

May 2008

# An Equilibrium Model of Lawmaking

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## Recommended Citation

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University of  
Connecticut

*Department of Economics Working Paper Series*

**An Equilibrium Model of Lawmaking**

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Working Paper 2008-16

May 2008

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This working paper is indexed on RePEc, <http://repec.org/>

## **Abstract**

This paper embeds a model of lawmaking in an equilibrium framework in which the demand for trials is rationed by court delay. The lawmaking process depends on a combination of selective litigation, judicial bias, and precedent. The steady state equilibrium of the model determines both the length of delay and the distribution of legal rules. Comparative statics show that an increase in the supply of trials reduces delay but may or may not increase the proportion of efficient rules. An increase in the fraction of judges biased in favor of the efficient rule, however, will likely improve efficiency on both counts.

**Journal of Economic Literature Classification:** K40, K41

**Keywords:** Court delay, judicial decisionmaking, lawmaking, precedent, rationing by waiting

# An Equilibrium Model of Lawmaking

## 1. Introduction

This paper deals with two issues related to the efficient operation of the litigation process, one practical and the other theoretical. The practical issue is the pervasive problem of court delay, which is a consequence of the excess demand for trials relative to the fixed supply of judicial resources. The theoretical issue is the nature of legal evolution, and particularly, the question of whether there is an inherent tendency for the common law to evolve in the direction of efficiency without the conscious help of judges. The analysis in this paper combines these issues by developing an equilibrium model of the litigation process in which trials are rationed by waiting, and legal rules are determined in an evolutionary setting by three factors: the selection of disputes for trial, the strength of precedent, and judicial bias. The steady state equilibrium of the model determines both the length of trial delay and the distribution of legal rules.

Court delay is an issue of long-standing concern for observers of the legal process (Posner, 2003, pp. 595-598). This concern became especially acute during the height of the “litigation explosion” in the 1970’s and 1980’s as court backlogs increased. A Rand study of civil cases in federal courts during this period found that over 40 percent of cases took one year or more to be resolved (Dungworth and Pace, 1990). The fact that better than 90 percent of civil cases settle before trial suggests that delay may only affect a small fraction of cases, but Kessler (1996) found that court delay is a significant determinant of settlement delay.<sup>1</sup>

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<sup>1</sup> For theoretical explanations of this finding, see Spier (1992) and Miceli (1999).

Gravelle (1990) developed the first and only theoretical model of delay within the context of the demand for and supply of trials. In particular, he employed a simple unilateral care accident model in which the demand for trials emerges from pretrial bargaining between injurers and victims over the assignment of liability. In this setting, delay serves as a rationing mechanism that adjusts to equate the demand for trials with the fixed supply, given an exogenous filing fee. The model to be developed in this paper closely follows Gravelle's set-up, with some minor simplifications.

The major innovation of the current paper is to incorporate legal change into this equilibrium framework for the purpose of deriving the steady state equilibrium distribution of legal rules. Following Posner's early conjecture that the common law exhibits an economic logic, Rubin (1977) and Priest (1977) identified forces that tend to propel the law toward efficiency based on the self-interested behavior of litigants, and without the help of judges. Specifically, they argued that because inefficient rules result in higher costs for litigants, they are more likely to end up at trial where they can be adjudicated and possibly replaced by more efficient rules. This important insight is referred to as the "selective litigation effect." Rubin and Priest, however, did not embed their analysis in an equilibrium model of litigation, and so stopped short of providing a complete characterization of the equilibrium distribution of legal rules. Also, their models essentially ignored the role of judges in shaping the law, treating them as passive agents.<sup>2</sup>

A fresh perspective on the evolution of the law that explicitly focuses on the behavior of judges is offered in the companion papers by Gennaioli and Shleifer

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<sup>2</sup> This was partly due to a lack of good models explaining judicial behavior, but also partly a conscious effort to identify a mechanism for legal change apart from judicial decision making.

(2007a,b). In their models, judges are potentially biased for one side or the other in a legal dispute, and so, to the extent that they have the power (or the inclination) to depart from precedent,<sup>3</sup> they can affect the direction of legal change. These models represent an important contribution to the literature on legal change because they are the first to incorporate judicial preferences in a meaningful way into the analysis of legal change. The current paper also borrows heavily from the characterization of potential judicial bias by Gennaioli and Shleifer, but it goes beyond their models by combining judicial bias and precedent with the Rubin-Priest selective litigation effect.

Finally, the model in this paper examines the efficiency of the steady state equilibrium regarding the impact of delay and the distribution of legal rules on the social cost of accidents (which is the measure of social welfare in the model). The main conclusion is that the law will not generally evolve completely toward any one rule, but will reach a steady state under which the distribution of rules depends on both the nature of judicial bias and the selective litigation effect.<sup>4</sup> The model does, however, identify a force that will tend to drive the law toward efficiency based on selective litigation—that is, inefficient laws will tend to be litigated more often than efficient laws, resulting in a higher proportion of efficient laws in the population of laws. Also, comparative static exercises suggest that increasing the supply of trials, while lowering the equilibrium trial delay, may or may not improve the efficiency of the law. In contrast, an increase in the proportion of judges biased in favor of the efficient rule will, under reasonable assumptions, both lower trial delay and improve the efficiency of the law, thereby

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<sup>3</sup> In their models, the authors distinguish between “overruling” precedent, and “distinguishing” a new law from precedent. The difference is not important for present purposes.

<sup>4</sup> This point was first made by Miceli (2009).

unambiguously reducing social costs. Unfortunately, it is not clear how one would implement such a policy.

The paper is organized as follows. Section 2 sets up the simple unilateral care accident model on which the analysis is based. Section 3 derives the steady state equilibrium of the model, and Section 4 examines its efficiency properties. Finally Section 5 concludes.

## 2. The Model

To provide an explicit basis for the lawmaking process, we consider a unilateral care accident model in which an injurer (defendant) chooses a level of care,  $x$ , that determines the probability of an accident,  $p(x)$ , where  $p' < 0$ ,  $p'' > 0$ . In the event of an accident, the victim (plaintiff) suffers a random loss,  $L$ , which we assume is uniformly distributed on  $[0, \bar{L}]$  with expected value  $\bar{L}/2$ .<sup>5</sup> The plaintiff observes her loss, but the defendant does not, though he knows the distribution of losses.

### 2.1. The Settlement Process

Once an accident occurs, the plaintiff decides whether or not to file suit. If she files, the plaintiff and defendant engage in pretrial bargaining, which, given the defendant's inability to observe the plaintiff's specific losses, proceeds as follows. First, the defendant makes a take-it-or-leave-it offer  $S$ , which the plaintiff accepts or rejects. If she accepts, the case ends. If she rejects, the case goes to trial, where the plaintiff expects to win with probability  $w$  (to be specified below). Thus, the expected value of trial to a plaintiff who has suffered a loss of  $L$  is  $wL - C_p$ , where  $C_p$  is the plaintiff's cost of a trial.

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<sup>5</sup> To keep the model simple, we assume that the defendant's care does not affect the distribution of plaintiff losses.

As noted above, trial involves a delay given the fixed “supply” of trials at any given point in time. We assume that waiting is costly for the plaintiff, which reduces the expected value of trial. For simplicity, we capture this with an additive waiting cost,  $k(t)$ , where  $k \succ 0$  (Miceli, 1999). Thus, the expected value of trial as of the date that the plaintiff rejects the defendant’s settlement offer is

$$V_p(t) = wL - C_p - k(t). \quad (1)$$

None of the qualitative results depend on this specification of the costs of delay. For example, similar results would be obtained if the plaintiff’s value of trial were discounted based on the expected delay.<sup>6</sup>

Given (1), a plaintiff of type  $L$  will accept the defendant’s settlement offer of  $S$  if and only if  $S \geq V_p(t)$ , or if and only if

$$L \leq \frac{S + C_p + k(t)}{w} \equiv \hat{L}(t), \quad (2)$$

where the critical value,  $\hat{L}(t)$ , is increasing in  $t$ . Thus, for any given settlement offer, the longer is the expected delay, the more likely the plaintiff is to settle.<sup>7</sup>

Consider next the determination of the defendant’s optimal settlement offer,  $S^*$ .<sup>8</sup> Recall that the defendant is assumed not to be able to observe the particular loss of the plaintiff prior to trial. Thus, he chooses  $S$  to minimize his expected costs. In solving this problem, we make the simplifying assumption that the defendant’s costs are unaffected by delay. This reflects offsetting effects of delay on the defendant: on one hand, delay

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<sup>6</sup> See Gravelle (1990).

<sup>7</sup> Miceli (1999) shows that defendants can use waiting cost to sort plaintiffs into those with more or less patience, resulting in a settlement pattern where impatient plaintiffs settle immediately, while patient plaintiffs settle on the courthouse steps.

<sup>8</sup> The settlement model employed here is originally due to Bebchuk (1984).



lowers the present value of the defendant's trial costs, but on the other, it increases his "carrying costs" (Miceli, 1999, p. 268). We assume that these factors offset.<sup>9</sup>

Given the above assumptions, we can write the defendant's problem as follows:

$$\min_S F(\hat{L})S + \int_{\hat{L}}^{\bar{L}} (wL + C_d)dF(L), \quad (3)$$

where  $C_d$  is the defendant's trial cost. The first order condition defining  $S^*$  is given by

$$F(\hat{L}) = f(\hat{L})(C_p + C_d + k(t))/w. \quad (4)$$

For the case where  $F$  is uniform, this condition yields

$$S^* = C_d. \quad (5)$$

Thus, the optimal settlement offer is simply equal to the defendant's trial costs. It is therefore independent of delay. Substituting this into (2) yields the equilibrium threshold for plaintiffs:

$$\hat{L}^*(t) = \frac{C_p + C_d + k(t)}{w}. \quad (6)$$

It follows that the probability of a trial is

$$\begin{aligned} T(t) &= 1 - F(\hat{L}^*(t)) \\ &= 1 - \frac{C_p + C_d + k(t)}{w\bar{L}}, \end{aligned} \quad (7)$$

where  $\partial T / \partial t = -k' / w\bar{L} < 0$ . Thus, delay reduces the probability of a trial.<sup>10</sup> Intuitively, delay reduces the value of trial to plaintiffs, making them more willing to settle as the

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<sup>9</sup> Gravelle (1990) explicitly models these effects, which shows that the overall impact of delay on the defendant's legal costs is ambiguous.

<sup>10</sup> Gravelle's treatment of legal costs yields an ambiguous effect of delay on the probability of trial. He nevertheless assumes that on net, the trial rate decreases in  $t$ , as we have derived here. As we will see below, this is a necessary condition for the overall demand for trials to be decreasing in  $t$ .

date of trial moves further into the future. We will see that in this way, delay rations the scarce supply of trials among plaintiffs (Gravelle, 1990).

Finally, we assume that  $S^*$  exceeds the filing costs of plaintiffs. Thus, all plaintiffs, whether or not they expect to go to trial, will file suit in the event of an accident.<sup>11</sup>

## 2.2. The Accident Rate

As noted above, the accident probability is determined by the defendant's choice of care. Define  $A^*(t)$  to be the minimized costs of the defendant during the settlement-trial stage. That is,  $A^*(t)$  is the minimized value of (3). Thus, at the accident stage, the defendant chooses  $x$  to solve

$$\min_x x + p(x)A^*(t). \quad (8)$$

The resulting first order condition is

$$1 + p'A^*(t) = 0, \quad (9)$$

which defines the optimal care level,  $x^*(t)$ . Differentiating (3), and applying the Envelope Theorem, we find that

$$\frac{\partial A^*}{\partial t} = -f(C_p + C_d + k(t)) \left( \frac{\partial \hat{L}^*}{\partial t} \right) < 0, \quad (10)$$

which implies that  $\partial x^*/\partial t < 0$ . Delay thus reduces the defendant's expected costs from litigation, and hence reduces his incentive to take care. Finally, the accident rate,  $p^*(t) \equiv p(x^*(t))$  varies with  $t$  as follows:

$$\frac{\partial p^*}{\partial t} = p' \left( \frac{\partial x^*}{\partial t} \right) > 0. \quad (11)$$

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<sup>11</sup> As a result, some cases whose expected value at trial is negative will succeed in obtaining a settlement (Bebchuk, 1988).

Increased delay thus increases the accident rate by diluting the defendant's incentive to take care.

### 2.3. *The Demand for Trials*

The total demand for trials can now be written as the product of the accident and trial rates:

$$D(t) = p^*(t)T(t). \quad (12)$$

Differentiating, we obtain

$$\frac{\partial D}{\partial t} = T \frac{\partial p^*}{\partial t} + p^* \frac{\partial T}{\partial t}, \quad (13)$$

which is ambiguous in sign. Whereas delay increases the accident rate by diluting incentives, it reduces the trial rate by making trials less valuable to plaintiffs. As Gravelle (1990) notes, however, for delay to work as a rationing device, the latter effect must dominate so that (13) is negative (i.e., demand must be downward sloping in  $t$ ). We assume hereafter that this is true (see Figure 1). (We postpone discussion of equilibrium in the "market" for trials until section 3.1 below.)

### 2.4. *The Evolution of Legal Rules*

In order to investigate the evolution of legal rules through the litigation process, and specifically, the proposition that the law evolves toward efficiency, we need to be explicit about the rules for allocating liability in our simple accident model. Because care is unilateral, it is sufficient to consider two rules: strict liability (SL) and no liability (NL). Strict liability will induce more care by injurers, which lowers the accident rate, but it also leads to more lawsuits, which are costly. Thus, depending on which effect dominates in terms of overall social costs, either rule may be efficient. At this point, however, we are only interested in what determines the distribution of the two rules.

Suppose that, at any point in time, both rules, SL and NL, exist in the population of legal rules in some arbitrary proportion. For example, consider a multi-jurisdictional legal system in which rules can vary by jurisdiction. In this setting, we ask how the process of litigation causes the distribution of rules to evolve. To that end, let  $\theta$  be the proportion of SL and  $1-\theta$  the proportion of NL. Further, suppose that each potential accident setting involves one of these rules, and that both the injurer and victim know with certainty which type of rule applies to their particular interaction. (That is, they know the prevailing rule in their jurisdiction.)

The possibility of legal evolution requires that laws change, but this can only happen at trial. That is, cases that settle can have no effect on the state of the law. In contrast, when a case goes to trial, the judge can either uphold the prevailing rule, which means finding for the plaintiff if the rule is SL and finding for the defendant if the rule is NL, or he can overrule the prevailing rule. Obviously, since there are only two rules, overruling means replacing SL with NL and vice versa. (Thus, we do not allow judges to fashion new or hybrid rules like negligence.) We suppose that two factors affect a judge's decision in this regard: *precedent* and *judicial bias*.

A judge who follows precedent simply enforces the prevailing rule. Since strict adherence to precedent permits no legal change, we assume that precedent has some strength but is not completely binding. Specifically, let  $\beta$  be the probability that a judge follows precedent, and  $1-\beta$  the probability that he overrules precedent. The magnitude of

$\beta$  (which is independent of the particular rule in place) thus represents an index of the strength of precedent.<sup>12</sup>

As for judicial bias, we suppose that there are two types of judges: pro-plaintiff (PP), and pro-defendant (PD) (Gennaioli and Shleifer, 2007a,b; Miceli, 2009). PP judges favor SL and will always apply it when it is the prevailing precedent. In addition, they will apply it with probability  $1-\beta$  when it is not the precedent. Conversely, PD judges favor NL, so they will always apply it when it is the precedent, and will apply it with probability  $1-\beta$  when it is not the precedent. Let  $\delta$  represent the fraction of PD judges (i.e., those who favor NL), while the remaining fraction,  $1-\delta$ , are PP (those who favor SL).

We can now calculate the win probabilities,  $w_j$ , for plaintiffs under each of the two rules ( $j=SL, NL$ ). This involves calculating the probability that the court will apply SL, the pro-plaintiff rule. First, if SL is the prevailing rule, it will automatically be applied by all PP judges and by those PD judges who follow precedent. Thus, we have

$$w_{SL} = (1-\delta) + \delta\beta. \quad (14)$$

In contrast, if NL is the prevailing rule, all PD judges will apply it, as well as those PP judges who deviate from precedent. Thus,

$$w_{NL} = (1-\delta)(1-\beta). \quad (15)$$

Comparing (14) and (15), we find that  $w_{SL} > w_{NL}$  if and only if  $\beta > 0$ , which we assume is true. Thus, as long as precedent has some force, SL results in a higher win probability for plaintiffs, reflecting its pro-plaintiff orientation.

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<sup>12</sup> It could also represent something about the distribution of judges regarding their respect for precedent (e.g., the proportion of activist judges versus strict constructionists). See Miceli and Cosgel (1994) on judicial preferences and precedent.

Returning to the above settlement model, we can now state, based on (7), that the probability of a trial is higher under SL than under NL; that is,  $T_{SL} > T_{NL}$ . This follows from the fact that  $\partial T / \partial w > 0$ . Intuitively, the higher win probability for plaintiffs under SL makes trials more valuable, all else equal, thereby increasing the probability that any given case will go to trial. Likewise, the accident model implies that defendant care is higher under SL ( $x^*_{SL} > x^*_{NL}$ ), and correspondingly, that the probability of an accident is lower under SL ( $p^*_{SL} < p^*_{NL}$ ). These conclusions follow from the fact that  $\partial A^* / \partial w > 0$ . Intuitively, a higher win rate for plaintiffs increases defendants' expected cost, thus inducing them to invest in greater care, which in turn results in fewer accidents.

### 3. The Determination of Equilibrium

We now derive the equilibrium of the above model. This involves deriving equilibrium in the “market” for trials, which determines delay, and equilibrium in the lawmaking process, which determines the steady state distribution of legal rules. We first derive these equilibria separately and then combine them.

#### 3.1. Equilibrium in the Market for Trials

Given the presence of two legal rules in the population, we need to rewrite the demand for trials in (12) as follows:

$$D(t, \theta) = \theta p^*_{SL}(t) T_{SL}(t) + (1 - \theta) p^*_{NL}(t) T_{NL}(t). \quad (16)$$

We continue to assume that  $\partial D / \partial t < 0$ , so that the demand is decreasing in delay. Further, following Gravelle (1990), we suppose that there is a fixed “supply” of trials,  $K$ , at any point in time. Thus, equilibrium in the market for trials requires that demand equals supply, or

$$D(t, \theta) = K. \quad (17)$$

This condition determines the equilibrium delay as a function of  $\theta$ , or  $t^*(\theta)$ . Figure 1 depicts this equilibrium graphically.

How does this equilibrium depend on the distribution of legal rules in the population? To answer this question, differentiate (16) with respect to  $\theta$  to obtain

$$\frac{\partial D}{\partial \theta} = p^*_{SL} T_{SL} - p^*_{NL} T_{NL}. \quad (18)$$

The sign of this expression is ambiguous, given that  $p^*_{SL} < p^*_{NL}$  and  $T_{SL} > T_{NL}$ . As noted above, an increase in the proportion of SL lowers the accident rate by increasing injurer care but raises the trial rate by increasing the value of trial to plaintiffs. Note that condition (18) is a formal version of the selective litigation effect in that it determines the relative frequency with which the two legal rules come before the court to be adjudicated. This effect plays an important role in determining the evolution of the law because, as noted, only those laws that make it to trial can be changed.

As an illustration, suppose that NL results in more trials than SL, so that  $\partial D / \partial \theta < 0$ . It follows that a parametric increase in  $\theta$  causes the demand for trials to shift down in Figure 1, which reduces the equilibrium delay. Thus, we have

$$\frac{\partial t^*}{\partial \theta} < 0. \quad (19)$$

In other words, as  $\theta$  increases parametrically, the proportion of strict liability rules in the population increases. But since SL results in fewer trials on average compared to NL (given that (18) is negative), the extent of trial delay declines as the demand for trials falls. Obviously, the opposite effect would occur if we assume that (18) is positive.

### *3.2. The Steady State Equilibrium Distribution of Legal Rules*

Thus far we have treated the distribution of rules in the population as exogenous, but the process of litigation will generally cause this distribution to evolve as cases come before the court to be adjudicated. As noted above, judges have biases and are imperfectly bound by precedent, so they will occasionally overturn laws based on their preferences. In this section, we examine the manner in which this evolution occurs within the context of the market for trials. In the process, we derive the steady state equilibrium distribution of the two rules.

To proceed, suppose that there is some initial fraction of SL rules,  $\theta_0$ , and suppose that litigation occurs over some period of time as described in the above model. We can then add up the number (proportion) of SL rules at the end of that period and see how it compares to  $\theta_0$ .<sup>13</sup> Given our characterization of judicial behavior, SL can emerge from the litigation process in four ways. First, if no accidents occur when SL is the prevailing rule, it will not be litigated and thus will remain in place. This occurs with probability  $\theta_0(1-p_{SL}^*)$ . Second, if an accident does occur, the case may settle before reaching court. In this case, which occurs with probability  $\theta_0 p_{SL}^*(1-T_{SL})$ , the rule will also remain in place. Third, if an accident occurs under SL and the case goes to trial, the judge may uphold the rule. This will happen either if the judge is pro-plaintiff (PP), or if the judge is pro-defendant (PD) but chooses to follow precedent. The combined probability of these two outcomes is  $\theta_0 p_{SL}^* T_{SL} [(1-\delta) + \delta\beta]$ . Finally, SL can emerge from an accident involving NL if the case makes it to court and the judge overturns precedent (an event that will only occur if the judge is PP). The probability of this outcome is  $(1-\theta_0) p_{NL}^* T_{NL} (1-\delta)(1-\beta)$ . Summing these probabilities yields the proportion of efficient rules at the start of the next cycle of litigation, denoted  $\theta_1$ :

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<sup>13</sup> This procedure follows Miceli (2009).



$$\begin{aligned} \theta_1 = \theta_0(1-p_{SL}^*) + \theta_0 p_{SL}^*(1-T_S) + \theta_0 p_{SL}^* T_{SL}[(1-\delta) + \delta\beta] \\ + (1-\theta_0)p_{NL}^* T_{NL}(1-\delta)(1-\beta). \end{aligned} \quad (20)$$

To derive the steady state equilibrium, set  $\theta_1=\theta_0=\theta$  in (20) and solve for  $\theta$  to obtain

$$\theta = \frac{p_{NL}^* T_{NL}(1-\delta)}{p_{NL}^* T_{NL}(1-\delta) + p_{SL}^* T_{SL} \delta}. \quad (21)$$

We will refer to (21) as the “selection ratio.” Note that it depends on the relative number of trials that arise under each of the two rules, and the distribution of judicial bias.

Interestingly, it does *not* depend on the strength of precedent,  $\beta$ . Thus, the strength of precedent only affects the rate of legal change, not its direction.<sup>14</sup>

Several special cases emerge from (21), depending on the distribution of judicial bias. First, if  $\delta=0$ , then  $\theta=1$ . Thus, if all judges are PP, then the law will eventually fully converge to SL. Conversely, if  $\delta=1$  (all judges are PD), then  $\theta=0$ ; that is, the law will fully converge to NL. Finally, if  $\delta=1/2$ , (21) becomes

$$\theta = \frac{p_{NL}^* T_{NL}}{p_{NL}^* T_{NL} + p_{SL}^* T_{SL}}. \quad (22)$$

In this case, judges are on average “unbiased.” Thus, the law evolves according the “pure” selection effect. Note that here, the law will not generally evolve fully toward either rule, but instead will settle at a steady state equilibrium in which *the proportion of a given rule equals the conditional probability that a case going to trial involves the other rule*. Intuitively, the more often a rule comes to trial, the more chances it has to be overturned by a judge and replaced by the other rule. Conversely, if a rule rarely comes to trial, it will have less chance to be overturned.

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<sup>14</sup> Miceli (2009) first derived this result in a simpler model.

We can now see the importance of the above assumption regarding the sign of (18). By assuming that it was negative, we were assuming that  $p_{SL} * T_{SL} < p_{NL} * T_{NL}$ , which, in view of (22), implies that  $\theta > 1/2$ . That is, the proportion of SL rules exceeds the proportion of NL rules in the steady state. In this case, the selection effect favors SL. The reverse would have been true if we had assumed that (18) was positive. That is, selection would have favored NL and  $\theta < 1/2$ . Of course, this pure selection effect can be either offset or augmented by judicial bias according to the more general condition in (21).

### 3.3. Simultaneous Determination of Trial Delay and Distribution of Legal Rules

Since the expected number of trials under the two rules depends on the length of trial delay as derived above, (21) defines the equilibrium distribution of legal rules as a function of  $t$ , or  $\theta^*(t)$ . Thus, the steady state equilibrium in the market for trials simultaneously determines the length of delay,  $t$ , and the distribution of legal rules,  $\theta$ , according to equations (17) and (21). We have already seen that the selection effect determines how the equilibrium delay,  $t^*$ , varies with  $\theta$  according to the market equilibrium condition (17). For the case where (18) is negative (i.e., selection favors SL),  $t^*(\theta)$  is negatively sloped (as indicated in (19)). Alternatively, if (18) is positive (i.e., selection favors NL),  $t^*(\theta)$  is positively sloped.

To determine the slope of the reaction function implied by the steady state condition (21), take the derivative of (21) with respect to  $t$  and rearrange to get:

$$\text{sign}\left(\frac{\partial \theta^*}{\partial t}\right) = \text{sign}[\delta(1-\delta)p_S * T_S p_N * T_N (\epsilon_{NLt} - \epsilon_{SLt})], \quad (23)$$

where  $\varepsilon_{jt}$  is defined to be the elasticity of the change in the number of trials with respect to a change in  $t$ .<sup>15</sup> The assumption that  $\partial D/\partial t < 0$  (i.e., the fact that the demand for trials is decreasing in delay) implies that  $\varepsilon_{jt} < 0$  for  $j=SL, NL$ , so the sign of  $\partial\theta/\partial t$  depends on the relative magnitudes of these parameters. If  $|\varepsilon_{SLt}| > |\varepsilon_{NLt}|$ , (23) is positive (assuming that  $0 < \delta < 1$ ), implying that an increase in delay causes an increase in the proportion of SL in the population of rules. That is, greater delay reduces the number of trials involving SL faster than it reduces the number of trials involving NL, thereby causing selection in favor of SL in the sense defined above. In this case, the reaction function defined by (21) is positively sloped. Alternatively, if  $|\varepsilon_{SLt}| < |\varepsilon_{NLt}|$ , the opposite is true. That is, greater delay increases the proportion of NL in the population. In this case, the reaction function defined by (21) is negatively sloped.

The nature of the equilibria that emerge from this process clearly depends on the assumptions we make regarding the slopes of the reaction curves. Figures 2 and 3 show the possible cases when  $t^*(\theta)$  is negatively sloped.<sup>16</sup> In Figure 2,  $\theta^*(t)$  is positively sloped, so a unique equilibrium exists, whereas in Figure 3,  $\theta^*(t)$  is negatively sloped, so multiple equilibria are possible. In the case illustrated, there are three equilibria, two unstable (A and C) and one stable (B). In contrast, if  $t^*(\theta)$  is positively sloped, corresponding equilibrium configurations exist.

Now that we have characterized the equilibrium of the lawmaking process, we turn to an evaluation of its welfare properties. For purposes of the analysis, we focus on the equilibria shown in Figures 2 and 3.

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<sup>15</sup> Specifically,  $\varepsilon_{jt} = t[\partial(p_j^*T_j)/\partial t]/(p_j^*T_j)$ .

<sup>16</sup> In both cases, we assume that equilibria exist.

#### 4. Welfare Analysis

Social welfare in the current model consists of minimizing overall costs, including the costs associated with accidents (care plus victim damages) and litigation costs. We initially consider the case where there is no trial delay—that is, all cases that do not settle go to trial immediately. Thus, the only litigation costs are trial costs.

In this case, social costs under rule  $j$  ( $j=SL, NL$ ) are given by

$$SC_j = x_j^* + p_j^*E(L) + p_j^*T_j(C_p + C_d). \quad (24)$$

Strict liability is therefore more efficient than no liability if  $SC_{SL} < SC_{NL}$ , or if

$$x_{SL}^* - x_{NL}^* < (p_{NL}^* - p_{SL}^*)E(L) + (p_{NL}^*T_{NL} - p_{SL}^*T_{SL})(C_p + C_d). \quad (25)$$

We know from the above accident model that  $x_{SL}^* < x_{NL}^*$  and  $p_{NL}^* > p_{SL}^*$ , or that SL results in greater injurer care and hence a lower accident rate. Thus, the left-hand side and the first term on the right-hand side of (25) are both positive. Together, the relationship between these two terms constitutes the standard Hand test for determining whether care is efficient. Based on these factors alone, we would conclude that SL is the more efficient rule due to its superior incentive effects.<sup>17</sup>

The final term on the right-hand side of (25) reflects the impact of litigation costs on the efficiency of the law. It may be positive or negative, depending on which rule results in more trials. It is positive if NL results in more trials, thus reinforcing the efficiency of SL. In contrast, it is negative if SL results in more trials, thus counteracting, and possibly overwhelming the efficiency of SL. Thus, when litigation is costly, it may

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<sup>17</sup> Since injurers take less than efficient care under both SL and NL, the rule that induces more care (SL) is closer to the efficient outcome.

or may not be socially desirable to use the liability system to induce injurers to take care.<sup>18</sup>

In terms of the evolution of law, the litigation cost term in (25) is crucial because it provides an explicit mechanism linking the efficiency of the law and the equilibrium distribution of laws as discussed above. For example, if this term is positive, NL results in more trials, which, in the absence of judicial bias, implies that SL will be the dominant rule in the steady state equilibrium (i.e.,  $\theta > 1/2$  in (22)). Conversely, if this term is negative, SL results in more trials, which implies that NL will be the dominant rule (i.e.,  $\theta < 1/2$ ). The selection effect therefore works in the right direction for efficiency in this model—that is, it works in the direction of favoring the efficient law.<sup>19</sup> It is important to note, however, that the alignment is not perfect. In particular, it is possible that the selection term will favor NL even if (25) indicates that SL is efficient, and vice versa, though these outcomes seem unlikely. Nor will selection generally be able to completely eliminate the less efficient rule, unless the judiciary is completely biased toward the efficient rule. At the same time, a judiciary that is biased against the efficient rule can drive the law away from efficiency in spite of a favorable selection effect (Gennaioli and Shleifer, 2007a,b).

Now let us re-introduce trial delay. We first need to ask whether greater delay raises or lowers social costs. Taking the derivative of (24) with respect to  $t$  yields

$$\frac{\partial SC_j^*}{\partial t} = \{1 + p' [E(L) + T_j(C_p + C_d + k(t))]\} \left( \frac{\partial x_j^*}{\partial t} \right) +$$

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<sup>18</sup> This point was first made by Shavell (1982, 1997, 1999). Also see Menell (1983), Kaplow (1986), and Rose-Ackerman and Geistfeld (1987).

<sup>19</sup> The link between the selection effect and the efficiency of the law described here is somewhat different from that identified by Rubin and Priest. Here, as noted, the more litigated rule tends to be less efficient because it results in higher litigation costs, whereas in Rubin-Priest, the less efficient rule imposes greater accident costs on parties, thus leading them to file more suits.

$$p_j^*(C_p + C_d + k(t))\left(\frac{\partial T_j}{\partial t}\right) + p_j^*T_jk', \quad j=SL,NL. \quad (26)$$

Now use (9) and the definition of  $A_j^*$  to substitute into the first line to obtain

$$\frac{\partial SC_j^*}{\partial t} = \left[ E(L) - \int_{\bar{L}_j^*}^{\bar{L}} w_j L dF(L) - (1 - T_j)S^* + T_j(C_p + k(t)) \right] \left( \frac{\partial p_j^*}{\partial t} \right) + p_j^*(C_p + C_d + k(t))\left(\frac{\partial T_j}{\partial t}\right) + p_j^*T_jk'. \quad (27)$$

The first line of (27) reflects the impact of delay on the defendant's care, and hence on the number of accident cases. Since  $\partial p_j^*/\partial t > 0$  by (11) (i.e., greater delay increases the number of accidents), the sign of this term is the sign of the term in brackets, which equals the difference between social costs and the defendant's private costs in the event of an accident. The first three terms in brackets represent the plaintiff's actual losses minus the losses the defendant expects to pay at trial or in a settlement. (Recall that for the uniform distribution,  $S^*=C_d$ ). This is probably positive given  $w_j < 1$ , though we cannot sign it with certainty because the defendant pays  $S^*$  to all plaintiffs who settle, which may overcompensate those with very low  $L$ . The final term in brackets is clearly positive as it represents the plaintiff's litigation costs at trial, which the defendant ignores. Overall, it is reasonable to assume that this first term is positive, meaning that the threat of liability underdeters defendants.

The second line of (26) contains two terms, the first of which is negative and the second of which is positive. The first term represents the savings in trial costs resulting from the reduced demand for trials as delay increases, while the second term reflects the increasing cost of delay to plaintiffs. Taken together, the preceding effects show that an

increase in trial delay may raise or lower social welfare.<sup>20</sup> The more plausible outcome, however, would seem to be that delay lowers welfare by diluting injurer incentives and raising waiting costs.<sup>21</sup> We will proceed based on this supposition.

Now let us return to the equilibrium as depicted in Figures 2 and 3. Recall first that the slope of the reaction function  $t^*(\theta)$  is determined by the selection effect according to (18). Thus, in light of the above discussion regarding the link between selection and efficiency,  $t^*(\theta)$  will tend to be negatively sloped when SL is the efficient rule, and positively sloped when NL is the efficient rule. In other words, it “tilts” in the direction of the efficient rule. Let us assume, for purposes of illustration, that SL is the efficient rule based on (25), and that  $t^*(\theta)$  is therefore negatively sloped, as illustrated in Figures 2 and 3. To understand this intuitively, note that the supply and demand for trials must be equal along this reaction function. Thus, a longer trial delay must be associated with an increasing demand for trials, which, holding the supply of trials fixed, means that the fraction of NL laws must be increasing. As a result,  $\theta$  must be falling in  $t$  which, by hypothesis, drives the law away from efficiency (i.e., toward lower  $\theta$ ).

Now consider the reaction function that defines  $\theta$  as function of  $t$  based on the steady state equilibrium condition (21). We argued above that this may be positively or negatively sloped, depending on how the demand for trials under each of the two rules responds to delay. Figures 2 and 3 show the two possible cases. In Figure 2 there is a unique equilibrium, whereas in Figure 3, there are multiple equilibria, two unstable (A and C) and one stable (B). (Note that stability requires the reaction function  $\theta^*(t)$  to cut  $t^*(\theta)$  from below.)

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<sup>20</sup> This conclusion is consistent with Gravelle (1990).

<sup>21</sup> Of course, it is possible that there is an optimal delay that just balances the social gain from lower trial costs against the loss from reduced incentives and higher waiting costs.

### 5.1. Comparative Statics

In order to compare these two equilibrium configurations in terms of their impact on social welfare, we conduct two comparative static exercises. First, we consider an increase in the supply of trials,  $K$ , and second, we consider an increase in the fraction of pro-plaintiff (PP) judges (i.e., a decrease in  $\delta$ ). As for the increase in  $K$ , note from Figure 1 and equation (17) that it will cause the equilibrium delay to decrease, all else equal. That is, the reaction function  $t^*(\theta)$  shifts down. This is true because, as the supply of trials increases, delay decreases for all  $\theta$ . In Figure 2, this causes both the equilibrium delay,  $t^*$ , and the proportion of SL,  $\theta^*$ , to decrease along the reaction function  $\theta^*(t)$ . Since we have conjectured that SL is the efficient rule and that delay raises social costs, this change has an ambiguous effect on welfare. While the reduction in delay lowers costs, the reduction in the proportion of SL in the population increases costs. The explanation for the latter effect is that the decline in delay raises the demand for trials faster for SL than for NL (given  $|\varepsilon_{SLt}| > |\varepsilon_{NLt}|$  in this case), thereby causing a selection effect in favor of NL. Thus, selection works against efficiency.

The result is different in Figure 3. Focusing on the stable equilibrium B, observe that a downward shift in  $t^*(\theta)$  will cause a decrease in  $t^*$  but an increase in  $\theta^*$ . Thus, social costs unambiguously decline. In this case, the decrease in the equilibrium delay increases the demand for NL faster than for SL, thus causing a selection effect in favor of SL. In comparing these two cases, the crucial factor is the slope of the reaction function  $\theta^*(t)$ , which depends on the relative elasticities of demand for trials under the two rules. The more favorable case for welfare is when the demand for NL is more elastic, causing



$\theta^*(t)$  to be negatively sloped (as in Figure 3). Which case happens to be true, however, is ultimately an empirical question.

Consider next a parametric increase in the fraction of PP judges, which in this case is the fraction favoring the efficient rule. As noted, this is reflected by a *decrease* in  $\delta$ . Differentiating (21) shows that  $\partial\theta/\partial\delta < 0$ , which implies that a decrease in  $\delta$  will cause the reaction function  $\theta^*(t)$  to shift upward. That is, the steady state fraction of SL in the population increases for all  $t$ . The effect of this change in Figure 2 is a decrease in  $t^*$  and an increase in  $\theta^*$ . Thus, welfare increases unambiguously. The same result occurs for the stable equilibrium in Figure 3. Thus, regardless of the nature of the equilibrium, an increase in the proportion of judges favoring the efficient rule causes social costs to decline. The key factor here is the negative slope of  $t^*(\theta)$ , which, as noted above, establishes a negative relationship between the length of delay and the fraction of SL rules through the selection effect. Thus, as judges opt for SL with greater frequency, the demand for trials falls, thereby lowering the equilibrium delay. As a result, welfare is improved. Unfortunately, there is no apparent way for policymakers to control  $\delta$ .

## 5. Conclusion

This paper has combined an equilibrium model of the supply and demand for trials with a model of the lawmaking process to assess the claim that the common law process has an inherent tendency to evolve toward efficiency. The contributions of the paper are, first, to derive the steady state equilibrium of the lawmaking process, and second, to identify the relative impacts of selective litigation, judicial bias, and precedent on the resulting distribution of legal rules. The main conclusion was that, while there

seems to be a tendency for the law to evolve in the direction of efficiency based entirely on the self-interested efforts of litigants, the effect is not strong and generally will not result in complete elimination of inefficient laws. Further, judicial bias can offset this effect, possibly leading the law away from efficiency. Finally, increasing the fixed supply of judicial resources, while probably reducing the length of court delay, does not assure an improvement in the steady state distribution of legal rules, and may actually worsen it. In contrast, an increase in the proportion of judges biased in favor of the efficient rule will likely reduce court delay and improve the efficiency of the law, but how one might implement such a policy is unclear.

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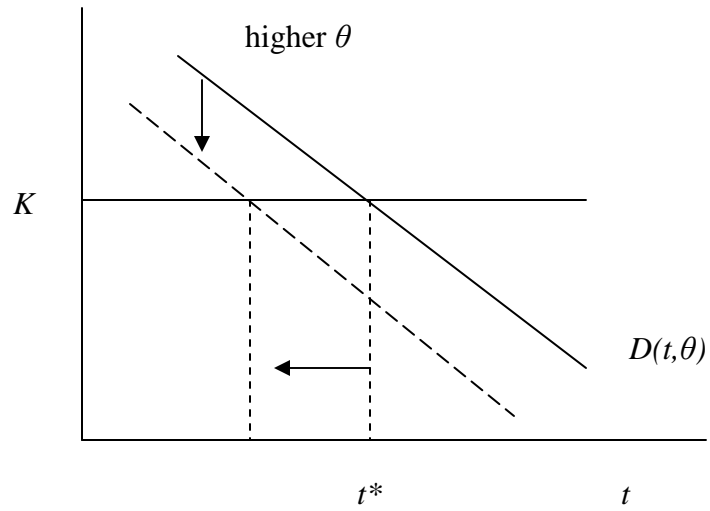
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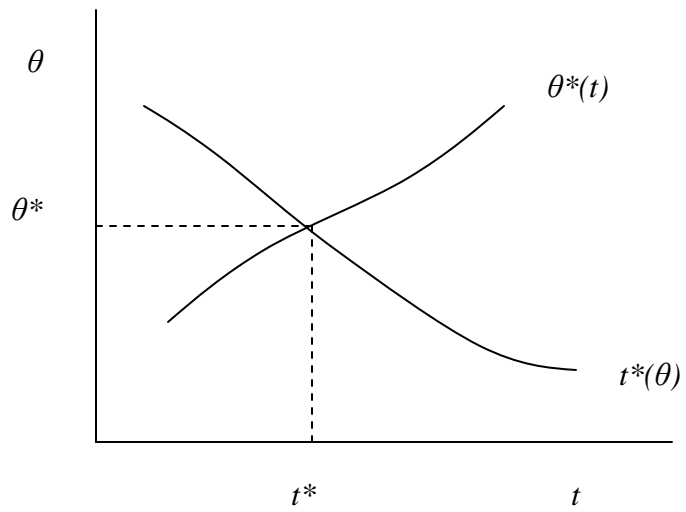
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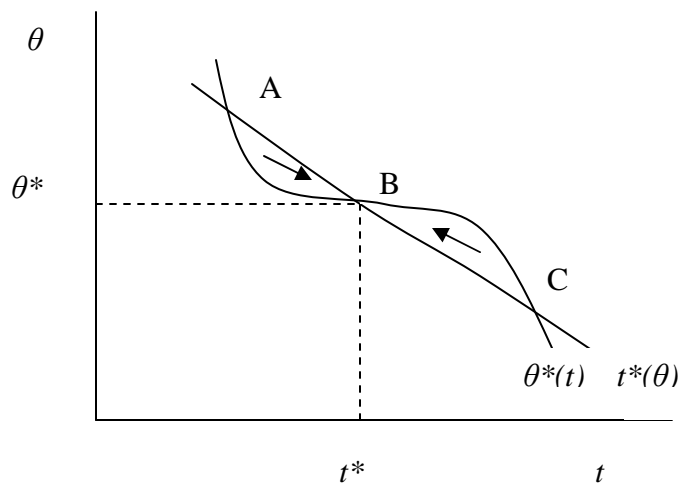
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**Figure 1.** Effect of an increase in the proportion of strict liability on the “market” for trials.



**Figure 2.** Case of a unique equilibrium.



**Figure 3.** Case of multiple equilibria.