as guidelines governing social interaction. If society adopts such rules as norms, then the doctrinal efficiency of such rules becomes an important consideration because the rules either reflect norms that already operate, or establish norms that will operate broadly—and once the norms are established, the courts effectively disappear. Such norms could be propagated within society through legal advice, or through informal sanctions. However, if such norms do not exist, then the case for analyzing or justifying legal rules on the basis of doctrinal efficiency would appear to be weak.

Another implication is that in light of information constraints binding on courts, there are some legal standards that are unlikely to meet even the doctrinal efficiency test. This is observed especially in areas where factors other than the defendant’s compliance failure might account for the plaintiff’s injury—the so-called factual causation cases. Courts often hold that the defendant is immune from liability because the injury suffered by the plaintiff would have happened even if the defendant had complied with the law. Such a finding often relies on information revealed only after the injury has occurred. By using such *ex post* information to determine whether the defendant should be held liable, courts may distort the *ex ante* effect of the legal standard (Hylton and Lin, 2013). In such settings, the information necessary to frame an efficient test is often lacking.

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23. If the advice consists solely of information on expected liability, taking litigation costs and judicial error rates into account, then the level of compliance generated through norm propagation, mediated by legal advice, is no different from the level of compliance that would be generated through direct information on the expected liability. However, since litigation would be avoided through such propagation, the operational efficiency standard would be inappropriate, and compliance levels distorted away from efficiency. If the advice ignores litigation costs (and judicial error rates) and instead focuses on the costs of compliance and benefits in terms of injury avoidance, then it would result in efficient compliance. For a model that allows for (doctrinally) efficient compliance resulting from legal advice, see Shavell (1988).

24. Ostracism by cooperators in a community could internalize doctrinally efficient norms (Cooter, 1994).
4. The Litigation Process

How does litigation arise in this framework? I have assumed plaintiffs do not know whether the defendant is innocent or guilty of violating the legal standard. The plaintiff sues knowing the equilibrium likelihood of a finding of guilt (\(w\)), based on judicial error probabilities, and the equilibrium rate of compliance. The defendant has the same information, and in addition, knows his specific innocence or guilt. If defendants did not act strategically in settlement, innocent defendants would reject settlement offers and guilty defendants would accept them, revealing their status. No suits would proceed to trial.

In this part, I explore one approach to incorporating strategic settlement negotiations within the framework of the previous part.

4.1. Incorporating Settlement

The problem of explaining litigation under informational asymmetry has been addressed in models by Png (1983, 1987), Reinganum and Wilde (1986), and Bebchuk (1984). Png’s (and Reinganum–Wilde) is a signaling model and Bebchuk’s is a screening model. While signaling would appear to be the natural choice for modeling litigation, the screening model is easier to analyze.\(^{25}\) The Bebchuk model assumes plaintiffs know the distribution of the defendant’s guilt probability while defendants know their true probability of guilt.

In this paper’s model, plaintiffs know more than the distribution of the guilt probability. They know the probability of guilt based on the noncompliance rate \(r\) (conditional on information specific to the type of injurious event) and public information on the likelihood of judicial error. Defendants, on the other hand, know with certainty whether they are guilty or innocent.

Since the screening model is easier to analyze, I will present a simple version of Bebchuk’s screening model that is consistent with the information structure assumed in the previous parts of this paper. The model incorporates systemic and idiosyncratic informational asymmetry.

---

\(^{25}\) For experimental evidence on outcomes under the two models, see Pecorino and Van Boening (2018), who find that the dispute rates are roughly the same under the two frameworks.
Because of systemic informational asymmetry, only the defendant knows whether he is guilty or innocent. However, in addition to this systemic difference, there is an idiosyncratic type of informational asymmetry. The idiosyncratic asymmetry arises from information that the defendant has peculiar to his case that leads him to predict, rationally, that his likelihood of conviction is either higher or lower than for other defendants of his type. In other words, among innocent (guilty) defendants, some are in effect more innocent (guilty) than others. The idiosyncratic factor could arise from facts peculiar to the defendant’s case, or something as simple as the knowledge that the judge is likely to hold a personal grudge against the defendant. 26 Such idiosyncratic asymmetry seems to be realistic as an assumption, and enables the model to both remain simple and explain some puzzling features of trial outcome statistics. Moreover, since idiosyncratic, uncorrelated errors (or informational asymmetries) are at the core of the Priest–Klein framework (Klerman and Lee, 2014; Lee and Klerman, 2016; Klerman, Lee, Liu, 2018), this model combines elements of the Priest–Klein and systemic asymmetric information approaches.

The defendant’s predictions of the probability of liability are as follows:

\[
\begin{align*}
\theta_2 + \varepsilon_d \text{ if innocent} \\
1 - \theta_1 + \eta_d \text{ if guilty'}
\end{align*}
\]

where \(\varepsilon_d\) has density \(f_{\varepsilon_d}\) and distribution function \(F_{\varepsilon_d}\), \(\eta_d\) has density \(f_{\eta_d}\) and distribution \(F_{\eta_d}\), and \(\mathbb{E}(\varepsilon_d) = \mathbb{E}(\eta_d) = 0\). For the innocent defendant, \(\varepsilon_d\) is centered around \(\theta_2\) on the interval \([\theta_2 - a, \theta_2 + b]\) and for the guilty defendant \(\eta_d\) is centered around \(1 - \theta_1\) on the interval \([1 - \theta_1 - b, 1 - \theta_1 + a]\). The idiosyncratic shock distributions are assumed to be mirror-image reflections. 27 The systemic information asymmetry is captured by the first terms in the probability estimates above.

26. The idiosyncratic shocks could be transformed, with only minor alterations in the treatment of the model, to purely psychological impressions that have nothing to do with accurate information on the real outcome from a trial. Relatively optimistic defendants would tend to litigate and relatively pessimistic defendants would tend to settle (Shavell, 1982). On the psychological basis for optimism in litigation, see Rachlinski (1996).

27. If the densities are graphed over \(x\), \(f_x(x) = f_x(-x)\), which allows for nonsymmetrical densities. The two densities being entirely symmetrical is just a special case.
Although only the defendant knows whether he is guilty or innocent, both the plaintiff and the defendant know $w$, $r$, and $1 - \theta_1$ and $\theta_2$. Plaintiffs and defendants both know the distributions of the idiosyncratic terms $\varepsilon_d$ and $\eta_d$, but only defendants observe their respective idiosyncratic terms.

To simplify, I assume that the plaintiff always has an incentive to sue because—$C_p + (\theta_2 - a)J > 0$, where $J$ is the damages award. As long as the court accurately determines damages, $J$ is a specific realization of $v$ (from the previous part). I use $J$ here because the loss is fixed and observable at the time of settlement negotiations, whereas the model in the previous part treats $v$ as a random variable.

The plaintiff makes a take-it-or-leave-it offer $S$ to the defendant. The defendant, if innocent, will accept the plaintiff’s offer if $S < (\theta_2 + \varepsilon_d)J + C_d$, or equivalently,

$$\varepsilon_d \geq \frac{S - C_d}{J} - \theta_2.$$

Thus, the greater the innocent defendant’s idiosyncratic upward adjustment on the risk of conviction, the more likely is settlement. For an innocent defendant, the probability of settlement is, therefore,

$$P(\text{settle} \mid \text{innocent}) = 1 - F_\varepsilon \left( \frac{S - C_d}{J} - \theta_2 \right).$$

By the same reasoning, the probability of settlement with a guilty defendant is

$$P(\text{settle} \mid \text{guilty}) = 1 - F_\eta \left( \frac{S - C_d}{J} - (1 - \theta_1) \right).$$

The plaintiff chooses an optimal settlement demand by maximizing his expected payoff:

$$\text{Payoff} \left( S \right) = (1 - r) \left\{ \left[ 1 - F_\varepsilon \left( \frac{S - C_d}{J} - \theta_2 \right) \right] S \\
+ F_\varepsilon \left( \frac{S - C_d}{J} - \theta_2 \right) E[(\theta_2 + \varepsilon_d)J - C_p \mid \varepsilon_d > \frac{S - C_d}{J} - \theta_2] \right\}$$

$$+ (r) \left\{ \left[ 1 - F_\eta \left( \frac{S - C_d}{J} - (1 - \theta_1) \right) \right] S \\
+ F_\eta \left( \frac{S - C_d}{J} - (1 - \theta_1) \right) E[(1 - \theta_1 + \eta_d)J - C_p \mid \eta_d < \frac{S - C_d}{J} - (1 - \theta_1)] \right\}.$$
The first bracketed term is the expected payoff to the plaintiff if the defendant is innocent and the second is the expected payoff if the defendant is guilty. Consider the case of innocence first. If the defendant accepts the settlement, the plaintiff receives $S$. If the defendant rejects the settlement offer, the plaintiff receives his expected payoff from litigation—which incorporates the plaintiff’s knowledge that idiosyncratic private information (such as the defendant’s knowledge that the judge dislikes him) influences the defendant’s decision to reject or accept. This pattern repeats for the guilty defendant in the second bracketed term.

Differentiating the plaintiff’s payoff function with respect to $S$ yields the first-order condition:

$$(1 - r)[1 - F_e(\frac{S^* - C_d - \theta_2}{J})] + (r)[1 - F_\eta(\frac{S^* - C_d - (1 - \theta_1)}{J})] = \left[(1 - r)\left(\frac{S^* - C_d - \theta_2}{J}\right) + (r)\left(\frac{S^* - C_d - (1 - \theta_1)}{J}\right)\right] (C_p + C_d).$$

Obviously, if the probability of noncompliance is either 1 or 0, this simplifies greatly, with the plaintiff choosing an optimal settlement amount on the assumption that the population of defendants consists of either innocent actors entirely or guilty actors entirely. If the probability of non-compliance is not in either corner, then it is still possible that the settlement amount will be geared to elicit an optimal payoff with respect to an innocent defendant only (or with respect to a guilty defendant only). The reason is that the uncertainty range surrounding the idiosyncratic shocks may not overlap.

This model is at the bottom, the same as an example discussed in Shavell (1996). Shavell examines a special case in which one type of defendant has a high probability of guilt and the other a low probability of guilt. He notes that the plaintiff will offer either a high settlement that will be accepted only by the guilty, while the innocent litigate, or a low settlement that will be accepted by both innocent and guilty, resulting in no litigation. In this model, the plaintiff will offer: (1) a low settlement that will be accepted by all of the guilty and result in litigation with some of the innocent, (2) a high settlement that will be accepted by some of the guilty while all of the innocent litigate, or (3) a blended settlement that will be accepted by most of the guilty and some of the innocent. In all cases, the innocent are disproportionately represented in litigation.
I will focus on this blended solution, though the “single-type” solutions are easy to examine as special cases. The trial win rate for plaintiffs will depend on the average over the types of defendants. Thus, the expected trial win rate is

\[
(1 - r) F_\epsilon \left( \frac{S - C_d}{J} - \theta_2 \right) \left\{ \theta_2 + E[\epsilon_d|\epsilon_d < \frac{S - C_d}{J} - \theta_2] \right\} \\
+ (r) F_\eta \left( \frac{S - C_d}{J} - (1 - \theta_1) \right) \left\{ (1 - \theta_1) + E[\eta_d|\eta_d < \frac{S - C_d}{J} - (1 - \theta_1)] \right\}, \\
(1 - r) F_\epsilon \left( \frac{S - C_d}{J} - \theta_2 \right) + (r) F_\eta \left( \frac{S - C_d}{J} - (1 - \theta_1) \right),
\]

or equivalently,

\[
(1 - r) F_\epsilon \theta_2 + (r) F_\eta (1 - \theta_1) \\
+ (1 - r) F_\epsilon \left\{ E[\epsilon_d|\epsilon_d < \frac{S - C_d}{J} - \theta_2] \right\} + (r) F_\eta \left\{ E[\eta_d|\eta_d < \frac{S - C_d}{J} - (1 - \theta_1)] \right\}, \\
(1 - r) F_\epsilon + (r) F_\eta.
\]

The first term represents the effect of systemic asymmetry of information on the trial win rate, and the second reflects the effect of idiosyncratic asymmetry. This expression can be rewritten as

\[
w_e + (1 - \beta)[(1 - \theta_1) - w_e] \\
+ (1 - r) \beta \left\{ E[\epsilon_d|\epsilon_d < \frac{S - C_d}{J} - \theta_2] \right\} + \\
(1 - (1 - r)\beta) \left\{ E[\eta_d|\eta_d < \frac{S - C_d}{J} - (1 - \theta_1)] \right\},
\]

where \(\beta = F_\epsilon / [(1 - r) F_\epsilon + r F_\eta] > 1 \) given \(S^*\). \(\beta\) measures the propensity of the innocent to litigate relative to the average propensity to litigate. Also, \((1 - r)\beta\) is equal to the conditional probability of litigation given that the defendant is innocent.

In the absence of any selection effects in settlement, the trial win rate would be the same as the “population win rate” \(w_e = r(1 - \theta_1) + (1 - r)\theta_2\), the rate that would be observed if all disputes went to trial. However, selection distorts the trial win rate from the population win rate in two ways. The first distortion, \((1 - \beta)[(1 - \theta_1) - w_e]\), shows the negative effect of systemic information asymmetry, and the second distortion (third and fourth terms above) shows the effect of idiosyncratic informational asymmetry. Since the conditional shock terms are both negative, the second distortion also suppresses the trial win rate below the population win rate.
The trial win rate is not any frequency imaginable, contrary to Shavell (1996). The trial win rate is equal to the population win rate adjusted downward by selection effects. The population win rate is a function of the equilibrium compliance and judicial error rates. To be sure, the trial win rate could be any number between 0 and 1 in this model, but there is a predictable link between the noncompliance rate \( r \) and the trial win rate (Hylton, 2002; Klerman and Lee, 2014). The trial win rate is in large part anchored by the noncompliance rate.

4.2. Understanding Trial Outcomes

In a high compliance equilibrium, the noncompliance rate \( r \) will be low, and the downward bias due to selection among innocent defendants will be the dominant distortion from the population win rate. For example, in the extreme case of perfect compliance (\( r = 0 \)), there are no guilty defendants, yet the trial win rate is still biased downward as follows:

\[
\theta_2 + E[\varepsilon_d | \varepsilon_d < \frac{S - C_d}{J} - \theta_2].
\]

Thus, if we choose an area of litigation where compliance rates are high, we will tend to observe downward-biased trial win rates.

Medical malpractice litigation provides an illustration. Under this “anchoring model,” low trial win rates can be taken as evidence of high compliance rates, coupled with selection toward innocent defendants (more specifically, the most confident innocent defendants) as litigants. Since physicians generally comply with medical custom, leading to low noncompliance rates, this model predicts that one should, as a general matter, observe low trial win rates in medical malpractice litigation. Moreover, trial win rates in medical malpractice litigation should vary with the rate

---

28. See, for example, White (1994, p. 78). One might argue that since most people comply with the law, this statement suggests that low win rates should be the norm. However, the anchoring model here applies to systemic informational asymmetry cases (first), and (second) says only that win rates should both reflect and vary with compliance rates.
of compliance. Since rates of compliance vary across regions, regional variation in medical malpractice win rates should reflect variation in compliance rates.

Table 1 presents data, from Daniels and Martin (1986), on regional variation in medical malpractice win rates in New York counties (1980–85). Among the jurisdictions with at least thirty-five verdicts in their sample, win rates range from 51.2% in Bronx County to 19.9% in Westchester County. These rates reflect, in part, the mix of claims brought by plaintiffs. However, they also reflect local variation in the quality of medical malpractice—or, using the terms of this model, the compliance rate. To test this hypothesis, I include data in Table 1 on median household income in 1980 in the sample counties. Other things being equal, counties with higher household income should generally have access to higher quality medical care. The win rates in Table 1 correlate negatively with household income levels, supporting the hypothesis that local variation in win rates reflects

### Table 1. Plaintiff success rates in New York counties for medical malpractice. New York Supreme, Civil, and County Courts, 1981–84

<table>
<thead>
<tr>
<th>Medical malpractice</th>
<th>Median household income 1979</th>
</tr>
</thead>
<tbody>
<tr>
<td>Success rates (1)</td>
<td>Number of verdicts (2)</td>
</tr>
<tr>
<td>Bronx</td>
<td>51.2</td>
</tr>
<tr>
<td>Kings</td>
<td>46.2</td>
</tr>
<tr>
<td>New York</td>
<td>45</td>
</tr>
<tr>
<td>Queens</td>
<td>45.1</td>
</tr>
<tr>
<td>Westchester</td>
<td>19.9</td>
</tr>
<tr>
<td>Nassau</td>
<td>33.3</td>
</tr>
</tbody>
</table>


29. On compliance rate changes and win rates, see Klerman and Lee (2014) and Hylton (2002).

30. The win rate sample runs from 1980 to 1984. The census data are from 1979. I also gathered median household income for 1989, and the ranking of counties remained the same as in 1979. The only noticeable change was that the differential in median income between Queens and New York counties declined over the intervening years, putting them at near parity in 1989.
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regional variation in the quality of medical care. Thus, the data suggest that plaintiff win rates correlate inversely with compliance rates, as this model predicts.

4.3. Trial Win Rate Variation across Medical Specialties

Some of the differences shown in the previous chart are attributable to variations in the mix of specialties heavily demanded in different regions. Some regions, for example, may include a higher percentage of claims against pediatricians than other regions. This suggests that it would be helpful to consider variation in plaintiff win rates across specialties as a way of ensuring that the previous chart is not entirely due to variation in the basket of specialties. I present data on win rates across specialties in Figure 2.

The two rightmost shaded areas of Figure 2 provide a visual representation of the win rate. The low plaintiff win rates generally observed in medical malpractice hold across the specialties, again confirming the model’s predictions. The exception is in diagnostic radiology, where the plaintiff win rate is close to 50%. The win rates in the other specialties shown in Figure 2 range from roughly one-tenth to one-third. The relatively

![Figure 2. Percentage of Litigation Claims. Source: Jena et al. (2012).](https://academic.oup.com/aler/article/24/2/407/7080533/boston-university-libraries-user-on-09-september-2023)
high win rate for diagnostic radiology probably results from the lack of systemic informational asymmetry: A plaintiff’s expert can read an image (say, an x-ray or MRI report) as well as the defendant’s expert. Diagnostic radiology differs from other specialty fields in that litigation likely involves parties with relatively equal information on the likelihood of malpractice. Equality of information probably explains the relatively high win rate in radiology malpractice litigation. Only idiosyncratic information, which is two sided, drives litigation.

4.4. Plaintiff Win Rates and Compliance Rates

In a low compliance equilibrium, the downward bias of the win rate due to settlement by guilty defendants will be the dominant distortion from the population win rate. In the extreme of total noncompliance ($r = 1$), the trial win rate will be

$$(1 - \theta_1) + E[\eta_d|\eta_d < S - C_d J - (1 - \theta_1)].$$

Thus, the trial win rate will not be as high as one would expect given the absence of compliance. In particular, in settings of extremely low compliance, one should observe trial win rates that are significantly lower than one minus the error rate.

There is empirical support for this prediction. Peters (2007), in a survey of studies of medical malpractice win rates, concludes that physicians win 80%–90% of the jury trials with weak evidence of medical negligence, approximately 70% of the borderline cases, and even 50% of the trials in cases with strong evidence of medical negligence. Figure 3 summarizes the findings. Cases of strong evidence of medical negligence, using the terms of this anchoring model, are cases where the conditional probability of noncompliance is high. The predicted plaintiff win rate for such cases should approximate 100% minus the probability of error. With error rates in medical malpractice estimated to be roughly 15% (White, 1994), the average plaintiff win rate for strong cases of medical negligence should be nearly 85%. The empirical studies, however, show actual trial win rates for such cases of only
50% (see Figure 3). The differential between observed and predicted trial win rates, roughly 20–30 percentage points, presumably is due to the selection decisions of defendants.31

On the other extreme, consider the extremely low win rates reported for cases of weak evidence of malpractice—with a simple average of roughly 12%. In the absence of selection, win rates against innocent doctors should be roughly equal to the 15% rate of error. Assuming not all of the doctors were completely innocent in the samples of “weak evidence” cases, the reported win rates are lower than one would expect. This is also consistent with selection even among innocent defendants, with those physicians who for rational though idiosyncratic reasons are pessimistic about their chances of settling out of court.

![Care Quality and Trial Outcome](https://example.com/care-quality-trial-outcome.png)


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31. One alternative possible explanation is that the false acquittal rate is especially high for “poor” care cases in Figure 3. However, this seems implausible, because it would imply that physicians who are most negligent are also most likely to be acquitted by juries.
4.5. Comparing Judicial Forums

What happens if you change the dispute resolution forum from one with a low rate of error to one with a high rate of error? Moving from a bench trial to a jury trial, for example, is an example of moving from a more accurate forum to a less accurate forum. To see what this implies in terms of this model, suppose the two error rates (type 1 and type 2) are the same and equal to \( \theta \). In the absence of any selection, an increase in the error rate would impact the plaintiff win rate by \( dw / d\theta = 1 - 2r \), so that if compliance is low \( (r > 1/2) \), the error would reduce the win rate (more false acquittals) and if compliance is high, the error would increase the win rate (more false convictions).

The effect of a change in error is complicated, but some insight can be gained from considering extreme cases. Suppose compliance is perfect, \( r = 0 \). The change in the trial win rate is then

\[
1 + \frac{\partial E[\varepsilon_d | \varepsilon_d < \frac{S-C_d}{J} - \theta]}{\partial \theta},
\]

where the first term, 1, is the pure “error rate effect” and the second, which is negative, is the selection effect induced by an increase in the error rate. If the selection effect is greater than the error effect, the change in the win rate under perfect compliance, due to an increase in the rate of error, will be negative. Intuitively, since the rate of false convictions is higher under juries relative to judges, only those innocent defendants who know (because of idiosyncratic information) that their chance of victory is very high litigate, which depresses the trial win rate. In short, it is no longer clear that error increases the trial win rate by increasing false convictions. Similarly, in the case of total noncompliance, the effect of a change in the error rate on the trial win rate could be positive because of selection.

An increase in the error rate causes the trial win rate to change as follows:

\[
1 - 2r - \left( \frac{\partial \beta}{\partial \theta} \right) ((1 - \theta) - w_v) (1 - \beta) + \left[ (1 - r) \left( \frac{\partial \beta}{\partial \theta} \right) E[\eta_d | \eta_d < \frac{S-C_d}{J} - (1 - \theta)] + (1 - (1 - r) \beta) \frac{\partial E[\eta_d | \eta_d < \frac{S-C_d}{J} - (1 - \theta)]}{\partial \theta} \right] + (1 - r) \left[ (\frac{\partial \beta}{\partial \theta}) E[\varepsilon_d | \varepsilon_d < \frac{S-C_d}{J} - \theta] + \beta \frac{\partial E[\varepsilon_d | \varepsilon_d < \frac{S-C_d}{J} - \theta]}{\partial \theta} \right].
\]
Here the first line shows the “population win rate effect” and it depends on whether the compliance rate is less than or greater than 50%. If compliance is high \( r < \frac{1}{2} \), the population effect is positive, leading to a higher win rate. The second line, showing the impact of systemic asymmetry, is positive. The reason is that error tends to change the mix toward more guilty defendants, which increases the trial win rate. The mix changes in favor of the guilty because the error rate increase implies more false acquittals. The third and fourth lines show the impact of idiosyncratic asymmetry. The third line is positive and the fourth line is negative. This suggests that counterintuitive results could be observed as a consequence of moving from a more accurate judicial forum to a less accurate forum. If, for example, compliance is high \( r < \frac{1}{2} \), then in the absence of selection, one would expect the trial win rate to increase as the likelihood of false convictions increases. However, the expression above implies that selection among innocent defendants is stronger given \( r < \frac{1}{2} \) (only the most confident of the innocent litigate), depressing the win rate. If this selection effect dominates the population effect, then moving a set of disputes involving high-compliance actors from a more accurate judicial forum to a less accurate forum could lead to a fall in the trial win rate.

This analysis suggests a resolution to a puzzle identified by Clermont and Eisenberg (1992), who found that plaintiff win rates are lower in jury trials than in bench trials for medical malpractice and product liability lawsuits (Table 2). Both medical malpractice and product liability are areas where the legal standard typically points only to the defendant’s conduct, and where the defendant is likely to enjoy an informational advantage over plaintiffs. One would ordinarily expect win rates to be higher under jury trials because most doctors comply and an increase in error would imply more false convictions. However, when one takes into account selection due to informational asymmetry, the observation of Clermont and Eisenberg is explainable. Both medical malpractice and product liability are areas where the market strongly encourages potential defendants to comply with the law, and consequently, compliance rates are likely to be high.\(^{32}\) With high compliance rates, the selection effects of innocent defendants impose the dominant distortion.

---

\(^{32}\) On general compliance in medical malpractice, see White (1994, p. 78); noting that medical malpractice claims are rare.
Innocent defendants settle more often under jury trials than under bench trials to avoid the greater risk of a false conviction by a jury, which reduces trial win rates in jury trials below those observed in bench trials.

Clermont and Eisenberg also noted areas of litigation where win rates are higher in jury trials than in bench trials. This is in accord with common intuition that juries favor plaintiffs. However, rather than attributing this finding to the presumption that juries favor plaintiffs, the selection process modeled here provides a potentially superior explanation. The two areas where win rates are higher under jury trials than under bench trials, in the Clermont and Eisenberg data, are FELA (Federal Employers Liability Act).

<table>
<thead>
<tr>
<th></th>
<th>Judge trial N (Completed)</th>
<th>Win rate</th>
<th>Jury trial N (Completed)</th>
<th>Win rate</th>
<th>Win ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Airplane Personal Injury</td>
<td>75</td>
<td>0.53</td>
<td>324</td>
<td>0.62</td>
<td>0.85</td>
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<td>Federal Employers’ Liability</td>
<td>94</td>
<td>0.62</td>
<td>1168</td>
<td>0.72</td>
<td>0.86*</td>
</tr>
<tr>
<td>Assault, Libel, Slander</td>
<td>86</td>
<td>0.43</td>
<td>339</td>
<td>0.49</td>
<td>0.88</td>
</tr>
<tr>
<td>Marine Personal Injury</td>
<td>889</td>
<td>0.57</td>
<td>1455</td>
<td>0.64</td>
<td>0.89***</td>
</tr>
<tr>
<td>Other Personal Injury</td>
<td>516</td>
<td>0.51</td>
<td>2769</td>
<td>0.49</td>
<td>1.04</td>
</tr>
<tr>
<td>General Contract</td>
<td>3979</td>
<td>0.69</td>
<td>2458</td>
<td>0.66</td>
<td>1.05</td>
</tr>
<tr>
<td>Torts to Personal Property</td>
<td>732</td>
<td>0.63</td>
<td>458</td>
<td>0.59</td>
<td>1.07</td>
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<tr>
<td>Torts to Land</td>
<td>203</td>
<td>0.66</td>
<td>149</td>
<td>0.6</td>
<td>1.1</td>
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<tr>
<td>Negotiable Instruments</td>
<td>643</td>
<td>0.81</td>
<td>173</td>
<td>0.73</td>
<td>1.11*</td>
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<td>Fraud</td>
<td>308</td>
<td>0.67</td>
<td>265</td>
<td>0.59</td>
<td>1.14</td>
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<td>3653</td>
<td>0.60</td>
<td>1.15***</td>
</tr>
<tr>
<td>Prod-Med</td>
<td>456</td>
<td>0.48</td>
<td>3648</td>
<td>0.28</td>
<td>1.71***</td>
</tr>
<tr>
<td>Medical Malpractice</td>
<td>64</td>
<td>0.50</td>
<td>732</td>
<td>0.29</td>
<td>1.72***</td>
</tr>
</tbody>
</table>

*Judge/jury win rates differ at 0.05 level; **at 0.01 level; ***at 0.001 level.

Source: Clermont and Eisenberg (1992).
and marine torts. In both, the high reported win rates likely reflect low compliance rates. The population effect considered alone \((1 - 2r)\) would imply a reduction in the win rate in moving from judge to jury, contradicting the data. However, on the assumption that the high win rates in these areas reflect low compliance rates, the dominant selection effect would be positive, as the mix of litigants changes to include more guilty defendants, which is consistent with the data (Table 2).

Finally, I should note that the other two statistically significant results in Table 2, for negotiable instruments and motor vehicle litigation, probably reflect the pure population effect \(1 - 2r\) without a significant selection bias. It is unlikely that information asymmetry is substantial in either area.

4.6. Appeals and Reversals

Trials in this model are black boxes that generate results with stable rates of error. Knowing the rates of settlement for the innocent and guilty respectively and the error rates, one could calculate the \textit{ex post} rate of “wrongful convictions” (i.e., erroneous findings of liability) within a sample of defendants who lose at trial:

\[
P(\text{innocent} \mid \text{conviction}) = \frac{(1 - r)F_\varepsilon \theta_2}{(1 - r)F_\varepsilon \theta_2 + (r)F_\eta (1 - \theta_1)}.
\]

As the compliance rate increases, the proportion of falsely convicted defendants in the sample of convictions increases. Indeed, as the compliance rate approaches 100\% \((r \text{ approaches } 0)\), so does the percentage of innocent defendants in the sample of convictions. Among acquitted defendants,

\[
P(\text{guilty} \mid \text{acquittal}) = \frac{rF_\eta \theta_1}{rF_\eta \theta_1 + (1 - r)F_\varepsilon (1 - \theta_2)}.
\]

Thus, as the rate of compliance approaches 0, the percentage of guilty defendants within the pool of acquittals approaches 100\%.

33. FELA lawsuits, for example, are against public sector employers, who are can pass on the liability burden to taxpayers. Thus, FELA liability may not be effective in securing compliance.
Appeals are likely to be associated with these pools of defendants. The innocents who have been found liable know that they have been falsely convicted (because of their systemic informational advantage) and therefore have a strong incentive to appeal. The guilty who have been acquitted have no incentive to appeal, but plaintiffs—who know the respective settlement rates of the guilty and the innocent, and the judicial error rates—are more likely to file appeals as the share of the falsely acquitted increases within the pool of acquitted defendants.34

The probability of innocence given a conviction is greater than the probability of guilt given acquittal when

$$\frac{F_\varepsilon}{F_\eta} > \frac{r\sqrt{(1 - \theta_1)\theta_1}}{(1 - r)\sqrt{(1 - \theta_2)\theta_2}}.$$ 

Given that $F_\varepsilon(S^*) > F_\eta(S^*)$, this inequality holds for middling to high rates of compliance (assuming that judicial error rates are small and of similar magnitude), which suggests that the share of falsely convicted defendants is larger than the share of falsely acquitted defendants—except where rates of compliance are low.

Moreover, the incentive to appeal is greater among the falsely convicted defendants than among plaintiffs who believe that they lost because of error. This is because a falsely convicted defendant knows that the likelihood of reversal is just one minus the rate of false conviction error at the appellate level. If error rates are the same on appeal as at trial, the reversal probability for such a defendant is

$$P(\text{reversal} \mid \text{innocent}) = 1 - \theta_2.$$ 

The plaintiff who appeals an acquittal (i.e., finding of nonliability), by contrast, can only infer the defendant’s guilt from information on settlement and error rates. For such a plaintiff, the perceived reversal likelihood is $P(\text{guilty} | \text{acquittal})(1 - \theta_1) + P(\text{innocent} | \text{acquittal})(\theta_2)$, or

34. This assumes that trial is insufficient to resolve informational asymmetry between the parties, see Hay (1995).
\[ P(\text{reversal} \mid \text{uninformed}) = \frac{rF_\eta \theta_1}{rF_\eta \theta_1 + (1 - r)F_\epsilon (1 - \theta_2)(1 - \theta_1)} (1 - \theta_2) + \frac{(1 - r)F_\epsilon (1 - \theta_2)}{rF_\eta \theta_1 + (1 - r)F_\epsilon (1 - \theta_2)} (\theta_2). \]

Since this is likely to be less than \( P(\text{reversal} \mid \text{innocent}) \), the wrongly convicted defendant has a higher likelihood of appealing his conviction than would a plaintiff facing a wrongly acquitted defendant. Put more plainly, defendants, who will tend to have an informational advantage as to their guilt or innocence, are very likely to appeal an adverse judgment when innocent, while plaintiffs generally appeal on the basis of hazier information.

These predictions of the model are consistent with the data on appeals in Table 3. Eisenberg and Heise (2009, 2015) and Clermont and Eisenberg (2001) report that reversal rates on appeal generally favor defendants. The first six rows of Table 3 show statistically significant reversal-rate differentials from Eisenberg and Heise’s (2009) study, which examines a sample of state civil trials (a longitudinal sample from 2001 to 2005). Overall, the reversal rate for state civil trials appealed by plaintiffs is 21.5% compared to 41.5% for trial outcomes appealed by defendants. Reversal rates for appeals in the broad categories of torts (38% vs. 21%) and contracts (46% vs. 22%) show a defendant advantage. A narrower category consisting of “assault, libel, and slander” cases shows a dramatic defendant advantage (73% vs. 8%). In sum, the reversal rates from state civil trials are consistent with this model’s prediction that the share of wrongly convicted defendants would generally exceed the share of wrongly acquitted defendants and that appeal incentives in disputes involving the former would be significantly greater than for the latter.

The bottom three rows of Table 3 show Clermont and Eisenberg’s data from a sample of federal civil trials (1988–97). Substantial reversal-rate differentials are observed in the categories of “assault, libel, slander,” “other personal injury,” and product liability. Product liability and defamation cases are areas where defendants are likely to enjoy a systemic informational advantage.35

35. This is even more likely to be true in medical malpractice. However, the data on medical malpractice cases were too thin for Clermont and Eisenberg to report a statistically significant result. Clermont and Eisenberg argue that their results do not support the selection hypothesis, but they appear to rely on a version of the hypothesis in which differential stakes rather than informational asymmetry drives selection.
liability cases, the defendant is in a better position than the plaintiff to know the feasibility of an alternative design proposed by the plaintiff. In defamation cases, the defendant is likely to have much better information than the plaintiff on potential privileges and justifications.\textsuperscript{36} The “other personal injury” category, which consists mostly of tort actions against businesses,\textsuperscript{37} is a broad category where the Table 3 results probably reflect the generally superior information possessed by such defendants on their own precaution levels. These results further support the prediction that defendants who have an informational advantage and regard themselves as innocent

<table>
<thead>
<tr>
<th>Table 3. State and federal reversal rates, by case category and trial type</th>
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<td><strong>Case category</strong></td>
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<tr>
<td>State</td>
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<tr>
<td>All cases</td>
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<tr>
<td>Assault, Libel, Slander</td>
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<td>Tort</td>
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<td>Jury trial</td>
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<td>Assault, Libel, Slander</td>
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<td>Other personal injury</td>
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<td>Product liability</td>
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\textsuperscript{36} This is also consistent with low plaintiff win rates observed in defamation cases. See, for example, Clermont and Eisenberg (1998, p. 596). The category of assault and defamation combined (Table 2) distorts the win rates in both subcategories. Win rates for intentional torts tend to be high, while win rates for defamation are low. See Cynthia G. Lee and Nicole L. Waters, Caseload Highlights, Court Statistics Project, page 1, Volume 16, December 2009, https://www.courtstatistics.org/__data/assets/pdf_file/0013/26320/16_4_medical_malpractice_on_appeal.pdf.

\textsuperscript{37} These lawsuits consist of tort cases that have been excluded from the categories of medical malpractice, airplane, motor vehicle, product liability, and the combined category “assault and defamation.”
are very likely to appeal while plaintiffs who appeal do so on the basis of greater uncertainty about the defendant’s guilt.38

Table 3 also shows that the reversal rate from jury trials exceeds that for bench trials, which is also consistent with this model’s predictions. Given that only the defendants who are most likely to prevail are taking their chances with juries in this model, appeals from these defendants are likely to be overturned more often than defendant appeals from bench trials, given reasonably accurate appellate courts. The jury trial is the less accurate forum, but it places the plaintiff and defendant in roughly comparable positions as in the bench trial. Reversal rates for both types of litigant are higher, but the reversal rate differential stays roughly the same, as shown in Table 3.

5. Selection and Legal Evolution

Suppose instead of systemic informational asymmetry, as assumed previously, the defendant’s private information is only of the idiosyncratic sort. Thus, given the equilibrium compliance rate, the defendant’s expectation of being found liable is

\[ P_d = w_e + \varepsilon_d. \]

For such an uninformed defendant, a settlement will be possible only if the payment \( S < (w_e + \varepsilon_d)J + C_{op} \) and it follows that

\[ P(\text{litigate} \mid \text{noasymmetry}) = F_\varepsilon \left( \frac{S^* - C_d}{J} - w_e \right). \]

The settlement model presented earlier can be carried through here to find the optimal settlement demand on the part of the plaintiff. Supposing the idiosyncratic shock follows a uniform distribution, the optimal settlement

38. For additional evidence on rates of appeal, showing that appeal rates are higher for medical malpractice defendants than for medical malpractice plaintiffs, see Cynthia G. Lee and Nicole L. Waters, Caseload Highlights, Court Statistics Project, page 4, Volume 16, December 2009, https://www.courtstatistics.org/__data/assets/pdf_file/0013/26320/16_4_medical_malpractice_on_appeal.pdf.
demand from the plaintiff is \( S^* = (a + w_e)J - C_p \). Substituting \( S^* \), and letting \( \sigma_\varepsilon \) represent the standard deviation of the idiosyncratic shock, the probability of litigation against a defendant whose private information is of a purely idiosyncratic type (either because the defendant is uninformed or the plaintiff knows the defendant’s type) is

\[
P(\text{litigate} \mid \text{no asymmetry}) = 1 - \left( \frac{1}{2\sqrt{3}\sigma_\varepsilon} \right) \left( \frac{C_p + C_d}{J} \right).
\]

Now return to the case of systemic asymmetry of information. For the case of litigation against an innocent defendant,

\[
P(\text{litigate} \mid \text{innocent}) = 1 - \left( \frac{1}{2\sqrt{3}\sigma_\varepsilon} \right) \left( \frac{C_p + C_d}{J} \right) + \frac{w_e - \theta_2}{2\sqrt{3}\sigma_\varepsilon}.
\]

The last term in this expression is positive, suggesting that litigation is more frequent compared to the case where the defendant has no systemic informational advantage. For the case of litigation against guilty defendants,

\[
P(\text{litigate} \mid \text{guilty}) = 1 - \left( \frac{1}{2\sqrt{3}\sigma_\varepsilon} \right) \left( \frac{C_p + C_d}{J} \right) + \frac{w_e - (1 - \theta_1)}{2\sqrt{3}\sigma_\varepsilon}.
\]

The last term is negative, suggesting less litigation compared to the case where there is no systemic asymmetry.

5.1. Priest–Klein and Selection Generally

Several observations follow from the foregoing expressions. First, the Priest–Klein hypothesis can be discerned from these equations by examining the probability of litigation for the case of no systemic information asymmetry—that is, only idiosyncratic asymmetry. Litigation declines as the sum of litigation costs increases, and increases with the judgment, as in

39. This assumes lower and upper bounds \(-a\) and \(a\), and \(2a > (C_p + C_d)/J\). The offer \( S^* \) is the solution for the systemic asymmetry case and also the solution for the case, examined here, where the sole defendant has only idiosyncratic information.
the traditional Landes–Posner–Gould model. Notice, however, that litigation increases with the standard deviation of the idiosyncratic shock. If the standard deviation of the idiosyncratic shock increases as the population win rate approaches 50%, then the Priest–Klein hypothesis follows immediately: Litigation will tend to be dominated by cases in which the expected win rate is 50%. To replicate the Priest–Klein conjecture within this model, then, one need only assume that \( \sigma_{\varepsilon} \) is a function of the population win rate \( w \) and that the function reaches its maximum when \( w \) is 50%. This is a natural assumption because idiosyncratic informational differences should be greatest when the question of compliance is most uncertain.

Although the assumption that the shock variance \( \sigma_{\varepsilon} \) reaches its maximum when the probability of plaintiff victory is 50% seems natural, there is no reason to think that it must be this way in all cases. There may be some areas of litigation where \( \sigma_{\varepsilon} \) reaches a maximum at another location, such as near one of the endpoints of the probability spectrum. For example, if it is not clear what you have to do to comply with the law, then a defendant who has every reason to believe that he is innocent may still perceive a substantial risk that the court might find facts to justify a guilty verdict. In such a case, \( \sigma_{\varepsilon} \) might be large near the innocence pole. This would make cases of innocence likely to come to court, and drive observed plaintiff win rates low. In other words, the Priest–Klein model, as presented here, can account for high, medium, or low trial win rates, even without the assumption of unequal litigation stakes, depending on the position along the probability spectrum where the idiosyncratic shock variance reaches a maximum. Of course, the most plausible default assumption is that this maximum occurs in the middle of the spectrum.

Now consider systemic asymmetry. If the idiosyncratic shock variance \( \sigma_{\varepsilon} \) declines as we move toward the endpoints of the spectrum of the likelihood of a plaintiff victory (which, again, is the plausible default assumption),
then the variance of the idiosyncratic shock will matter less as a driver of litigation in cases of systemic asymmetry. For such cases, the last terms in the last two equations, reflecting systemic information asymmetry effects, take on greater importance as drivers of litigation. Thus, Priest–Klein-type selection emerges here as a special case within a simple model that also generates selection based on information asymmetry.\textsuperscript{43} The greater rate of litigation involving innocent defendants drives win rates down from the 50% “base-case” level (e.g., Hylton, 2006).

5.2. Legal Evolution

As Priest (1980) noted, if litigation is driven by idiosyncratic shocks, resulting in plaintiff win rates of 50%, then doctrinal trends would hardly ever be observed. The law would appear to follow a random walk, in which trends in favor of plaintiffs would be just as likely as trends in favor of defendants. Priest’s implicit assumption, which I find plausible, is that trends in the law reflect the side with the best success rate in litigation.

In the case of systemic asymmetry, the random walk is unlikely.\textsuperscript{44} In particular, if innocent defendants tend to litigate more often, and appeal more often, then trends in favor of defendants are likely to result. However, the law will be altered by the incorporation of private information held by defendants in the shaping of legal standards. A general cost–benefit standard such as the Hand Formula, for example, has ambiguous implications for efficiency if the standard is not informed by factually accurate assessments of cost and benefit (Cooter, Kornhauser, and Lane, 1979).\textsuperscript{45} The biased pattern of litigation induced by informational asymmetry ensures that general legal standards incorporate private (and therefore accurate) information (Hylton, 2006).

\textsuperscript{43} Depending on the parameters of this model, selection based on “differential expectations” or information asymmetry can be observed. For an empirical studies examining which type of selection best matches the data, see Waldfogel (1998) and Siegelman and Waldfogel (1999).

\textsuperscript{44} It should be clear that altering the allocation of legal expenses (e.g., British rule) could change the pattern of evolution in this model.

\textsuperscript{45} Although related, the incorporation of accurate private factual information into legal standards, as a process through which the law becomes more efficient, should be distinguished from the minimization of bias due to extreme policy preferences among judges. On the latter process, see Gennaioli and Shleifer (2007).
However, this is not the complete story of the evolution of law. I have so far assumed systemic informational asymmetry only with respect to compliance. However, if one party knows the probability of judicial error, while the other party does not, the party with superior information on error will litigate more, biasing win rates in his favor. Suppose the defendant knows that the true judicial error rates are $\theta_1$ and $\theta_2$. Now the probability of litigation against such a defendant is

$$P(\text{litigate}) = 1 - \left( \frac{1}{2\sqrt{3}\sigma} \right) \left( \frac{C_p + C_d}{J} \right) + \frac{r(\tilde{\theta}_1 - \theta_1) + (1 - r)(\theta_2 - \tilde{\theta}_2)}{2\sqrt{3}\sigma}.$$ 

If the defendant’s information is favorable to himself, the likelihood of litigation is higher than otherwise. Plaintiff win rates will be biased in favor of the defendant because of the defendant’s informational advantage with respect to the likelihood of judicial error.

In this evolutionary process, legal standards are not enhanced in accuracy or made more efficient by litigation. Indeed, the rule of law is destroyed over time, as Bentham suggested, by biasing due to litigation involving parties with superior information on judicial errors. Such information could result from having superior access to or control over the officers of the courts.46 If we define microevolution as marginal changes in the law (e.g., recognizing facts that create exceptions to a settled rule) and macroevolution as the complete abrogation of a rule, the foregoing expressions suggest three types of microevolution in the common law. One is a white noise process observed under Priest–Klein assumptions and described in Priest (1980).47 A second is microevolution toward efficiency, through the incorporation of private information in updated legal standards.48 A third is microevolution

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46. Gennaioli and Shleifer (2007) show that biased judges distort the path of evolution toward inefficiency. However, if parties know of the judges’ biases, they will settle. In this paper’s model, by contrast, bias in legal evolution results from selective litigation caused by differential knowledge of judicial biases.

47. As noted before, this argument is traditionally associated with Bentham. However, the specific connection between this theory and litigation is suggested in Holmes (1881, p. 126–128) (discussing litigation and resolution of uncertainty over the negligence standard).

48. This type of evolution is associated with the common law efficiency hypothesis. On updating of standard to incorporate information of litigants, see Cooter Kornhauser, and Lane (1979) and Hylton (2006).
toward biased rules, of the sort envisioned by Bentham, where the law gradually becomes the property of advantaged classes.

This model’s analysis has no bearing on the question of macroevolution of law, addressed by Rubin (1977) and Cooter and Kornhauser (1980). Inefficient legal rules could generate more litigation, until the rules are undone. Alternatively, injunctive settlements of litigation could quietly overturn inefficient rules (Hylton and Cho, 2010), replacing them with efficient norms or conventions (Ellickson, 1991).

6. Conclusion

My aim has been to show that both intuitive and counterintuitive implications for deterrence can be derived from a model that takes information costs seriously, and that the same model can be employed to resolve puzzles in the data on trial and settlement, and to characterize processes of legal evolution. The emphasis throughout has been on empirical implications. However, there are many other subjects to which this model could be applied—such as, for example, the effects of litigation cost allocation rules on incentives to take care.

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