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Legal versus Normative Incentives under Judicial Error

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Abstract:
We analyze the complementarity between legal incentives (the threat of being held liable for damages) and normatives incentives (the fear of social disapproval or stigma) in situations where instances of misbehavior are not perfectly observable. There may be multiple equilibria within a given legal regime, as well as multiple socio-legal equilibria. In particular, there are high stigma-high evidentiary standard regimes versus low stigma-low standard ones. We argue that this may explain some of the differences between common law and civil law regarding the notions of *fault* or *negligence*. Our analysis also provides an explanation for trends currently observed in civil-law systems, in particular the weakening of evidentiary requirements in tort cases.

1 Introduction

Social norms as guide to behavior may both be substitutes and complements for law. Kaplow and Shavell (2002) observe that there is a strong norm to avoid injuring others and to compensate them for injuries one does cause. A similar observation was made by Adam Smith in his *Theory of Moral Sentiments*. An individual found to have caused harm due to his carelessness faces not only a legal sanction—the damages he must pay the victim—but also social disapproval or stigma, which presumably is by itself a source of disutility. In preventing accidental harm, social behavioral norms and the fear of disapproval if one is shown to have misbehaved may therefore provide incentives to exert care, in addition to legal incentives. Compliance with a social behavioral norm seems to be relevant in litigation involving medical malpracice, professional liability or breach of contract.

We analyze the complementarity between legal incentives (the threat of being held liable for damages) and normative incentives (the fear of social disapproval or stigma) in situations where instances of misbehavior are not perfectly observable. Specifically, we consider the following set-up:

1. Carelessness causing harm is not directly observable, but putative victims may file civil actions on the basis of imperfectly informative evidence. Given such evidence, courts rule whether a defendant was careless, i.e., at fault or negligent.

2. A judgment of negligence implies the payment of damages to the plaintiff. Since such judgments are made public, they also confer additional disutility due to disapproval or stigma, given the social norms of behavior.

3. The stigma attached to rulings of fault depend on the actual incidence of misbehavior in the population and on the courts' evidentiary standard for establishing fault, i.e., on the degree of certainty they require in the presence of evidentiary uncertainty.

4. The evidentiary standard is itself endogenous. It reflects the trade-off faced by courts between the risk of error in judging the case at hand and the effect of court decisions on future compliance.

We show that in such a set-up there may be multiple equilibria within a given legal regime, as well as multiple socio-legal equilibria. In particular, there may be high stigma-high evidentiary standard regimes versus low stigma-low standard ones. Moreover, we show that small societal changes in the relevance of stigma may trigger important adaptative changes in the legal regime. These are shown to reinforce the exogenous change in the significance of stigma, through a form of socio-legal multiplier. We argue that this may explain some of the differences between common law and civil law regimes regarding the notions of *fault* or *negligence.* We also argue that our analysis may provide an explanation for trends currently observed in civil law systems, in particular the weakening of standard of proof requirements in tort cases.

If there is a stigma associated with an adverse court judgement, the extent of the stigma presumably depends on the weight of evidence required by courts. Indeed, in a system where the defendant can be found negligent on the basis of relatively weak evidence, the stigma should be smaller than if very strong evidence is needed because the risk of mistakenly condemning the innocent is greater.

For civil litigation, it is well known that common law regimes require much weaker evidence for finding fault than civil-law countries. In England and the United States, the standard of proof is probabilistic: a plaintiff need ordinarily prove his claim only by a *preponderance of the evidence.* By contrast, as noted by Clermont and Sherwin (2002), civil-law regimes require a higher degree of proof, although "the judge may and must always content himself with a degree of certainty that is appropriate for practical life" (Kaplan and Schaefer, 1958). The stigma associated with an adverse judgment should therefore be smaller in common law system.

As the fear of stigma generates incentives, this raises the issue whether

common law regimes induce lower compliance? We show that this does not follow because evidentiary standards also have incentives effects. Indeed, we show that similar compliance levels can be reached through different means, i.e. low evidentiary standard - low stigma versus high evidentiary standard - high stigma.

One may ask why evidentiary standards differ between legal regimes. On the one hand, it may be that different legal systems seek different objectives. For instance they trade-off differently considerations of deterrence and of judicial error. On the other hand, it may also be that legal systems share identical objectives but that the societies in which they operate are very different. Evidentiary standards reflect the trade-offs faced by the legal system. The terms of this trade-off may be very different between societies, yielding different evidentiary standards.

In this paper, we explore a variant of the second explanation. We show that legal systems may in fact diverge substantially even though societies differ only slightly. The intuition is that societal differences have self-reinforcing effects. Small societal shocks that reduce the importance of stigmas (e.g., greater individualism or greater anonymity) tend to reduce compliance. However, lower overall compliance influences the court's priors about the defendant's behavior. Moreover, lower stigma means that the penalty erroneously imposed on the innocent defendant is smaller. The consequence is that, for a given set of evidence, courts will be less reluctant to declare a defendant negligent. In turn, this stabilizes compliance but tends to lower further the stigma associated with an adverse judgement. Altogether, adaptative changes in the legal system therefore have a stabilizing effect on compliance but a destabilizing effect on stigma.

The paper develops as follows. Section 2 discusses how our paper relates to the literature on stigma and social interactions. Section 3 presents the model. Section 4 derives the comparative statics when the legal regime is held fixed. In section 5, the legal regime is made endogenous, leading to the concepts of socio-legal equilibria and socio-legal multipliers. Section 6

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concludes. Proofs of propositions are in the appendix unless statements are obvious from the text.

2   Literature

The relation between legal rules and social norms has been addressed only recently in the law and economics literature. To quote McAdams and Rasmusen (2005), "Law seeks to regulate behavior when self-interest does not produce the correct results as measured by efficiency or fairness. If people behave well without regulation, law is superfluous and merely creates extra costs. And if law is not what actually determines human behavior, scholars debating it are wasting their time. Law becomes relevant when social norms or other forms of social control fail. For this reason, law matters primarily to the "bad man" of Oliver Wendell Holmes, Jr. (1897)... For the man who is not "bad" in this sense, however, there are other important influences on his behavior. Whether the influence is described as morality or norms, the law does not fully determine the behavior of the remainder of society that is not bad". The economic analysis of law should therefore be interested in the power of normative incentives, whether these take the form of guilt, pride, esteem or disapproval.

Cooter and Porat (2001) analyzed the interaction between social norms and legal decisions from a social cost perspective. They consider a liability case where, say, the defendant's negligence caused a loss of 10000 euros to the plaintiff without harming anyone else. Suppose the court holds the defendant liable for 10000 euros but that, upon learning of the court's decision, citizens boycott the defendant's business and cause a loss of 2500 euros. Courts largely ignore this kind of interaction between their decisions and nonlegal sanctions. Cooter and Porat remark that "the contrast between formal state law and informal social norms could help to explain the relative advantages or disadvantages of law and morality as a means of social control". They argue that courts should take nonlegal sanctions into account because deducing

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nonlegal sanctions (from damages awarded to victims) would contribute to the reduction of social costs by improving the incentives of both wrongdoers and potential victims[1].

Normative incentives through the fear of stigmas represent a special case. Stigmas refer to the external incentives due to the reluctance of individuals to interact with persons who breach social norms (Rasmusen, 1996). What is important for our purpose is that stigma frequently follows legal sanctions. This is obviously the case for criminal convictions, particularly in jurisdictions in which one's criminal record is made public. Indeed, some criminal law experts have suggested that the stigma effect of sentencing should be increased (Massaro, 1997). Shaming penalties — penalties whose effectiveness hinges largely on stigma — have recently become popular in many American jurisdictions. Klement and Harel (2006), however, point out some limitations to the usefulness of stigma as a tool in crime prevention. They argue that the extensive use of stigma as a substitute for traditional sanctions, e.g., in the context of shaming penalties, may undermine its deterrent effects. In their analysis, the effectiveness of stigma is inversely related to the rate of crime detection. As more crimes are detected, the stigma from a conviction decreases, implying a smaller deterrent effect.

The discussion about stigmas also bears a relation to the so-called expressive theory of law. According to this theory, laws have a norm-activation power in the sense that they affect behavior not only by shaping the material payoffs, but also by directly influencing people's motives (Cooter, 1998). As law expresses values, it can change individual beliefs and coordinate actions into new equilibria. Tyran and Feld (2006) and Galbiati and Vertova (2007) discuss experiments on the behavioral effects of legal rules defined as obligations backed by incentives. The results show that rules affect both beliefs about others' behavior and people's preference for cooperation.

Our paper is also related to the literature on social interactions, which

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[1]However, the amount of the appropriate deduction is unknown because there is little knolwledge of the extent of nonlegal sanctions.

constitute a particular form of externality. In this approach, the actions of a reference group directly affect an individual's preferences (Scheinkman, 2006). The reference group depends on the context and is typically an individual's family, neighbors, friends or peers. Social interactions are sometimes called non-market to emphasize that they are not regulated by the price mechanism. They seem particularly apt to solve a pervasive problem in the social sciences, namely the observation of large differences in outcomes in the absence of commensurate differences in fundamentals. Due to strategic complementarity (one's marginal utility of undertaking an action is increasing in the average action of one's peers), actions change not only because of the change in fundamentals, but also because of the change in the behavior of others, leading to a social multiplier effect.

As a result, there may be large variations in endogenous variables relative to the variation in fundamentals, which seems characteristic of phenomena as diverse as stock market crashes, religious differences, or differences in crime rates. Moreover, multiple equilibria can occur, i.e., different outcomes are consistent with the same fundamentals. For instance, Glaeser, Sacerdote and Scheinkman (1996) observe that crime rates across large American cities differ too much to be explained by the usual socioeconomic variables. They develop a model connecting the structure of social interactions among individuals with the variation of aggregate behavior across space, providing a framework for investigating the importance of social interactions. Our paper proposes to capture a similar phenomenon in the field of civil law. The intuition is that the interaction between legal regimes and stigma may yield different socio-legal equilibria.

Our paper also shares some features with Bénabou and Tirole (2006). In that paper, individuals are concerned with social esteem, based on how others view their true "type". Observable actions influence the beliefs of others and therefore play a social signaling role. In our set-up, social esteem depends on an individual's behavior, rather than his type, and actions are not directly observable. However, court judgments have a signaling role and

therefore affect social esteem.

3   The model

Individuals choose between two actions or types of behavior. The action n is the social norm while h is socially undesirable. In the present context, h refers to careless behavior imposing harm on others. Although carelessness is not legally a crime, it may constitute the basis for a civil suit if harm can be proved in court. In addition to the risk of legal sanction, carelessness is also met with social disapproval or stigma, which by itself is a source of disutility for the individual found to have behaved carelessly. Thus, n is both a social norm of behavior and the legal due care standard.

For simplicity, the occurrence of harm due to carelessness is non stochastic. An individual's behavior $j \in \{n, h\}$, equivalently the occurrence of harm, is not directly verifiable but it generates evidence that may be brought in court. Evidence about one's behavior is summarized by a signal x with cumulative distributions $F_j(x)$ and corresponding density functions $f_j(x)$.

ASSUMPTION 1: *The support of $f_h(x)$ and $f_n(x)$ is $[\underline{x}, \overline{x}]$, $f_h(x)/f_n(x)$ is strictly increasing over the support and $f_h(\overline{x})/f_n(\overline{x}) = \infty$.*

The condition that the densities have the same support means that evidence never perfectly reveals behavior or harm. The monotone likelihood ratio property (MLRP), with the convention that $f_h(x)/f_n(x)$ is strictly increasing, implies that large values of x represent "unfavorable" evidence as to whether behavior was appropriate. The assumption that the likelihood ratio tends to infinity at the upper bound of the support ensures an interior solution in the optimization problem of section 5. It also means that some realizations of the evidence may be very "convincing" that the defendant was indeed negligent (e.g., he may be infinitely more likely to have taken action h).

An individual believing he has suffered harm due to someone's carelessness may file suit and submit the evidence x. Courts use a threshold $\widehat{x}$ to

assess whether harm due to carelessness occurred. When presented with the evidence $x > \widehat{x}$, they rule that the defendant was negligent and caused harm, in which case he is held liable for damages. The threshold $\widehat{x}$ is the courts' evidentiary standard, i.e., the weight of evidence needed for a judgment against the defendant. A higher $\widehat{x}$ means a more demanding standard.

Because evidence is imperfect, there is a probability $F_h(\widehat{x})$ that an individual who has actually misbehaved will escape liability. Similarly, there is a probability $1 - F_n(\widehat{x})$ that an individual who has conformed to the social norm will nevertheless be sued and found to have misbehaved. For instance, the plaintiff may have suffered harm that is not due to the defendant's carelessness, but it is not always possible to identify such situations. Accordingly, an individual is sued and loses his case if the evidence satisfies $x > \widehat{x}$, he is not sued if $x \le \widehat{x}$ (alternatively, he could be sued but would win anyway).

Carelessness procures a private benefit b distributed according to the cumulative distribution $G(b)$. Equivalently, b is the opportunity cost of conforming to the social norm. We assume that b is less than the harm imposed by h, which means that h is always socially undesirable. Indeed, some individuals may be "altruistic" in the sense that they have a negative b: they derive utility from not causing harm to others (or would suffer guilt from harming others). An individual knows b before deciding between n and h. The disutility from being found liable includes the damages l paid to the successful plaintiff and the stigma s from social disapproval.

An individual with benefit b from misbehaving conforms to the behavioral norm if
$$b - (1 - F_h(\widehat{x}))\,(l + s) \le -\,(1 - F_n(\widehat{x}))\,(l + s),$$
that is, if
$$b \le (F_n(\widehat{x}) - F_h(\widehat{x}))\,(l + s), \tag{1}$$

The inequality states that the benefit from action h is less than the expected disutility due to the increase in the risk of an unfavorable court judgment.

The expression

$$\delta(\widehat{x}) \equiv F_n(\widehat{x}) - F_h(\widehat{x}), \tag{2}$$

which we refer to as *detection*, is the difference in the probability of being declared negligent when one undertakes h rather than n.[2] Detection is positive since MLRP implies $F_n(\widehat{x}) > F_h(\widehat{x})$ for any $\widehat{x} \in (\underline{x}, \overline{x})$. However, detection is also less than unity because evidence is imperfect.

Compliance is defined as the fraction of the population conforming to the social norm. Combining (1) and the distribution of the private benefit, compliance is

$$y = G\left[\delta(\widehat{x})(l + s)\right]. \tag{3}$$

For our purpose, the situations considered must be such that compliance, although suboptimal (i.e. $y < 1$), is not too small. This makes sense in the context of a social behavioral norm which most people are expected to conform to. We make this explicit through the following assumption:

ASSUMPTION 2: $G(0) > \frac{1}{2}$.

This condition is satisfied, irrespective of stigma and of legal sanction, if intrinsic motivations induce a majority of the population to comply, i.e., there is a majority of individuals with a negative benefit b.

With respect to suboptimality, observe that compliance is non decreasing in detection and in legal and normative sanctions. In the absence of stigma, undercompliance is consistent with compensatory damages because detection is imperfect. The stigma must not be large enough to compensate for imperfect detection. It may also be that legal damages are less than compensatory, as is often the case for nonpecuniary harm, thus aggravating suboptimality. In any case, detection and legal or normative damages are assumed to be such that (3) is always less than unity.

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[2]To emphasize, "detection" refers here to the probability of being found negligent as seen by the individual who chooses between the actions n and h.
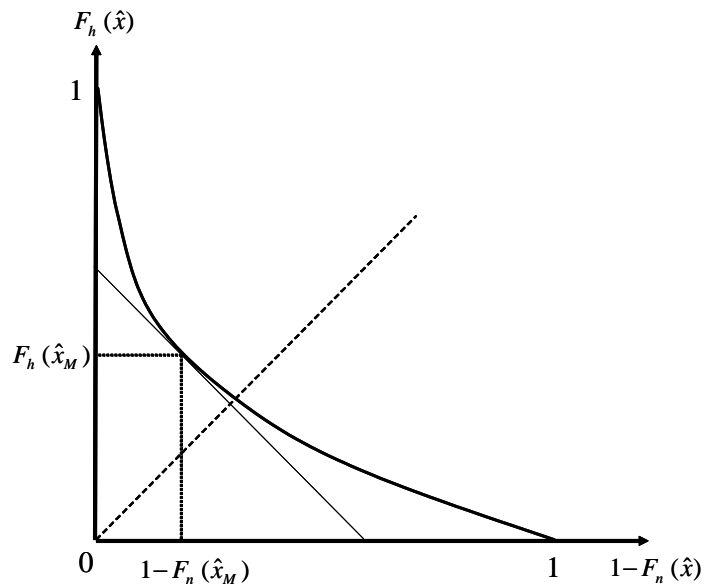
Figure 1: Judicial errrors

Judicial errors

Penalizing the "innocent" will be referred to as the type I error, not penalizing the "culpable" as the type II. The probability of a type I error is $1 - F_n(\widehat{x})$, that of a type II is $F_h(\widehat{x})$. There is obviously a trade-off between the two: a higher evidentiary standard (a larger $\widehat{x}$) increases the type II error but reduces the type I. The convex curve in figure 1 describes this relationship. The marginal rate of substitution between type II and type I error is

$$-\frac{dF_h(\widehat{x})}{d(1 - F_n(\widehat{x}))} = \frac{f_h(\widehat{x})}{f_n(\widehat{x})},$$

the likelihood ratio of h versus n at the threshold $\widehat{x}$. By MLRP, The likelihood ratio increases with $\widehat{x}$. Hence it is larger as the type II error gets larger, implying that the curve in figure 1 is convex with respect to the origin.

Both errors are equal when the curve cuts the forty-five degree line. Above this line, evidentiary standards are such that the type I error is smaller than

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the type II. What critical likelihood ratios $\frac{f_h(\widehat{x})}{f_n(\widehat{x})}$ do such standards require? We assume the following:

ASSUMPTION 3: *If* $\frac{f_h(\widehat{x})}{f_n(\widehat{x})} \geq 1$, *then* $1 - F_n(\widehat{x}) \leq F_h(\widehat{x})$.

The intuition is as follows. A defendant is found negligent only if $x > \widehat{x}$, equivalently if $f_h(x)/f_n(x) > f_h(\widehat{x})/f_n(\widehat{x})$. When the evidentiary standard satisfies $f_h(\widehat{x})/f_n(\widehat{x}) \geq 1$, a defendant can therefore be found to be at fault only if negligence is more likely than due care. The assumption states that the type I error should then not be larger than the type II. The interpretation is that the potential evidence is not skewed against the innocent. If the assumption did not hold, a type I error smaller than a type II would require that negligence be found only if it is sufficiently more likely than due care. In figure 1, the evidentiary standard satisfying $f_h(\widehat{x})/f_n(\widehat{x}) = 1$ is denoted $\widehat{x}_M$. At this point, the slope of the trade-off curve (in absolute value) equals unity.

Compliance

Before proceeding, we analyze how compliance with the social norm varies with the stigma and the evidentiary standard. Denote by $y(s, \widehat{x})$ the compliance function defined in (3). Clearly, it is increasing in s. The effect of a change in the evidentiary standard is given by

$$\frac{\partial y(s, \widehat{x})}{\partial \widehat{x}} = G' \cdot (l + s)\delta'(\widehat{x}).$$

The sign depends on whether detection increases or decreases with a strengthening of the standard.

>From (2), it is immediate that $\delta(\underline{x}) = \delta(\overline{x}) = 0$, hence detection is maximized at some $\widehat{x}_M \in (\underline{x}, \overline{x})$. Now,

$$\delta'(\widehat{x}) = f_n(\widehat{x}) - f_h(\widehat{x}) = f_n(\widehat{x}) \cdot \left(1 - \frac{f_h(\widehat{x})}{f_n(\widehat{x})}\right),$$

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yielding our first result, which follows directly from MLRP.

PROPOSITION 1: *The detection maximizing evidentiary standard is $\widehat{x}_M$ satisfying $f_h(\widehat{x}_M)/f_n(\widehat{x}_M) = 1$. $\delta'(\widehat{x})$ is positive for $\widehat{x} < \widehat{x}_M$ and negative for $\widehat{x} > \widehat{x}_M$.*

Thus, $y(s,\widehat{x})$ is increasing in the first argument. It may be increasing or decreasing in the second, depending on whether the evidentiary standard is higher or lower than $\widehat{x}_M$. Observe that any standard $\widehat{x} \geq \widehat{x}_M$ requires that negligence be more likely than due care for a judgement against the defendant.

COROLLARY 1: *For a standard $\widehat{x} \geq \widehat{x}_M$ the proportion of individuals not found liable is*

$$yF_n(\widehat{x}) + (1-y)F_h(\widehat{x}) > \frac{1}{2}.$$

Assumption 2 ensures that compliance y is greater than one half. Combining this with assumption 3 yields the result. If the evidentiary standard satisfies the above condition, the "average individual" in society escapes liability. In other words, being found negligent is an unusual event.

Stigma

Society at large does not observe the behavior of any particular individual, but whether someone has been sued for faulty behavior and the outcome of the trial is public information. We assume that most people are not cognizant of the detailed evidence discussed in any particular trial. Thus, suits and trial outcomes act as signals about individual behavior. They constitute an imperfect screening device for sorting society's members between those who conform to the social norm and those who do not.

The stigma associated with an adverse judgment depends on the extent of compliance and on the evidentiary requirement for proving negligence, i.e., $s = s(y, \widehat{x})$. Following Schelling (1978), the social interaction literature has

emphasized strategic complementarities. The greater the fraction of the population that behaves, the greater the disutility from being seen to misbehave.

Let $\varphi(y)$, an increasing function, be the utility or social consideration earned by someone who is known for sure to conform to the social norm. If courts never erred or if individuals were naive and disregarded the possibility of judicial error, the stigma from an adverse judgment would then simply be the loss of $\varphi(y)$.

However, individuals recognizing the risk of court error will factor in the information content of an adverse judgment. Using Bayes' theorem, the posterior probability that an individual conformed to the behavioral norm, conditional on not being sued (equivalently on being sued but winning the case), is

$$p_0(y, \widehat{x}) = \frac{yF_n(\widehat{x})}{yF_n(\widehat{x}) + (1-y)F_h(\widehat{x})}.$$

Conditional on an adverse judgment, the probability that the defendant in fact conformed to the norm is

$$p_1(y, \widehat{x}) = \frac{y(1 - F_n(\widehat{x}))}{y(1 - F_n(\widehat{x})) + (1-y)(1 - F_h(\widehat{x}))}.$$

The information content of the signals provided by the legal system can therefore be expressed as

$$q(y, \widehat{x}) = p_0(y, \widehat{x}) - p_1(y, \widehat{x}),$$

i.e., the difference across "good" and "bad" outcomes in the up-dated probability of appropriate behavior.

The stigma attached to an unfavorable trial outcome is

$$s(y, \widehat{x}) = q(y, \widehat{x})\varphi(y). \tag{4}$$

To see this, suppose that courts never err, i.e., $F_n(\widehat{x}) = 1$ and $F_h(\widehat{x}) = 0$; then $q(y, \widehat{x}) = 1$ and the stigma reduces to $\varphi(y)$. Conversely, if trial outcomes are uninformative, i.e., $F_n(\widehat{x}) = F_h(\widehat{x})$, then $q(y, \widehat{x}) = 0$ and the stigma attached

to an adverse outcome is nil. Abstracting from these extreme cases, the stigma from an adverse outcome should therefore lie between zero and $\varphi(y)$.

According to (4), the stigma is the difference in expected social esteem across good and bad outcomes. If trials were not available, an individual taken at random would be credited with the average social esteem $y\varphi(y)$. When trials exist, and assuming for the sake of the argument that this does not modify y, individuals sort themselves between "winners" with social esteem $p_0(y, \widehat{x})\varphi(y)$ and "losers" with social esteem $p_1(y, \widehat{x})\varphi(y)$. The differential loss of status between the two is the stigma as defined in (4). This is consistent with the use of s in the incentive condition (1), where the stigma is the difference between the status of an individual found negligent and one who has not been found negligent.

We now discuss how y and $\widehat{x}$ affect the stigma. By assumption, $\varphi(y)$ is increasing, so we need only discuss $q(y, \widehat{x})$.

PROPOSITION 2: *$q(y, \widehat{x})$ is strictly concave in y with $q(0, \widehat{x}) = q(1, \widehat{x}) = 0$. When $0 < y < 1$, $q(y, \widehat{x})$ is increasing in $\widehat{x}$ for $\widehat{x} \geq \widehat{x}_M$.*

The function $q(y, \widehat{x})$ is easily seen to be increasing in y for small values and decreasing for sufficiently large values. The reason is that the impact of a trial outcome on "posterior" beliefs is smallest when "priors" are more precise, which is the case when y is close to either zero or unity.

To see why q is increasing in $\widehat{x}$, at least over a certain range, consider its value for arbitrarily high or low evidentiary standards. When the standard is very high, not being found negligent is relatively uninformative, so winners earn approximately the "prior" social esteem $y\varphi(y)$. By contrast, being found negligent is very informative, so losers get zero esteem. Accordingly, the stigma from an adverse judgment is then $y\varphi(y)$.

Conversely, under an arbitrarily low evidentiary standard, nearly every one is found negligent. An adverse judgement then provides little information, so that losers earn approximatively $y\varphi(y)$. On the other hand, winners may get up to the full $\varphi(y)$. Hence, the stigma may be as high as $(1 - y)\varphi(y)$.

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This is smaller than the stigma under an arbitrarily high standard, provided $y > \frac{1}{2}$. It follows that, under assumption 2, the function $q(s, \widehat{x})$ is "globally" increasing in $\widehat{x}$. From corollary 1, a majority of individuals escapes liability when $\widehat{x} \geq \widehat{x}_M$. In turn, this can be shown to ensure that $q(y, \widehat{x})$ is locally increasing in the evidentiary standard for $\widehat{x} \geq \widehat{x}_M$.

Summing up, the stigma $s(y, \widehat{x}) = q(y, \widehat{x})\varphi(y)$ is "presumably" increasing in y, although we must allow for the possibility of a negative effect. Greater compliance increases the stigma associated with a sure deviation from the social norm of behavior, but it may decrease the information value of an adverse court judgment when compliance is already sufficiently large. Regarding the effect of the evidentiary standard, $s(y, \widehat{x})$ is unambiguously increasing if the standard is above $\widehat{x}_M$.

In the next section we analyze the equilibrium values of y and s, taking the evidentiary standard as given but assuming it satisfies $\widehat{x} \geq \widehat{x}_M$.

4   Comparative legal regimes

One obvious reason for considering exogenously given evidentiary standards is that real legal systems differ. It is generally the case in a civil suit that the plaintiff bears the burden of proof, i.e. he has to proof the merit of her claim. As noted in the introduction, the weight of evidence required by the court varies differs between legal system. In Common Law, this is captured by a standard of proof requirement. The default standard in a civil suit is the so-called preponderance of proof: the plaintiff must demonstrate that her claim is more likely true than false, which is generally interpreted as a fifty percent threshold. By contrast, strictly speaking, the concept of standard of proof does not exist in civil-law regimes. Nevertheless, the "implicit" standard is known to require a higher degree of certainty, often captured by notions such as *intime conviction*. The consequence is that the claimant winning a suit under common law could well have lost it under a civil-law regime.

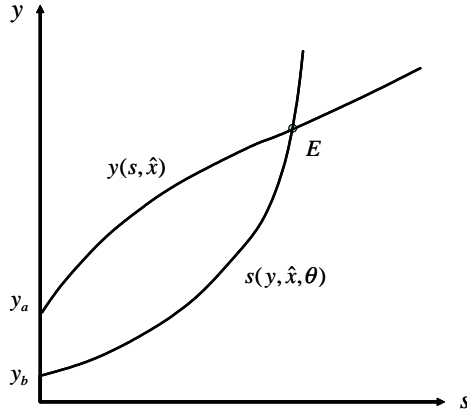In the present section, we discuss the effects of different evidentiary stan-

Figure 2: Single equilibrium

dards for compliance and the stigmas associated with a finding of negligence.

Equilibria under a given evidentiary standard

For a given threshold $\widehat{x}$, an equilibrium is a pair of y and s solving

$$y = y(s, \widehat{x}), \tag{5}$$
$$s = s(y, \widehat{x}). \tag{6}$$

Examples of the corresponding curves are represented in the figures 2 to 4. In figure 2, the intercept y_a of the curve $y(s, \widehat{x})$ is the level of compliance that would arise in the absence of stigma. The intercept y_b for curve $s(y, \widehat{x})$ is the level of compliance below which there is no stigma from an adverse court judgment. Accordingly, the $s(y, \widehat{x})$ curve also includes the portion on the vertical axis below y_b. In figure 2 the equilibrium is at E.

In figure 3, there are two points of intersection, E and D. However, we discard D since it corresponds to an unstable equilibrium. In a stable equilibrium, as with point E in figure 2, the s curve cuts the y curve from
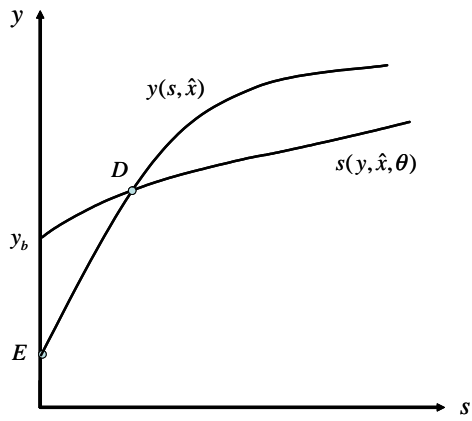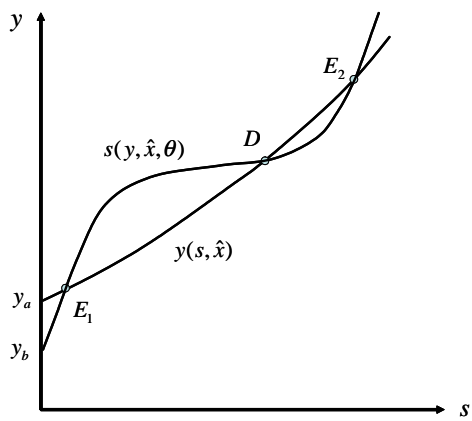
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Figure 3: Zero stigma equilibrium

Figure 4: Multiple equilibria

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below, that is,

$$\frac{\partial y(s, \widehat{x}, \gamma)}{\partial s} > \left(\frac{\partial s(y, \widehat{x}, \theta)}{\partial y}\right)^{-1} \text{ or } 1 - y_s s_y > 0,$$

where y_s and s_y are short-hand for the respective partial derivatives[3]. The equilibrium in figure 3 (at point E) illustrates a situation of low compliance where the stigma from an adverse judgement is nil.

Figure 4 illustrates the case of multiple equilibria, a well known possibility in social interaction models. The S-shaped curve for the stigma function may be explained by a similar form for the full information stigma $\varphi(y)$. The stigma starts to build up only once a critical level of compliance has been reached, but the rate of increase levels down when sufficiently large compliance level is reached. This may be compounded by how $q(y, \widehat{x})$ varies with y, as discussed in the last section. The two stable equilibria are E_1 and E_2.

Figure 5 makes the point that countries with different legal regimes may exhibit similar compliance levels. Suppose two legal regimes A and B with evidentiary standards $\widehat{x}_B > \widehat{x}_A > \widehat{x}_M$. >From proposition 1, if the stigma from an adverse judgment were the same in both cases, society A would have higher compliance — the curve $y(s, \widehat{x}_A)$ is above the curve $y(s, \widehat{x}_B)$. However, from proposition 2 and every thing else equal, the stigma in society B should be higher than in A — the curve $s(y, \widehat{x}_A)$ is below the curve $s(y, \widehat{x}_B)$. As depicted in the figure, compliance in both societies is roughly the same. Case A corresponds to a low evidentiary standard - low stigma socio-legal regime, case B to a high evidentiary standard - high stigma one.

One can interpret this result from a comparative legal systems perspective. If we consider that the second case is representative of civil law countries and the first of common law countries, the comparison tells us that one system

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[3]Suppose y differs initially from the value corresponding to point E in figure 2a and suppose s and y adapt to one another with a small lag. Then the system would converge to E.
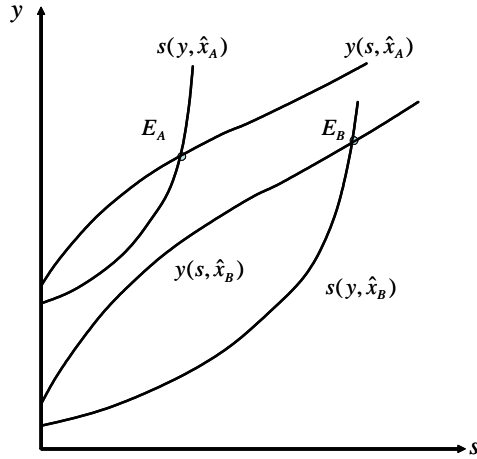
Figure 5: Compliance and stigma under different legal regimes

need not be superior to the other with respect to deterrence. Both systems may constitute two different ways of regulating social behavior through the interactions between social norms and formal rules.

Exogenous societal shocks

In the next section, we will argue that societies may end up with apparently divergent legal regimes as a result of small exogenous shocks. As a preliminary step, we briefly discuss how compliance and stigma are affected by autonomous changes in the societal set-up when the legal regime is taken as given. Consider an exogenous drop in the stigma associated with misbehavior. This may reflect less concern for social esteem or a more individualistic and anonymous society. We capture this by the shift factor θ in the stigma function, which we now write as $s(y, \widehat{x}, \theta) = q(y, \widehat{x})\varphi(y, \theta)$ where by convention $\varphi(y, \theta)$ is increasing in θ.

Substituting in (5) and (6), the comparative statics with respect to the shift parameter exhibits the standard social multiplier effect if the stigma
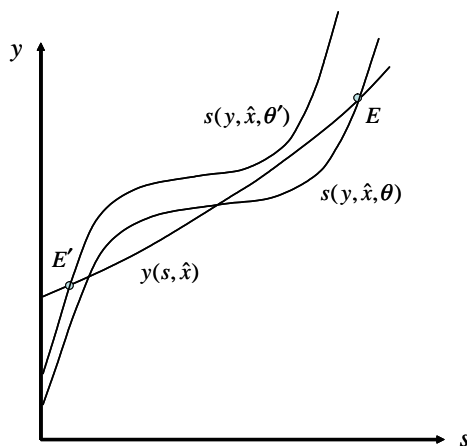
19

Figure 6: Low-compliance low-stigma versus high-compliance high stigma equilibria

increases with compliance:

$$\frac{ds}{d\theta} = \frac{s_\theta}{1 - y_s s_y} \text{ and } \frac{dy}{d\theta} = \frac{y_s s_\theta}{1 - y_s s_y},$$

where $1/(1 - y_s s_y)$ is the social multiplier, this being greater than unity when $s_y > 0$.

If there are multiple equilibria, small societal changes may lead to a drastic change in the equilibrium. One such possibility is illustrated in figure 6. Assume the initial equilibrium is at E under curve $s(y, \widehat{x}, \theta)$. An exogenous drop in stigma shifts the curve up to $s(y, \widehat{x}, \theta')$, with the equilibrium now at E'. Starting from a high-compliance high-stigma equilibrium, society now jumps to a low-compliance low-stigma one.

Both the social multiplier and multiple equilibria require the stigma function $s(y, \widehat{x}, \theta)$ to be increasing in y. In what follows, we show that an endogenous evidentiary standard introduces additional possibilities because of adaptative legal changes. These may attenuate changes on some dimensions and reinforce them on others, through a form of legal multiplier.

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5 Endogenous legal systems

As already noted, standards of proof differ between legal systems,. However, all systems share similar concerns. First, they dislike judicial error. Secondly, they tend to particularly dislike type I errors (penalizing the innocent) when the consequences for the defendant are particularly severe. This is clearly demonstrated by numerous legal and political commentators, as well as in the works of authors as varied as Shakespeare, Voltaire, Condorcet or Tocqueville. Finally, legal systems also understand that evidentiary standards affect compliance and that deterrence is one of the purposes of law.

When judging a particular case, courts must deal with the risks of error for the case at hand. How they deal with the case may set an example or even jurisprudence, with consequences for future compliance. Accordingly, we model court behavior and jurisprudence as partly adaptative and partly forward looking.

In assessing the risks of type I and II error for the case before them and the consequences for the defendant, courts are not engaged in social engineering but take society's "parameters" as given. In the present context, the relevant parameters are the extent of compliance y and the severity of the normative penalty s that would be imposed on the defendant. The normative penalty is a net social loss, by contrast with legal damages which constitute a transfer, hence the courts' reluctance in imposing such a loss. In trading off these concerns, courts are adaptative in the sense that y and s are taken as given.[4]

However, courts are also forward looking to the extent that they care about future compliance. We assume they can only do so in a crude way, which is captured by a concern for $\delta(\widehat{x})$, interpreted here as the *future* detection level as a function of the evidentiary standard for the case at hand. By setting $\widehat{x}$ in the case before them, courts understand that they are thereby signaling that a similar $\widehat{x}$ may hold in the future. Individuals will come to anticipate $\delta(\widehat{x})$ as the detection power of judicial proceedings and the $\widehat{x}$

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[4]They also take as given the legal damages l, which remains exogenous in our analysis.

chosen for the case at hand may influence how future courts will decide.

Evidentiary standard

The legal system reflects a society's values and characteristics. We summarize the trading-off of issues by assuming that the legal system, taking y and s as given, sets $\widehat{x}$ so as to maximize

$$W\left(\widehat{x}, y, s\right) = \delta(\widehat{x}) - \mu\left[y\left(1 - F_n(\widehat{x})\right) + (1-y)F_h(\widehat{x})\right] - \nu y\left(1 - F_n(\widehat{x})\right)s.$$

All else equal, the legal system prefers more detection to less since it induces a greater compliance. The second term is the loss ascribed to judicial error in the case at hand. The parameter $\mu \geq 0$ is the weight given to this concern and the expression in brackets is the expected probability of type I and II errors, given the extent of compliance in society. The third term, with weight $\nu \geq 0$, is the loss ascribed to the imposition of the stigma s on an innocent defendant. A positive ν amounts to increasing the relative weight ascribed to a type I error. Courts are assumed not to care about the stigma suffered by a culpable defendant.[5]

At an interior solution, the evidentiary standard $\widehat{x} = \widehat{x}(y, s)$ satisfies the first-order condition

$$\frac{\partial W}{\partial \widehat{x}} = f_n(\widehat{x}) - f_h(\widehat{x}) + \mu\left[y f_n(\widehat{x}) - (1-y)f_h(\widehat{x})\right] + \nu y f_n(\widehat{x})s = 0$$

or equivalently
$$\frac{f_h(\widehat{x})}{f_n(\widehat{x})} = \frac{1 + (\mu + \nu s)y}{1 + \mu(1-y)}. \tag{7}$$

To see the implications, suppose first that the legal system cares only about future detection, i.e., μ and ν are zero. Then the right-hand side equals unity as in proposition 1 and therefore $\widehat{x} = \widehat{x}_M$. Suppose, by contrast, that courts seek only to minimize the probability of judicial error, i.e., μ is

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[5]See Demougin and Fluet (2005) for a related formulation of the legal system's objective function.

arbitrarily large. Then

$$\frac{f_h(\widehat{x})}{f_n(\widehat{x})} = \frac{y}{1-y}$$

Since a majority of the population conforms to the social norm, the right-hand side is greater than unity and therefore $\widehat{x} > \widehat{x}_M$. A positive ν also pushes the standard above $\widehat{x}_M$. Moreover, assumption 1 ensures that a solution to (7) exists and that the second-order condition for the optimization problem is satisfied.[6]

PROPOSITION 3: *If μ or ν is positive, $\widehat{x}(y,s) > \widehat{x}_M$ and is increasing in y. If ν is positive, $\widehat{x}(y,s)$ is also increasing in s.*

The result follows directly from the above discussion. The greater the extent of compliance in society, the greater the weight of evidence required by courts to rule that the defendant was negligent. When courts dislike imposing a net social cost on innocent defendants, $\widehat{x}(y,s)$ is also increasing in s. The greater the stigma attached to a ruling of negligence, the more are courts reluctant to rule against the defendant.

Socio-legal multipliers

As in section 4, the level of compliance y and the stigma s are endogenous variables given the legal regime and the characteristics of society. From the above dicussion we now have that the legal regime, as captured by the evidentiary standard $\widehat{x}$, is also itself endogenous. The socio-legal equilibrium is now a solution to the equation system

$$\begin{aligned} y &= y(s, \widehat{x}), \\ s &= s(y, \widehat{x}), \\ \widehat{x} &= \widehat{x}(y, s). \end{aligned}$$

Obviously, different societies will exhibit different equilibria. In particular,

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[6]Given MLRP, the objective function is strictly quasi-concave in $\widehat{x}$.

if societies differ only through the objective function characterizing their legal systems, then different evidentiary standards would be observed such as $\widehat{x}_A$ and $\widehat{x}_B$ in the foregoing section. Compliance would not necessarily diverge but stigmas would. In what follows, we argue that small differences in the stigma function can also yield the same consequences given the fact that legal systems are endogenous.[7]

To capture the effect of a small difference between societies, we introduce as in section 4 a shift factor in the stigma function $s(y, \widehat{x}, \theta)$. Again, there may be multiple solutions and we discard unstable equilibria. A necessary condition for stability is[8]

$$\Delta \equiv \begin{vmatrix} 1 & -y_s & -y_{\widehat{x}} \\ -s_y & 1 & -s_{\widehat{x}} \\ -\widehat{x}_y & -\widehat{x}_s & 1 \end{vmatrix} > 0.$$

The comparative statics of an exogenous increase in the stigma function is

$$\begin{aligned} \frac{dy}{d\theta} &= \frac{(y_s + y_{\widehat{x}}\widehat{x}_s)s_\theta}{\Delta}, \\ \frac{ds}{d\theta} &= \frac{(1 - y_{\widehat{x}}\widehat{x}_y)s_\theta}{\Delta} > 0, \\ \frac{d\widehat{x}}{d\theta} &= \frac{(\widehat{x}_s + \widehat{x}_y y_s)s_\theta}{\Delta} > 0. \end{aligned} \tag{8}$$

>From proposition 1, $y_{\widehat{x}} < 0$ because $\widehat{x} > \widehat{x}_M$ in any equilibrium. Since at least one of $\widehat{x}_y$ or $\widehat{x}_s$ is positive, the effect of a change in the stigma function on the equilibrium s and $\widehat{x}$ has an unambiguous sign. By contrast, the effect on compliance can go either way: a larger stigma increases compliance, but it also leads to a more demanding evidentiary standard, which reduces

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[7]We disregard the case where the legal system values only compliance, otherwise the equilibria are the same as in section 4 but with $\widehat{x} = \widehat{x}_M$.

[8]The so-called Routh-Hurwitz necessary and sufficient conditions (see, e.g., Gandolfo, 1971) are $\Delta > 0$ and $3(3 - y_{\widehat{x}}\widehat{x}_y - s_{\widehat{x}}\widehat{x}_s - s_y y_s) > \Delta$. The interpretation of stability is the same as in footnote 3.

compliance. If the direct effect dominates, a positive shock on the stigma function increases compliance.

The issue we address is whether a small exogenous societal shocks may lead legal systems to diverge, although societies remain apparently similar. If this is indeed the case, that would suggest that an endogenous legal system has a stabilizing effect on society, compared to the case where the legal system does not adapt to societal changes. In other words, it is the legal system that bears the effect of the shock.

We say that the legal system is *stabilizing* if endogeneity of the system dampens the impact of shocks on societal variables. To formalize this intuition, start with an equilibrium $(y_0, s_0, \widehat{x}_0)$ and suppose the legal system is held fixed at $\widehat{x}_0$. As in section 4, the effects on y and s of an exogenous increase in stigma are then[9]

$$\left.\frac{dy}{d\theta}\right|_{\widehat{x}=\widehat{x}_0} = \frac{y_s s_\theta}{1 - y_s s_y} > 0,$$

$$\left.\frac{ds}{d\theta}\right|_{\widehat{x}=\widehat{x}_0} = \frac{s_\theta}{1 - y_s s_y} > 0.$$

The legal system is *stabilizing* with respect to a societal variable if the above partial effect is larger than the total effect in (8), where account is taken of the adaptative changes in the legal system.

PROPOSITION 4: *For exogenous changes in the social stigma, the legal system is stabilizing with respect to y if $y_{\widehat{x}} + y_s s_{\widehat{x}} < 0$, it is destabilizing with respect to s if $s_{\widehat{x}} + s_y y_{\widehat{x}} > 0$.*

Recall from section 4 that $s_{\widehat{x}}$ is positive (given that $\widehat{x} > \widehat{x}_M$) while the sign of s_y is ambiguous. It follows that the conditions in proposition 4 are not necessarily satisfied because the terms may be of opposite signs. However, the conditions hold if direct effects dominate. The first condition is the effect on compliance of an increase in the evidentiary standard, both the direct

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[9]We assume as before that $1 - y_s s_y > 0$

effect and an indirect one through the impact of the standard on the stigma. The second condition is the effect of the evidentiary standard on the stigma associated with adverse judgments, again a direct effect and an indirect one through the impact of the standard on compliance.[10]

For instance, suppose the above conditions hold and consider a negative shock on θ, recalling that $s(y, \widehat{x}, \theta) = q(y, \widehat{x})\varphi(y, \theta)$. Before the legal system adapts, the shock reduces compliance y and the stigma s. Moreover these changes may be large due to the social multiplier effect. Faced with a smaller y and a smaller s, the legal system adapts through a less demanding evidentiary standard, i.e., $\widehat{x}$ is lowered towards $\widehat{x}_M$. This increases incentives to conform, therefore stabilizing compliance, but it also reinforces the decrease in stigma. The latter in turn pushes the legal system to a still lower evidentiary standard. Thus, with respect to stigma, the socio-legal multiplier is larger than the crude social multiplier computed with an exogenous legal system.

Multiple equilibria and jumps in legal systems

Normative penalties and legal incentives are complementary in inducing compliance. However, the foregoing discussion shows that adaptative changes in the legal system may substitute one set of incentives against the other. Moreover, the possibility of multiple equilibria suggests that changes in the socio-legal equilibrium can be abrupt. Section 4 discussed jumps in the social equilibrium from a high compliance-high stigma situation to a low compliance-low stigma one, taking the legal regime as given. In the same section, we also showed that similar levels of compliance could be achieved under apparently very different legal systems. We now demonstrate that when legal systems are endogenous large differences between legal systems may result from small societal shocks.

Figure 7 illustrates this possibility. The initial equilibrium is at E_0 under

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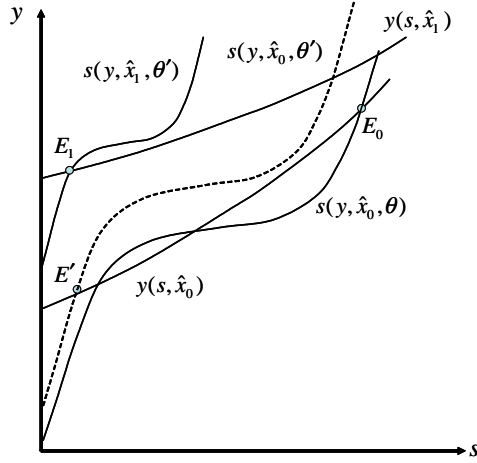[10]Note that the conditions necessarily holds if s_y is negative.

Figure 7: Jumps in legal regimes

the legal regime $\widehat{x}_0$. A small exogenous drop in the relevance of stigma pushes the stigma curve upwards, as shown by the dotted curve (where $\theta' < \theta$). If the legal system remained fixed, the equilibrium would jump to the low stigma-low compliance situation E' (this effect is the same as in figure 6). However, the legal system adapts by reducing the evidentiary standard, which shifts both the compliance and stigma curves upwards. If the evidentiary standard has a sufficiently strong effect on stigma, the final equilibrium will be at E_1 characterized by the legal regime $\widehat{x}_1 < \widehat{x}_0$. Compliance does not differ much from the initial equilibrium, but the small exogenous shock to the stigma function will have triggered an important change in the legal regime. At the new equilibrium, normative penalties play a much reduced role in inducing compliance, legal incentives a much larger one.

6   Concluding remarks

The thrust of this paper was to analyze how legal systems respond to small societal shocks concerning the relevance of stigma avoidance as a regulator of behavior. We showed that adaptative changes may lead to substantially

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divergent legal systems. Moreover, such changes may substitute formal legal incentives for informal normative incentives.

There is now a large literature on the crowding out of "intrinsic motivation" by extrinsic incentives (e.g., Fehr and Gächter, 2001, and for a survey Frey and Jegen, 2001). Bénabou and Tirole (2006) develop a theory of "prosocial behavior" where social esteem depends on the perception of one's type. Formal rewards or punishments create doubt about the true motive for which prosocial actions are undertaken. Crowding out arises following the introduction of formal incentives because actions are now noisier signals of one's true type.

In our set-up, crowding out also occurs because of a noisier signal effect. However, social esteem depends on perceived behavior rather than the perception of one's type. Furthermore, the extent of noise and the extent to which formal incentives are used are endogenous: they reflect adaptive changes in the legal system. Thus, our contribution is not in providing an understanding of the intrinsic versus extrinsic motivation puzzle per se. Rather, we provide an instance of a social process whereby one set of incentives crowds out another.

Appendix

PROOF OF PROPOSITION 2: By definition,

$$q(y, \widehat{x}) = \frac{yF_n(\widehat{x})}{yF_n(\widehat{x}) + (1-y)F_h(\widehat{x})} - \frac{y(1 - F_n(\widehat{x}))}{y(1 - F_n(\widehat{x})) + (1-y)(1 - F_h(\widehat{x}))}.$$

The claim concerning changes in y follows trivially. To show the effect of changes in $\widehat{x}$, observe that $\partial q(y, \widehat{x})/\partial \widehat{x}$ has the same sign as $\partial q(y, \widehat{x})/\partial F_n(\widehat{x})$. Noting that $\partial F_h(\widehat{x})/\partial F_n(\widehat{x}) = f_h(\widehat{x})/f_n(\widehat{x})$, we have

$$\frac{\partial q}{\partial F_n} = y(1-y) \left[\frac{F_h - F_n(f_h/f_n)}{(yF_n + (1-y)F_h)^2} - \frac{(1 - F_n)(f_h/f_n) - (1 - F_h)}{(1 - yF_n - (1-y)F_h)^2} \right].$$

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Write $\pi \equiv yF_n + (1 - y)F_h$ for the proportion of individuals who escape liability. Recalling that $f_n = f_h$ at $\widehat{x}_M$, we get

$$\left. \frac{\partial q}{\partial F_n} \right|_{\widehat{x}=\widehat{x}_M} = y(1 - y)(F_n - F_h) \left[\frac{1}{(1 - \pi)^2} - \frac{1}{\pi^2} \right]. \tag{9}$$

Since $F_n > F_h$, the sign of (9) is positive if the term in brackets is positive. This requires $\pi > 1/2$, but by corollary 1 the latter holds for all $\widehat{x} \geq \widehat{x}_M$. Taking the second derivative,

$$
\begin{aligned}
\frac{\partial^2 q}{\partial F_n^2} \;=\;\; & y(1 - y) \left[\frac{1}{(1 - \pi)^2} - \frac{1}{\pi^2} \right] F_n \frac{\partial (f_h/f_n)}{\partial F_n} \\
& + 2y(1 - y)\left(y + (1 - y)(f_h/f_n)\right) \left[\frac{F_n(f_h/f_n) - F_h}{\pi^3} \right] \\
& + 2y(1 - y)\left(y + (1 - y)(f_h/f_n)\right) \left[\frac{(1 - F_h) - (1 - F_n)(f_h/f_n)}{(1 - \pi)^3} \right].
\end{aligned}
$$

Consider the first term. The expression in brackets is positive for all $\widehat{x} \geq x_M$. Moreover, MLRP implies that f_h/f_n increases with F_n. Hence the first term is positive. Consider now the second term. It is positive if $f_h/f_n > F_h/F_n$. Similarly, the third term is positive if $(1 - F_h)/(1 - F_n) > f_h/f_n$. Both inequalities are well known to follow from MLRP. Hence, all terms are positive, implying that $q(y, \widehat{x})$ is convex in $F_n(\widehat{x})$ for $\widehat{x} \geq x_M$. Since $\partial q/\partial F_n$ is positive at x_M, it must therefore be positive at all $\widehat{x} \geq x_M$, thereby completing the proof. Q.E.D.

PROOF OF PROPOSITION 4: Assuming $1 - y_s s_y > 0$, the legal system is stabilizing with respect to y if

$$\frac{(y_s + y_{\widehat{x}}\widehat{x}_s)s_\theta}{\Delta} < \frac{y_s s_\theta}{1 - y_s s_y}.$$

Expanding the determinant and simplifying, the condition reduces to

$$(y_{\widehat{x}} + y_s s_{\widehat{x}})(\widehat{x}_s + \widehat{x}_y y_s) < 0$$

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where the second factor is positive. Similarly, the legal system is destabilizing
with respect to s if

$$\frac{(1 - y_{\widehat{x}}\widehat{x}_y)s_\theta}{\Delta} > \frac{s_\theta}{1 - y_s s_y},$$

which reduces to

$$(s_{\widehat{x}} + s_y y_{\widehat{x}})(\widehat{x}_s + \widehat{x}_y y_s) > 0.$$

Q.E.D.

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