LEGAL ERROR, LITIGATION, AND THE INCENTIVE TO OBEY THE LAW

A. Mitchell Polinsky
Steven Shavell

Discussion Paper No. 41

4/88

Program in Law and Economics
Harvard Law School
Cambridge, MA 02138

The Program in Law and Economics is supported by a grant from the John M. Olin Foundation.

LEGAL ERROR, LITIGATION, AND THE INCENTIVE TO OBEY THE LAW

A. Mitchell Polinsky
Steven Shavell

LEGAL ERROR, LITIGATION, AND THE INCENTIVE TO OBEY THE LAW

A. Mitchell Polinsky
Steven Shavell[*]

Abstract

This article studies the effects of legal errors on litigation and on the incentive to obey the law. It also examines how various policies can be used to lessen the problems caused by such errors. Type I errors (guilty defendants escape liability) reduce the incentive to sue and type II errors (innocent defendants incur liability) increase it. If a suit is brought, both types of error reduce compliance with the law. But the effect of legal errors on compliance is more complicated because errors also influence whether suits will be brought.

The occurrence of legal error seems inevitable since evidence brought before courts will often be incomplete or subject to misinterpretation, and since courts will sometimes misconstrue the law.[1] This article studies the effects of legal errors on the decision to bring a suit and on the incentive to obey the law. It also examines how various policies can be used to lessen problems caused by legal errors.

The first section of the article considers the influence of legal errors on litigation. It is observed that "type I" errors--in which truly guilty defendants escape liability--discourage suits since such errors reduce a plaintiff's probability of prevailing. Conversely, "type II" errors--in which truly innocent defendants are found liable--encourage suits since such errors raise the probability of success.[2] However, the effects of legal errors on the propensity to sue can be altered through such policies as fining losing plaintiffs or subsidizing suits.

The second section of the article is concerned with the incentive to obey the law.[3] Legal errors influence this incentive both by affecting the likelihood of suits and by affecting the outcomes of suits that are brought.

Assuming a suit will be brought, both types of error reduce an individual's incentive to obey the law. Clearly, the chance that a truly guilty defendant will escape liability (a type I error) will reduce the incentive to obey the law. And the chance that a truly innocent defendant will be found liable (a type II error) will reduce the incentive to obey the law because the reward for compliance with the law will be lowered.

In general, however, the effect of legal errors on the incentive to obey the law is more complicated because errors also influence whether a suit will be brought. If the chance of errors results in a tendency not to comply with the law, various policies--like penalizing losing defendants--can be employed to increase compliance.

The third section of the article relaxes the assumption made in the first two sections that litigants pay their own legal costs, and allows for a more general range of policy instruments.[4]

I. Legal Error and Litigation

Consider a risk neutral plaintiff who is contemplating suing a defendant.[5] If the plaintiff sues, he will bear his legal costs and, if he prevails, he will obtain a judgment.[6] Whether the plaintiff will prevail depends on the true guilt or innocence of the defendant and on the possibility of legal error. If the defendant is truly guilty, a court may mistakenly find him not liable; and if the defendant is truly innocent, the court may mistakenly find him liable. The plaintiff is assumed to know the probabilities of the two types of errors and to have formed a subjective probability estimate about the defendant's true innocence or guilt. Let

q_1 = probability of type I error, that a truly guilty defendant will be found innocent ($0 \leq q_1 \leq 1$);

q_2 = probability of type II error, that a truly innocent defendant will be found guilty ($0 \leq q_2 \leq 1$);

p = plaintiff's subjective probability that the defendant is truly guilty ($0 \leq p \leq 1$);

a = plaintiff's legal costs if he brings suit ($a \geq 0$);[7]

d = judgment plaintiff will obtain if he prevails ($d \geq 0$).

It is assumed that the probability of prevailing against a guilty defendant exceeds that against an innocent defendant; in other words, $1 - q_1$

$> q_2$, or, equivalently,

$$1 - q_1 - q_2 > 0. \tag{1}$$

The probability that the defendant will be found liable in court is

$$p(1-q_1) + (1-p)q_2. \tag{2}$$

Thus, the plaintiff's expected gain if he sues is

$$[p(1-q_1) + (1-p)q_2]d - a. \tag{3}$$

He will be assumed to sue if and only if (3) is positive. The plaintiff's expected gain, and therefore his incentive to sue, is decreasing in q_1 (the more likely a guilty defendant is to escape liability, the less likely the defendant is to be found liable), increasing in q_2 (the more likely an innocent defendant is to be found liable, the more likely the defendant is to be found liable), and increasing in p (the more likely the defendant is to be truly guilty, the more likely he is to be found liable).

Since the plaintiff's expected gain is increasing in p, there is some probability of the defendant's true guilt above which the plaintiff will bring suit and below which the plaintiff will not sue. This probability will be referred to as the <u>threshold probability of guilt</u> and will be denoted by $\hat{p}$. Setting (3) equal to zero and solving for p yields this probability:[8]

$$\hat{p} = \frac{a - q_2 d}{(1-q_1-q_2)d}. \tag{4}$$

For example, suppose that the plaintiff's legal costs are a = \$3,000, that the error probabilities are $q_1 = .1$ and $q_2 = .2$, and that the judgment the plaintiff would obtain if he prevails is d = \$10,000. Then $\hat{p}$ = (\$3,000-\$2,000)/\$7,000 = .144, so the plaintiff would bring a suit only when he believes that the defendant is truly guilty with a probability of at least .144.

The threshold probability $\hat{p}$ can be raised or lowered to any socially desired level p^*.[9] This can be accomplished in a variety of ways, including taxing or subsidizing plaintiffs' litigation costs; modifying the judgments that prevailing plaintiffs obtain; or imposing fines on losing plaintiffs.

If $\hat{p} < p^*$ (plaintiffs' incentives to sue are excessive), $\hat{p}$ can be raised to p^* with the use of, for example, a fine f on losing plaintiffs. With such a fine, a plaintiff's expected gain from suit equals the expression (3) less $[pq_1 + (1-p)(1-q_2)]f$. Setting the expected gain equal to zero and solving for p gives the threshold probability:

$$(5) \qquad \hat{p} = \frac{a - q_2d + (1-q_2)f}{(1-q_1-q_2)(d+f)}.$$

It is easily verified that $\hat{p}$ is increasing in f and that by an appropriate choice of f, $\hat{p}$ can be raised to p^*. In particular, substituting p^* for $\hat{p}$ in (5) and solving for f gives the formula for the optimal fine:

$$(6) \qquad f^* = \frac{[q_2 + p^*(1-q_1-q_2)](d-a)}{(1-q_2) - p^*(1-q_1-q_2)} - a.$$

To illustrate, suppose in the numerical example that it is socially optimal to raise the threshold probability of guilt from .144 to $p^* = .5$. Then, from (6), the fine that a plaintiff should pay if he loses is $f^* = [.55(\$7,000)/.45] - \$3,000 = \$5,556$.

On the other hand, if $\hat{p} > p^*$ (plaintiffs' incentives to sue are inadequate), $\hat{p}$ can be lowered, for instance, by subsidizing plaintiffs' litigation costs by an amount s. The expected gain from suit then becomes $[p(1-q_1) + (1-p)q_2]d - (a-s)$. Setting the expected gain equal to zero and solving for p gives the threshold probability; and then substituting p^* for this probability and solving for s gives the optimal subsidy:

(7) $s^* = (a - q_2 d) - p^*(1 - q_1 - q_2)d.$

Thus, if it is desirable in the numerical example to reduce the threshold probability to $p^* = .1$, the optimal subsidy of a plaintiff's litigation costs is (\$3,000-\$2,000) - .1(\$7,000) = \$300.

Formulas analogous to (6) and (7) can be developed in a straightforward way to compute the values of other policy instruments for raising or lowering the threshold probability to the desired level p^*.

II. Legal Error and the Incentive to Obey the Law

Now consider a risk neutral defendant who is deciding whether to obey a law. His decision will depend on the cost of obeying the law, on whether he will be sued (if he obeys the law or if he disobeys it), and on his litigation costs and expected payment given a suit. Let

c = cost of obeying the law ($c > 0$);

b = defendant's legal costs if he is sued ($b \geq 0$).

The plaintiff's subjective probability of the defendant's guilt is assumed to be lower if the defendant obeys the law than if he disobeys it. Let

p_i = plaintiff's subjective probability that the defendant is guilty if the defendant is truly innocent;

p_g = plaintiff's subjective probability that the defendant is guilty if the defendant is truly guilty,

where $p_i < p_g$.[10]

The plaintiff will sue if and only if his subjective probability, p_i or p_g, exceeds the threshold probability, $\hat{p}$, as explained in the previous section. The defendant is assumed to know whether he would be sued if he obeys the law and if he does not.[11] Therefore, to understand the defendant's decision, it is necessary to consider three cases.

(a) <u>Defendant will not be sued whether or not he obeys the law</u>: Given the definition of $\hat{p}$, this case arises when $\hat{p} \geq p_g > p_i$. The defendant obviously will not obey the law since obeying the law would cost him c but would not benefit him since he will not be sued.

(b) <u>Defendant will be sued only if he disobeys the law</u>: This case occurs when $p_g > \hat{p} \geq p_i$. If the defendant obeys the law his cost will be c, whereas if he does not obey the law he will be sued and his expected liability and defense cost will be $(1-q_1)d + b$. Hence, he will obey the law if

$$(8) \qquad (1-q_1)d + b \;\geq\; c.$$

Here, the higher the probability of a type I error, the lower the defendant's expected liability if he disobeys the law, and thus the lower the incentive to obey the law.

(c) <u>Defendant will be sued whether or not he disobeys the law</u>: This case arises when $p_g > p_i > \hat{p}$. If the defendant obeys the law, his total cost will be $c + q_2d + b$, while if he disobeys the law his total cost will be $(1-q_1)d + b$. Therefore, he will obey the law if

$$(9) \qquad (1-q_1)d + b \;\geq\; c + q_2d + b,$$

or, equivalently, if

$$(10) \qquad (1-q_1-q_2)d \;\geq\; c.$$

It is evident from (10) that both type I and type II errors lower the incentive to obey the law. A type I error lowers the incentive because, as in the previous case, it reduces the defendant's expected liability if he disobeys the law. And a type II error lowers the incentive to obey the law because it means that the defendant will face liability even if he obeys the law, thereby reducing the benefit to him of obeying the law.[12]

Note also that the incentive to obey the law in case (c) is less than in case (b); the left-hand side of (10) is less than the left-hand side of (8). The reasons are that, in case (c), type II errors dull incentives and the legal costs of suit are not avoided by obeying the law.

The defendant's decision whether to obey the law can be illustrated by the numerical example from the previous section. In that example, the error probabilities were $q_1 = .1$ and $q_2 = .2$, and the threshold probability was $\hat{p} = .144$. Suppose also that the defendant's legal costs are b = \$2,000. If p_g and p_i are both less than .144, case (a) applies and the defendant will disobey the law. If $p_g > .144 > p_i$ (say $p_g = .9$ and $p_i = .1$), case (b) applies and the defendant will obey the law unless the cost of doing so exceeds \$11,000 (see (8)). Finally, if p_g and p_i both exceed .144 (say $p_g = .9$ and $p_i = .3$), case (c) applies and the defendant will obey the law unless the cost of doing so exceeds \$7,000 (see (10)). Therefore, if the cost of obeying the law is between \$7,000 and \$11,000, the defendant will obey the law in case (b) but not in case (c).

Thus far, the effects of legal errors have been discussed within one or another of the three possible cases. It is apparent, however, that the magnitudes of the errors also determine which of the cases will be applicable. This complicates the description of the effects of legal errors on the incentive to obey the law.

Suppose, for example, that the values of the error probabilities initially are such that the threshold probability, $\hat{p}$, is less than both p_g and p_i, so that case (c) applies. Now consider the effect of an increase in the probability of a type I error, q_1, holding the probability of a type II error, q_2, constant. As q_1 rises, $\hat{p}$ rises (see (4)). As long as $\hat{p}$ remains below p_i, so that case (c) continues to apply, the incentive to obey the law declines (see (10)). But when the increase in q_1 becomes sufficient to make $\hat{p}$ exceed p_i, case (b) begins to apply. When this occurs, there is a discontinuous increase in the incentive to obey the law (the cost of disobeying rises from $(1-q_1-q_2)d$ to $(1-q_1)d + b$). But then, within case (b), further increases in q_1 again reduce the incentive to obey the law. (The effect of changes in q_2 is analogous to those in q_1.)

If the law would not be obeyed because of legal errors, incentives to obey the law can be increased. First, the threshold probability can be altered, as in the previous section, to ensure that plaintiffs will bring suits when defendants disobey the law (i.e., to ensure that either case (b) or case (c) applies).[13] Second, given plaintiffs' propensity to sue, defendants can be induced to obey the law by, for example, making them pay sufficiently high fines to the state if they lose (in addition to the judgments they pay to plaintiffs).

Note that separating what defendants pay from what plaintiffs receive allows the defendants' incentives to obey the law to be altered independently of the plaintiffs' decisions to sue. Thus, for example, if losing defendants are made to pay fines to the state, plaintiffs' incentives to sue will not be changed; similarly, if losing plaintiffs are made to pay fines to the state, defendants' incentives to obey the law will not be affected.[14]

III. A More General Formulation of the Model

This section reformulates the model of legal error in order to consider different systems for the allocation of legal costs and a broader range of policies. In the reformulation, the amounts that the plaintiff and the defendant pay or obtain are expressed as final amounts rather than as sums and differences of their components (such as the judgment, legal costs, and fines). Except as noted, the same notation and assumptions will be used as in the previous sections.

Consider the plaintiff first and let

x = final amount plaintiff will obtain if he wins;

y = final amount plaintiff will pay if he loses.

The amount x is the plaintiff's judgment plus any subsidy or other benefit that he obtains minus any legal or other costs that he bears. The amount y (and the amounts x' and y' defined below) are interpreted similarly.

The plaintiff's expected gain from bringing suit is

$$p[(1-q_1)x-q_1y] + (1-p)[q_2x-(1-q_2)y]. \tag{11}$$

Setting (11) equal to zero and solving for p gives the threshold probability of guilt:[15]

$$\hat{p} = \frac{(1-q_2)y - q_2x}{(1-q_1-q_2)(x+y)}. \tag{12}$$

This probability can be raised or lowered to the socially desired level p^* by an appropriate choice of x and y. In particular, setting the right-hand side of (12) equal to p^* and solving for x gives the optimal x as a function of y:

$$x^* = \left[\frac{(1-q_2) - (1-q_1-q_2)p^*}{q_2 + (1-q_1-q_2)p^*}\right] y. \tag{13}$$

Alternatively, solving for y gives:

$$y^* = \left[\frac{q_2 + (1-q_1-q_2)p^*}{(1-q_2) - (1-q_1-q_2)p^*}\right] x. \tag{14}$$

Now consider the defendant and let

x' = final amount defendant will pay if he loses;

y' = final amount defendant will pay if he wins.

Given p_i, p_g, and the threshold probability of guilt determined by (12), one of the three cases considered in Section II will apply. If the defendant will not be sued whether or not he obeys the law (case (a)), the defendant obviously will not obey the law, as before. If the defendant will be sued only if he disobeys the law (case (b)), he will now obey the law if

$$(1-q_1)x' + q_1 y' \geq c. \tag{15}$$

And if the defendant will be sued whether or not he disobeys the law (case (c)), he will obey the law if

$$(1-q_1-q_2)(x'-y') \geq c. \tag{16}$$

It is always possible to choose x and y to alter the threshold probability so that either case (b) or case (c) applies, and then to choose x' and y' so that the defendant will obey the law.[16]

In this reformulated model, observe that any system for allocating legal costs corresponds to a particular set of x, y, x', and y'. The system assumed in Sections I and II was the "American" system, under which each side pays its own legal costs. Thus, $x = d - a$, $y = a$, $x' = d + b$, and $y' = b$. Under the "British" system the losing side pays both sides' costs, so that $x = d$, $y = a + b$, $x' = d + a + b$, and $y' = 0$.

Similarly, any regime involving fines or subsidies can easily be described in terms of x, y, x', and y'. For example, a fine f imposed on losing defendants and paid to the state would increase y' by f but not affect x, x', or y. And a subsidy s of plaintiffs' legal costs under, say, the American system, would reduce x and y by s, but not affect x' or y'.

Thus, the propensity to sue and the incentive to obey the law under any system for allocating legal costs and under any fine or subsidy scheme can be determined using the formulas in this section.

IV. Concluding Remarks

To be able to apply the policies discussed in this article, courts (or legislatures) would need to have information about the probabilities of legal errors. For example, to determine the fine necessary to discourage plaintiffs from suing defendants likely to be innocent, courts would need to know the chances of both type I and type II errors. Although the courts' ability to estimate the likelihood of these errors undoubtedly is limited, the framework presented here does provide a basis for systematically using whatever information can be obtained to correct the problems created by legal errors.

It should also be noted that the analysis of the policies considered in this article treated the probability of legal errors as given. There are, of course, many ways to reduce the probability of errors directly (e.g., through procedural rules governing the admissibility of evidence). However, even after all reasonable efforts to reduce legal errors have been undertaken, some errors will remain, and the analysis here will be relevant.

Finally, it is worth observing that much of the analysis here is applicable to the criminal context. A prosecutor's decision whether to initiate a criminal action, as well as an individual's decision whether to commit a crime, depend on type I and type II errors and can be influenced by various policies.

Notes

[*] Stanford University and Harvard University, respectively. Both authors also are affiliated with the National Bureau of Economic Research. Polinsky's research was supported by the National Science Foundation (grant SES-8409858) and by the Stanford Legal Research Fund, made possible by a bequest from the Estate of Ira S. Lillick and by gifts from Roderick E. and Carla A. Hills and other friends of the Stanford Law School. Shavell's research was supported by the National Science Foundation (grant SES-8420226). Helpful comments on an earlier draft were received from Robert Cooter, Richard Craswell, Jeffrey Perloff, Daniel Rubinfeld, and Gordon Tullock.

[1] The few studies of legal errors that have been undertaken suggest that such errors are not inconsequential. For example, Tullock (1980, pp. 31-33) estimates the probability of a legal error generally to be about one-eighth. And Bedau and Radelet (1987, pp. 72-73) review evidence which indicates that of approximately 7,000 lawful executions carried out in the United States in this century, at least 23, or at least 1/3%, have been of innocent individuals.

[2] Although the focus of this article is on civil rather than criminal litigation, the terms "guilt" and "innocence" are used for convenience.

[3] The term "obey the law" is meant to be interpreted broadly. For example, it can refer to adhering to a negligence standard or fulfilling the requirements of a contract.

[4] Although several authors have discussed various aspects of what is studied in this article, no one has analyzed within a formal model how type I and type II errors affect the decision to sue and the incentive to obey the

law. For example, Png's (1986) analysis of the effects of legal errors on compliance with the law assumes that defendants are always sued. See also Posner (1973, pp. 402-408 & 452-455), Wittman (1974, pp. 249-251), Ehrlich and Posner (1974, pp. 262-264), and Salop and White (1986, pp. 1022-1024 & 1053-1055).

[5] The terms "plaintiff" and "defendant" are used even though there may not in fact be a suit.

[6] For simplicity, it is assumed that all suits result in trials. Taking account of settlements would not affect the character of the results.

[7] Because the concern in this section is with the plaintiff's decision to sue, consideration of the defendant's legal costs is deferred.

[8] The right-hand side of (4) will be a probability if two conditions hold. First, $a - q_2 d \geq 0$ (suing a defendant who is known to be innocent would not be worthwhile). Second, $(1-q_1-q_2)d > a - q_2 d$, or $(1-q_1)d > a$ (suing a defendant who is known to be guilty would be worthwhile). However, if $a - q_2 d < 0$, $\hat{p}$ will be defined to be 0 since a suit will always be brought. And if $(1-q_1)d \leq a$, $\hat{p}$ will be defined to be 1 since a suit will never be brought.

[9] The probability p* may be regarded as the solution to the second-best problem when courts (or other social authorities) cannot directly command that defendants obey the law but can control the circumstances--in terms of probabilities of guilt--under which plaintiffs sue.

[10] In general, the plaintiff's beliefs about a particular defendant's guilt will be determined by what he observes about that defendant and by what he knows about the equilibrium behavior of all defendants. The model used in the text can be justified along the following lines. Suppose there are three

types of individuals: those who send a "bad" signal regardless of whether they obey the law; those who send a "good" signal regardless of whether they obey the law; and those who send a good signal if they obey the law and a bad signal if they disobey it. Let the fraction of each group be θ_1, θ_2, and θ_3, respectively. In equilibrium, the first and second groups will disobey the law (since their behavior will not affect their signal); and suppose that the third group obeys the law. Then if the plaintiff observes a good signal, the probability that the defendant is truly guilty is $\theta_2/(\theta_2 + \theta_3)$; and if the plaintiff observes a bad signal, the probability that the defendant is truly guilty is 1. Therefore, for the first group, $p_i = p_g = 1$; for the second group, $p_i = p_g = \theta_2/(\theta_2 + \theta_3)$; and for the third group, $p_i = \theta_2/(\theta_2 + \theta_3)$ and $p_g = 1$. Since the focus of this section is on defendants' behavior given p_i and p_g, it is not necessary for us to develop how p_i and p_g are determined in equilibrium.

[11] In a more general model, a defendant would not know with certainty whether he will be sued. But it will be clear that altering the assumption made here would not affect the nature of our results.

[12] The point that type II errors as well as type I errors reduce the incentive to obey the law was first noted by Ehrlich and Posner (1974, pp. 262-264) and Wittman (1974, pp. 249-251); it did not receive much attention until Png (1986). However, if defendants can take excessive care (a possibility excluded from our analysis), they might do so in order to reduce the risk of being found liable by mistake. See, for example, Craswell and Calfee (1986).

[13] Presumably case (b) would be preferred to case (c) since litigation costs would be lower.

[14] Analogously, having plaintiffs or defendants collect subsidies from the state allows incentives to sue and incentives to obey the law to be altered independently.

[15] It is assumed that x + y is positive. Also, as in note 8 above, $\hat{p}$ is defined to be 0 if the right-hand side of (12) is negative and to be 1 if the right-hand side of (12) exceeds 1.

[16] Given p_i and p_g, x and y can be chosen so that the threshold probability is between p_i and p_g--case (b)--or less than p_i--case (c). Then x' and y' can be chosen (independently of x and y) to induce the defendant to obey the law since (15) or (16), which ever is relevant, can easily be satisfied.

References

Bedau, Hugo Adam, and Michael L. Radelet, "Miscarriages of Justice in Potentially Capital Cases," Stanford Law Review, Vol. 40, No. 1 (November 1987), pp. 21-179.

Craswell, Richard, and John E. Calfee, "Deterrence and Uncertain Legal Standards," Journal of Law, Economics, and Organization, Vol. 2, No. 2 (Fall 1986), pp. 279-303.

Ehrlich, Isaac, and Richard A. Posner, "An Economic Analysis of Legal Rulemaking," Journal of Legal Studies, Vol. 3, No. 1 (January 1974), pp. 257-286.

Png, I. P. L., "Optimal Subsidies and Damages in the Presence of Judicial Error," International Review of Law and Economics, Vol. 6, No. 1 (June 1986), pp. 101-105.

Posner, Richard A., "An Economic Approach to Legal Procedure and Judicial Administration," Journal of Legal Studies, Vol. 2, No. 2 (June 1973), pp. 399-458.

Salop, Steven C., and Lawrence J. White, "Economic Analysis of Private Antitrust Litigation," Georgetown Law Journal, Vol. 74, No. 4 (April 1986), pp. 1001-1064.

Tullock, Gordon, Trials on Trial: The Pure Theory of Legal Procedure (New York: Columbia University Press, 1980).

Wittman, Donald, "Two Views of Procedure," Journal of Legal Studies, Vol. 3, No. 1 (January 1974), pp. 249-256.