"The Dynamic Quality of Law: The Role of Judicial Incentives and Legal Human Capital in the Adaptation of Law"

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Abstract

Much of the existing literature investigating the relationship between legal regimes and economic growth focuses on the agency problem of aligning judicial incentives with social welfare. In this paper I look instead at the factors that influence the quality of law when judges have incentives to promote social welfare but they have limited knowledge about the environment in which law is to be applied. The key insight is that the capacity for a legal regime to generate value-enhancing legal adaptation to local and changing conditions depends on its capacity to generate and implement adequate expertise about the environment in which law is applied. The central mechanism of adaptation is the interaction among three factors: 1) judicial incentives for rule-following and rule-adaptation, 2) litigant incentives for investing in costly evidence and innovative legal argument and 3) the accumulation of *shared legal human capital*–defined as the sum of litigant investments in evidence and argument– which determines the systemic likelihood of judicial error.

Key words: legal origins, common law, civil code, evolution of law, judicial incentives, legal human capital

1 Introduction

As developing countries and countries transitioning from planned economies struggle to develop the institutions that support market democracy, there has been increased attention from economists and legal scholars directed to the question of what legal environments best promote economic growth and stability. Much of this work focuses on the substance of legal rules: the provisions of a constitution, the elements of a corporations or antitrust statute, the law governing the enforcement of contracts or property rights. Relatively little attention is paid to the institutions of the legal system, such as the organization of courts, the judiciary and the legal profession. A recent exception is the legal origins literature (La Porta et al 1997, 1998, 2004, Mahoney 2001, Djankov et al 2002, 2003, Botero et al 2004), which identifies an empirical relationship between economic variables and legal families broadly identified as those rooted in civil law (French, German, Scandinavian) and common law (English). While some strands in this literature are explicitly focused on differences in substantive law (financial or administrative regulations for example) that appear correlated with legal origin, others suggest that differences arise from the institutional features of different legal families, apart from the substantive law they implement. Some writing in the comparative literature on the common law and the civil law suggest, for example, that these regimes differ in the extent to which judges (or juries) are independent of distortionary political control (Glaeser and Shleifer 2002, Mahoney 2001). Others have explored differences in the information available to and the incentives facing judges as opposed to legislators or regulators. Shavell (2005) analyzes the value of ju-

dicial discretion when judges have better (ex post) case-specific information than legislators or regulators but preferences that may diverge from social welfare. Although Shavell's work is framed as a choice between more and less detailed rules (and thus related to an earlier literature comparing the costs and benefits of regulation by rules versus regulation by standards (Diver 1983, Rose 1988, Kaplow 1992)), it is easily interpreted to address the institutional question of how the judicial role should be structured. Anderlini, Felli and Riboni (2006) engage in a very similar type of analysis, supposing that judicial and legislative incentives diverge because although better informed, judges acting ex post face time-inconsistency in their preferences and cannot commit to implementing an ex ante efficient rule. Anderlini, Felli and Riboni explicitly place this work in the context of the choice between a legal regime based on codes versus one based on judge-made precedents.

The existing literature thus tends to focus heavily on the agency problem: what is the likelihood that judges will implement established legal rules and forego private benefits that might be derived from personal policy preferences or corrupting political or social influences? Missing from the existing literature is an equally important question: what is the likelihood that judges will accurately identify, interpret and implement legal rules in a complex environment? This is the problem of judicial competence and the quality of legal rules as they are developed and applied in practice. Even judges with socially-aligned incentives and access to better information than that available to legislators may make good faith errors in interpreting evidence and exercising discretion in socially optimal ways. Moreover judges are vulnerable to being misled by strategic litigants who may distort the evidence they present or the arguments they make about how a judge should exercise his or her discretion to interpret

or adapt law. Several papers have explored strategic revelation of private information in models of adjudication (Milgrom and Roberts 1986, Shin 1994, Shin 1998, Dewatripont and Tirole 1999, Daughety and Reinganum 2000.) By and large, however, this work has not been integrated into the institutional frameworks of different legal regimes. [1]

In this paper I focus specifically on a mechanism by which the structure of judicial incentives, in light of the potential for judicial error, can affect the dynamic quality of law. Positive economic analysis of the common law has, since Posner (1977), been organized around the claim that the value of the common law is its ability to work out, over time, efficient legal rules. Some authors have rested this claim on the premise that common law judges inherently seek efficiency; often this literature has framed the analysis as an investigation of the different incentives influencing parties interacting with courts and legislatures and as a debate about whether judges or legislators are more susceptible to rent-seeking (Posner 1977, Rubin 1982, Tullock 1980). Gennaioli and Shleifer (2007) focus on the impact of judicial bias on the capacity of common law to evolve to efficiency. Hadfield (1992) considers the capacity of common law to evolve to efficiency given that the information generated through litigation is necessarily a biased sample, in contrast to the potential for legislative in-

[1] Shin (1998) compares what he calls adversarial and inquisitorial regimes, but these do not map onto the institutional differences between, for example, common law and civil law. In particular, the inquisitorial regime he analyzes is one in which judges bear the cost of discovering evidence as opposed to parties. Although it is true that judges in many civil law regimes are empowered to seek out evidence, by contacting a title registry or a bank for example, much of the cost of evidence production is still borne by litigants, as is the case under an adversarial regime.

vestigation to be comprehensive. Other authors have rested predictions about the likelihood that the common law will evolve to efficiency on the incentives of litigants to continue challenging inefficient rules (Rubin 1977, Priest 1977, Goodman 1978, Cooter, Kornhauser and Lane 1979). Despite differences, these models of the evolution of the common law all share a common recognition that courts do not start out with the right rules. Rather, they move towards them based on the information learned directly or indirectly from litigants who bring cases to them.

The dynamic quality of law is especially important for the evaluation of alternative legal regimes. As Berkowitz, Pistor and Richard (2003) and Botero et al (2003) have emphasized in evaluating the empirical evidence of the growth generated by transplanted legal regimes, the value of a legal regime depends on its ability to adapt to local conditions. Intuitively also, in a changing environment, law must adapt to changing conditions in order to continue to promote economic value in the organization of activities and trade. At its core, a market economy is decentralized in its response to information about the environment. The more important this is to the organization of economic activity, the more important we can expect the adaptability of a legal system to be. This is the insight of the rules versus standards literature, recognizing the value of what judges learn about a heterogeneous environment through adjudication. The point has also been recognized in the legal origins literature: Johnson et al (2000), for example, attribute the differential success in controlling "tunnelling" (the removal of assets from a company by controlling shareholders at the expense of minority shareholders) in civil law and common law countries to the capacity of common law courts to develop more refined regulation of opportunistic behavior based on what is learned in litigation

from specific instances of abuse. Given the importance of such 'grass-roots' information, it is essential to understand the capacity of different institutional environments to support the dynamic evolution of a legal regime, and to direct its development to optimal adaptation to local and changing circumstances.

The central mechanism of adaptation in this paper is the equilibrium interaction among three factors: 1) judicial incentives for rule-following and rule-adaptation, 2) litigant incentives for investing in costly evidence and innovative legal argument and 3) the accumulation of *shared legal human capital*–defined as the sum of litigant investments in evidence and argument– which determines the systemic likelihood of judicial error. Landes and Posner (1976) also develop a model that conceptualizes precedent as a stock of legal capital produced by the investments of lawyers, litigants and judges. The services provided by the stock of legal capital in their model consist primarily in the information precedents provide to future disputants about the likely outcome of their disputes. Here I am focused on the value of legal human capital in generating more precise (efficient) legal rules. In addition, I explicitly address the question of how legal human capital accumulates; Landes and Posner (1976), who concentrate primarily on empirical tests of the depreciation of precedents, take the investment in precedent as exogenous.

The key insight here is that the capacity for a legal regime to generate value-enhancing legal adaptation to local and changing conditions depends on its capacity to generate and implement adequate expertise about the environment in which law is applied. The process by which this happens in a legal regime is an organic and evolutionary one, dependent on institutional design and the equilibrium coordination of the work of judges, lawyers and litigants. Efforts to develop legal regimes to support economic growth and efficiency, therefore,

must take into account the impact of legal design on legal human capital and the incentives of lawyers and judges. A focus on the static content of legal rules is inadequate and misleading.

2 Model

The model investigates the conditions under which a legal regime will adapt an existing legal rule to new information about welfare-relevant changes in the environment. Adaptation takes the form of switching to a new rule that produces higher social welfare if implemented without error.

Consider a multi-period system in which in each period there are N actors each of whom engages in an activity $x \in X$ with value V. (In each period, the actors are one-shot players and exit the system at the end of the period.) Assume that as of the start of some period 1 an existing legal rule, R^e, a function that maps this action into a penalty D, has emerged:

$$R^e(x) = D \qquad \forall\ x \in X$$

I assume

$$V > D$$

such that no actor is deterred from acting by R^e. Concrete examples of such a rule include a strict liability rule for injuries caused by defective products and a rule that requires an actor to pay damages if choosing not to carry through on a contractual agreement.

Suppose that in period 1 there is a change in the environment that differen-

tiates the actors into two types: a good type, representing a fraction p of all actors, and a bad type. This partitions the activity space X into two subsets, X_G and X_B. Given this change good types should be allowed to engage in activity X without penalty whereas bad types should incur the penalty. That is, per-period social welfare beginning in period 1 would be higher under a new rule R^n where

$$R^n(x) = \begin{cases} D & \forall\ x \in X_B \\ \\ 0 & \forall\ x \in X_G \end{cases}$$

In terms of a rule imposing strict liability for defective products, for example, the new information may result from a change in technology such that the products sold by good types no longer are defective according to the appropriate legal definition of 'defective' while those sold by bad types are. If the rule concerns contract liability, the new information may be about the correct interpretation of the intent of good types not to incur a particular contractual obligation.

I assume that x is observable to an enforcer (a prosecutor or a plaintiff) and that it is costless for an enforcer to sue an actor engaged in activity x. Thus all such actors (whom we can now call defendants) are sued in each period. There are N judges (or courts–I will use the terms interchangeably) and defendants are randomly assigned to a judge. There is no settlement and no appeal so in each case a judge reaches a final determination of liability, either holding a defendant liable for damages D or releasing the defendant from liability. The activity x is verifiable by the judge. Whether an action x makes an actor a good type ($x \in X_G$) or a bad type ($x \in X_B$) is known only to the actor *ex ante.*

In making the liability determination, the judge adopts and attempts to implement a rule, either R^e or R^n. Courts are passive in the sense that they can only make the decisions that they are asked to make by the parties before them. This implies that a judge will adopt and implement R^e unless asked by a defendant to consider adopting R^n. Once sued, a defendant chooses whether or not to ask the court to allow the defendant to present a defense, attempting to persuade the judge that it is a good type and therefore to switch to R^n. Proceedings to present a defense, if permitted, cost the defendant k and the court c. Without loss of generality, I am assuming that the plaintiff presents no evidence or argument other than the (costless) evidence that the defendant has engaged in activity x and would thus be liable under the existing rule.

If a court indicates it is willing to consider adopting R^n it hears evidence and argument about whether the defendant's activity should be classified as good and the defendant therefore released from liability. We can think of a judge's decision not to allow evidence and argument and to implement R^e based on the costlessly observable and verifiable information x as a decision to grant summary judgment. A judge that allows evidence and argument to be advanced to persuade the judge to deviate from R^e can be thought of as denying a motion for summary judgment and allowing the matter to proceed to more extended hearings or trial.[2] I will say that R^n has been *adopted* by a judge if the judge finds a defendant not liable (dismissal), meaning that the outcome could only have been reached given the application of R^n.[3]

[2] In civil law countries where there is no single-event trial and a judge (or panel of first-instance judges) conducts a series of hearings on factual and legal matters, the decision to foreclose a line of evidence and argument would simply be one of several sequential decisions shaping the case.

[3] This accords with the practice in common law reasoning of extracting a rule

If a judge conducts more extended proceedings and attempts to determine whether the defendant's activity can be justified as good in a given case–leading to dismissal–he or she risks making either of two types of errors: holding a good type liable (*type 1 error*, α) or a bad type not liable (*type 2 error*, β). The error that a judge may make is not strictly speaking identifying a good defendant as bad or vice versa; it is interpreting the evidence and argument presented by the defendant as providing good reasons to depart from the existing legal treatment of the defendant's activity. A judge is called upon to articulate these reasons and judged on the basis of them. Thus a judge might know that the pool of defendants contains only 'good' types, for example, but may still make an error in reasoning, providing bad reasons for dismissing the case against the defendant or being unable to understand or articulate the good reasons for dismissal and so being unable to justify dismissal. This is what distinguishes the judicial requirement of reasoned decisionmaking from voting or pure discretion.

I assume that judges know the probability p that, based on information about x alone, a defendant is a good type and, given additional evidence and argument, the probabilities α and β that he or she will make a type 1 and type 2 error in interpreting the defendant's case. I assume defendants also know these true probabilities.

The probability that the judge makes an error in interpreting the defendant's case is a function of the *shared legal human capital*, K_t, available to the judge

from a decision only if the outcome requires the rule. If judges express an opinion about the desirability of a change in a rule, but reach a decision that can be fully explained in terms of the existing rule, the judicial opinion is dicta and is not treated as authoritative in the sense of establishing a precedent–a new rule.

in each period. In particular,

$$\alpha_t = f^1(K_t)$$
$$\beta_t = f^2(K_t)$$

with

$$\frac{df^i}{dK_t} < 0.$$

K_t represents the accumulated knowledge within the legal system about the relationship between rules, the environment and social welfare. Thus higher shared legal human capital increases the competence of every judge, allowing him or her to do a better job of interpreting a defendant's case and deciding whether social welfare would be increased or decreased by a determination that the defendant's activity is of the good type. I abstract from individual differences in judicial competence in order to focus on systemic effects.

The available legal human capital in period 1, K_1, is exogenous. K_2, legal human capital in period 2, can be augmented by the investments in evidence and legal argument made by defendants in period 1. In particular,

$$K_2 = K_1 + i(\Delta)$$

where i is an information processing function that captures the extent to which information in particular cases is shared among judges and other commentators and converted into legal human capital. I will assume that i is strictly informative*:* $i' > 0$. [4]

[4] Information collected at trial could be disinformative if errors made in individual cases become systemic, rather than being corrected by aggregation and wider analysis. I leave the analysis of this possibility for future work.

2.1 Defendants' Incentives to Seek Rule Change

Suppose a defendant has asked the court to hold proceedings to consider the adoption of R^n and the court has announced that it will. The defendant must then decide whether to present evidence and argument seeking to persuade the court that the defendant's activity should be properly classified as an element of X_G, making the defendant a good type. If the defendant chooses not to present a defense its expected loss L equals D: in the absence of evidence relevant to R^n the court reverts to implementing R^e.

Both types seek to minimize their loss. For good types, presenting a defense results in an expected loss

$$L_G = \alpha_t D + k$$

and good types will be willing to invest in presenting a defense if and only if

$$\frac{k}{D} \leq (1 - \alpha_t).$$

For bad types, the expected loss is

$$L_B = (1 - \beta_t)D + k$$

and bad types will be willing to invest in presenting a defense if and only if

$$\frac{k}{D} \leq \beta_t.$$

Notice that good types are discouraged from investing by the risk of type 1 errors; bad types are encouraged by the risk of type 2 errors. I assume defendants' true type has some impact on the information content of what they present as evidence and argument and in particular that good types are more likely than bad types to be identified as good types, and bad types

are more likely than good types to be identified as bad types. Formally, $(1-\alpha) > \beta_t$. Given this, we have the following result:

Lemma 1 *No defendants seek rule change in period t if*

$$\frac{k}{D} > (1-\alpha_t).$$

Only good defendants seek rule change if

$$\beta_t \leq \frac{k}{D} < (1-\alpha_t).$$

Both good and bad defendants seek rule change if

$$\frac{k}{D} \leq \beta_t.$$

We can now state our first result with respect to the capacity for a legal regime to adapt to changes in the environment and switch from R^e to R^n:

Proposition 2 *If* $\frac{k}{D} > (1-\alpha_1)$ *, R^e is adopted and implemented by all judges in both periods 1 and 2. That is, the system does not adapt.*

Because the legal system is passive, meaning courts cannot adapt the law if they are never asked to do so, if defendants in period 1 are unwilling to provide the court with the costly evidence and argument they would need to justify a change in the rule there can be adaptation in period 1. This is true regardless of judicial willingness to entertain the case for rule change. With no willingness to provide information in period 1, there is no accumulation of shared legal human capital and the state of the system is the same in period 2 as in period 1: the system never adapts.

If at least some defendants are willing to invest in seeking rule change, the

systems capacity to adapt will depend on judicial willingness to entertain the case for rule change. The next section considers judicial incentives.

2.2 Judicial Incentives and Rule Change

Judges who are asked by defendants to entertain a defense must decide whether to be rule-followers (granting summary judgment, refusing to conduct further proceedings and continuing to implement R^e) or potential rule changers (denying summary judgment, allowing extended proceedings and in so doing opening up the potential that they will adopt a new rule R^n). This depends on judicial assessement of the rewards for rule-following and rule-changing. Depending on the nature of the judiciary in a given regime and how it evaluates judges, the source of these rewards might be promotion within the ranks to a superior position or transfer to a more desirable court or city, re-election, the prestige or perks derived from being well-thought of by professional peers and/or the public, appointment to a higher court and/or personal satisfaction. (See Hadfield 2008 for a discussion of the factors that influence judicial rewards in different types of legal systems.)

Let γ be the per-period reward judges enjoy when they follow the existing rule R^e. The judge receives this reward if he or she grants summary judgment or, after conducting proceedings, nonetheless finds the defendant liable. Conducting the trial, however, costs the judge $c > 0$, resulting in a net reward of $(\gamma - c)$ if after proceedings the judge reaches the same result (holding the defendant liable) that could have been reached on summary judgment. For simplicity I assume the reward for rule-following is the same for all judges. In addition I assume that even if R^n is adopted by some judges in period

1, judges in period 2 still perceive R^e to be the existing rule with reward γ. Thus in this time scale there is no capacity for judicial assessment that R^n has become the new rule they should follow to obtain payoff γ.

Let φ_j be the reward judge j expects to receive if he or she independently and *correctly* adapts or changes a rule, that is, if he or she correctly identifies and articulates good reasons for dismissing the case against a good defendant. Again, conducting the proceedings costs c and the net reward is $\varphi_j - c$. φ_j is distributed with positive density everywhere on the interval $[0, \bar{\varphi}]$ according to the cumulative distribution function G. This assumes that the reward enjoyed by a judge who changes the rule varies among judges and depends on whether those who determine judicial rewards (the judge's audience–superiors in a civil service bureaucracy, the public and politicans in a common law judiciary, for example.) agree that the reasons provided for allowing this change in the rule are good and the judge is found to have correctly concluded that social welfare is higher with this change in the rule. I assume this audience correctly identifies the correct outcome for a case. This assumption–that the audience is ultimately perfectly informed–is grounded on two ideas: first, that the audience reaches this assessment at some future point when all cases have been decided and can be evaluated together and second, that the audience consists of a large number of observers. Time and scale thus overcome the individual errors judges make in a given time period and case. I normalize the return judges obtain if they are found to have made an error and incorrectly changed the rule–by appealing to bad reasons (which may happen even if the defendant is in fact good, and always happens if the defendant is in fact bad)–to be zero.

If proceedings are conducted, the outcome is determined by the judge's in-

terpretation of the evidence and argument and thus the probability of type 1 (seeing no good reasons to dismiss even when the defendant is good) and type 2 (seeing good reasons to dismiss when the defendant is bad). The outcome after proceedings is thus not a choice variable–the court is bound to reach the decision that is justified by his or her ability to articulate reasons based on the evidence and argument. The judge's choice variable, therefore, is whether to allow further proceedings (deny summary judgment) or not.

The judge's decision to allow proceedings or not depends on the judge's belief about the risk of errors and thus on the mix of defendants seeking to present a defense. From Lemma 1 we know that the pool of defendants that will ask a judge to entertain a defense consists either of all defendants, good and bad, or only good defendants. Let $\hat{p}$ be the probability that a defendant asking to present a defense is a good defendant and assume that the judge knows this probability. Then Lemma 1 implies

$$\hat{p} = \begin{cases} p & if \ \frac{k}{D} \leq \beta_t \\ \\ 1 & if \ \frac{k}{D} > \beta_t \end{cases}.$$

The probability of dismissing after hearing evidence and argument in period t is then given by

$$pr(dismissal) = \left[(1-\alpha_t)\hat{p} + \beta_t(1-\hat{p})\right].$$

Applying Bayes' rule, the probability that a dismissal will be judged to be based on good reasons and hence produce the reward φ_j is then given by

$$pr(good\ reasons\,|dismissal) = \frac{(1-\alpha_t)\hat{p}}{(1-\alpha_t)\hat{p} + \beta_t(1-\hat{p})}.$$

The expected payoff of further proceedings for judge j is therefore

$$(1-\alpha_t)\hat{p}\varphi_j + [1-(1-\alpha_t)\hat{p} - \beta_t(1-\hat{p})]\,\gamma - c.$$

This implies that a judge will allow further proceedings to consider the defendant's evidence and argument for a new rule R^n if

$$\begin{aligned}\varphi_{,j} &\geq \left[1 + \frac{\beta_t(1-\hat{p})}{(1-\alpha)\hat{p}}\right]\gamma + c \\ &= \varphi_t^*.\end{aligned}$$

Note that if relative legal costs are sufficiently high (the probability of type 2 errors sufficiency low) such that $\frac{k}{D} > \beta_t$ and the pool of defendants seeking rule change consists exclusively of good types, then the minimal reward for rule change φ need only be sufficiently above the reward for rule-following to justify the cost of conducting the proceedings to hear evidence and argument:

$$\varphi^* = \gamma + c.$$

The proportion of judges who are willing to allow proceedings in period t is $(1 - G(\varphi_t^*))$. Because judges only conduct these proceedings if they are asked to do so by a defendant, however, the proportion of cases in which evidence and argument are heard is

$$(1-(\hat{p}-p))(1-G(\varphi_t^*)).$$

This proportion is equal to $(1 - G(\varphi_t^*))$ if relative legal costs are low enough to give bad defendants an incentive to invest in presenting a defense and $p(1 - G(\varphi_t^*)$ if only good defendants find the investment in proceedings worth it.

We can now state a basic proposition about the conditions necessary for legal

rule change to occur in period 1.

Proposition 3 *A proportion of judges equal to*

$$(1-(\hat{p}-p))(1-G(\varphi_1^*))\left[(1-\alpha_1)\hat{p}+\beta_1(1-\hat{p})\right]>0$$

will effect a switch from R^e *to* R^n *in period* 1 *if and only if*

$$\frac{k}{D}\leq(1-\alpha_1)$$

and

$$\varphi_1^*<\bar{\varphi}.$$

Proposition 3 demonstrates a key insight: in order for rule change to occur, it is necessary for *both* defendants *and* at least some judges to face incentives to incur the costs associated with rule change. These are the costs of legal evidence and argument in the case of defendants and the costs associated with hearing evidence and argument and risking a mistaken decision for judges. Thus a legal regime can be stuck at R^e, despite the existence of a welfare-enhancing legal improvement R^n. This could occur because the costs to defendants of persuading courts to change the rule are too high ($\frac{k}{D}>(1-\alpha)$) or because no judges perceive an adequate reward to risking rule change ($\varphi^*>\bar{\varphi}$).

Both judicial and defendant decisions depend on judicial error: if error is too high, judges are unwilling to risk changing the rule and/or (good) defendants will not find it worth investing in the effort to change the rule given the high likelihood they will not benefit from the change. This connection to judicial error, however, also reveals a more subtle result. Legal costs that are *too low* might also stymie legal change. Low legal costs encourage bad defendants

to join good defendants in the effort to persuade judges to adopt R^n; bad defendants are exploiting type 2 errors. This increases the threshold reward for rule change φ^* necessary to encourage judges to risk extended proceedings to consider a novel defense. If the risk introduced by bad defendants is sufficiently high (p is low and/or β is high) then this threshold may exceed the upper bound on the distribution of rewards perceived by judges. That is, if legal costs are too low, there may be no judges willing to risk hearing the defendant's case because of the presence of bad defendants in the pool of those seeking to present a defense.

As a corollary of Proposition 3 note that if the conditions for rule change are not met for at least some judges and defendants in period 1, then no rule change will occur in period 2 in the absence of external shocks to the parameters of the system. This expands our understanding of how a legal regime can stay mired at an existing rule despite the availability of a revised rule that, if accurately implemented, would eliminate a persistent welfare-reducing error in the existing rule. This can occur if legal costs are too high or too low, judicial rewards for rule change are too low or if legal human capital is too low (errors are too high.)

The interaction between judicial error and the willingness of both judges and defendants to invest in rule change thus produces the dynamics in the model. If a share of judges in period 1 do adopt R^n, then defendants' total period 1 investments in presenting evidence and argument (Δ) can accumulate as shared legal human capital, available to all judges in period 2. Given that information processing is strictly informative ($i' > 0$), this implies that

$\alpha_2 < \alpha_1$
$\beta_2 < \beta_1$
$\varphi_2^* \leq \varphi_1^*$.

We can therefore state the following with respect to rule change in period 2:

Proposition 4 *If there is no rule change in period 1 there is no rule change in period 2.*

If there is rule change in at least some cases in period 1, then

1) the proportion of cases involving good defendants resulting in rule change is greater in period 2 than in period 1:

$$(1 - G(\varphi_2^*))(1 - \alpha_2) > (1 - G(\varphi_1^*))(1 - \alpha_1);$$

2) if

$$\beta_2 < \frac{k}{D} \leq \beta_1$$

there are no proceedings to consider rule change in cases involving bad defendants in period 2; and

3) if

$$\frac{k}{D} \leq \beta_2 < \beta_1$$

the proportion of cases involving bad defendants resulting in rule change is lower in period 2 than in period 1 iff

$$\frac{(1 - G(\varphi_2^*))}{(1 - G(\varphi_1^*))} < \frac{\beta_1}{\beta_2}.$$

3 Welfare Analysis: Comparing Legal Regimes

Proposition 4 3) introduces the idea that reducing legal errors through the accumulation of legal human capital may have undesirable consequences. Lower error rates encourage more judges to allow defendants to present evidence and legal argument but, unless the probability of a type 2 error has fallen sufficiently to cause bad defendants to drop out of the pool of defendants seeking a to present a defense, this increases the potential for a type 2 error. Whether this results in more or fewer wrongful dismissals for bad defendants then depends on whether the increased number of proceedings for bad defendants is outweighed by the reduced risk of a type 2 error in a given proceeding.

More generally, even though R^n is the 'correct' rule, in the sense that it treats good and bad defendants appropriately, whether a legal regime achieves a higher level of welfare when (some) judges switch to R^n depends on the costs of the new rule. This includes both the costs of presenting evidence and argument and conducting proceedings, and the costs of error–the wasted expenditure if the court is unable to identify the reasons that justify dismissing the claim against a good defendant and the welfare loss that results from dismissing claims against bad defendants.

3.1 Welfare effects of rule change

Let W^* be the level of social welfare enjoyed in a given case when either type of defendant is treated correctly: a good defendant is released from liability or a bad defendant is held liable. Normalize the level of social welfare when either a type 1 or a type 2 error is made to zero. To focus on the impact of the dynamics

of judicial error and legal human capital on welfare, I will assume that if a court was able to restrict the availability of proceedings to good defendants, the welfare gains available from correctly dismissing the claim against a good defendant would justify the costs of those proceedings. Assuming that the judicially perceived cost of hearing evidence and argument c is also the social cost, the assumption is that

$$W^* > c + k.$$

Expected per-case social welfare in period t can then be written as

$$W_t = \begin{cases} (1-p)W^* & if\ \frac{k}{D} > (1-\alpha_t) \\ (1-p)W^* + (1-G(\varphi_t^*))\left[p(1-\alpha_t)W^* - (1-\hat{p})\beta_t W^* - k - c\right] & if\ \frac{k}{D} \leq (1-\alpha_t) \end{cases}$$

Let $W^e = (1-p)W^*$. $W_t = W^e$ if there is no rule change, that is either of the conditions in Proposition 3 are not met: no judges allow and/or no defendants seek proceedings to present evidence and argument to support a rule change.

First observe the following:

Lemma 5 *Proceedings to consider the adoption of R^n increase social welfare in period t ($W_t > W^e$) iff*

$$\left[\hat{p}(1-\alpha_t) - (1-\hat{p})\beta_t\right] W^* > k + c.$$

Then we can show the following:

Proposition 6 *Social welfare increases from period 1 to period 2 ($W_2 > W_1$) if $W_1 > W^e$.*

PROOF. (See appendix)

Proposition 2 is an important result because it demonstrates that so long as some rule change is justified in period 1, then the system is on a path to higher social welfare. This is true even if the greater proportion of judges, facing lower type 1 and type 2 errors, willing in period 2 to consider a possible rule change leads to more bad proceedings and thus a greater risk of a type 2 error. The intuition behind this proposition is that given that the benefit of potentially discovering that the defendant seeking to present a defense is a good defendant outweighs the risk that the effort may lead to a type 2 error in period 1, this is also true for the incremental proceedings to consider rule change in period 2.

Conversely, however, if $W_1 < W^e$, such that period 1 welfare is reduced by any rule change, it may still be the case that some rule change in period 1 is justified. This will be the case if the accumulation of social legal human capital in period 1 generates sufficient reductions in type 1 and type 2 errors. We can easily show the following:

Lemma 7 *There exist parameters such that*

$$W_1 + W_2 > 2W^e$$

and some rule change in period 1 is welfare-promoting even though $W_1 < W^e$.

PROOF. (See appendix)

The fact that the accumulation of legal human capital at cost in period 1 can potentially generate sufficient reductions in errors in period 2 also leads to a somewhat surprising observation about the value of having bad defendants in the pool of defendants seeking rule change.

Proposition 8 *Consider two legal regimes A and B that are identical with the exception that*

$$\beta_1^A > \left(\frac{k}{D}\right)^A$$
$$\beta_1^B < \left(\frac{k}{D}\right)^B$$

implying that in regime A both good and bad defendants seek rule change but only good defendants seek rule change in regime B. Regime A will accumulate more legal human capital in period 1 if

$$\frac{(1 - G(\varphi^{A*}))}{(1 - G(\varphi^{B*}))} > p.$$

Then there exist parameters such that

$$W_1^A + W_2^A > W_1^B + W_2^B.$$

PROOF. (See appendix).

3.2 Comparing Legal Regimes

I turn now to comparisons across legal regimes to determine the welfare impact of different attributes: the quality of judicial information processing, the distribution of judicial rewards, the initial levels of legal human capital, damages and the cost to both the court and defendants of proceedings to present legal evidence and argument. Some of these attributes are policy variables. The case in which rule change is never justified in either period 1 or period 2 is one in which the policy implications are clear, namely that a legal regime should structure judicial incentives that do not reward rule change. The more inter-

esting cases from a policy perspective involve circumstances in which some rule change is warranted. I look first at the case in which rule change is justified even at initial levels of judicial error ($W_1 > W^e$) and then at the case in which rule change in period 1 is justified only by gains in period 2 ($W_1 < W^e$).

3.3 Welfare gains from rule change period 1

Consider two legal regimes, A and B, both of which would benefit from rule change in period 1: $W_1^A > W^e$ and $W_1^B > W^e$. Proposition 6 establishes that if initial levels of judicial error are sufficiently low to justify period 1 rule change without regard to gains in period 2, the level of social welfare achieved in a legal regime depends on how widespread rule change becomes and what further reductions in judicial error might be enjoyed in period 2.

3.3.1 Information processing

Suppose first that A and B are identical in all respects except that they have different information processing functions, with $i^A(\Delta) > i^B(\Delta)$. Regime A is thus more effective at extracting valuable error-reducing information out of the accumulated evidence and legal argument presented to courts; it may be characterized by greater publication of judicial opinions, more effective feedback from experts, or higher levels of judicial specialization or training. Regimes A and B will experience the same degree of rule change in period 1. Assuming this involves some positive accumulation of evidence and argument ($\Delta > 0$), regime A will experience lower rates of both type 1 and type 2 errors in period 2. This implies that judges in A are more willing to change rules than judges in B. Proposition 6 establishes that given our assumption that expected

welfare from proceedings to consider a change to R^n is an improvement on welfare under the existing rule period 1 ($W_1 > W^e$), it is also the case that expected welfare from period 2 proceedings to consider rule change generates value above the level of the existing rule ($W_2 > W^e$). Higher period 2 social welfare in A then results both from more greater judicial willingness to consider evidence and argument directed to rule change and lower judicial errors in the event of such proceedings.

3.3.2 Judicial incentives

Now consider two regimes that differ only in the distribution of judicial incentives. Suppose that in regime A there are more judges with higher judicial rewards for accurate rule adaptation than in regime B and in particular $G^A(\varphi_1^*) < G^B(\varphi_1^*)$. This implies that in period 1, for a given level of judicial error, more judges in A are willing to consider a proffered defense than is the case in B and rule change results in a larger set of case with good defendants in A. The assumption that $W^1 > W^e$ ensures that the gains from more extensive period 1 rule change in cases with good defendants outweighs losses from increased rule change in cases with bad defendants. Regime A also begins period 2 with a higher level of shared legal human capital and lower type 1 and type 2 errors. Higher judicial rewards then magnify the results we obtained with respect to improved judicial processing in period 2: positive expected value proceedings are more widespread in A than B, both because of lower error and because more judges at a given level of error are willing to risk rule change. Taken together, social welfare in A is higher in both periods and the gains come both directly from increased willingness to risk welfare-improving rule change and indirectly from the reductions in legal error and the further

expansion of rule-changing that initial rule-change produces.

3.3.3 Initial judicial error

What if regime A begins period 1 with a higher level of legal human capital and lower errors than regime B? The effect here is analogous to what happens with higher judicial rewards. Suppose that it is either the case that the probability of a type 2 error is sufficiently high to lead bad defendants in both regimes to seek rule change or sufficiently low to exclude bad defendants in both regimes from the pool of those seeking rule change. Then lower errors in A imply that judges in A are more willing to entertain rule change in period 1. Proposition 6 then implies more positive expected welfare proceedings are conducted in A, resulting in even higher gains in A in period 2, through a widening gap between the levels of judicial error in the two regimes.

It is possible, however, that regime B with higher initial legal error could in the long run do better than regime A. As Proposition 8 establishes, if the higher probability of type 2 error encourages bad defendants to seek period 1 rule change in regime B but not in regime A, then more legal human capital may accumulate in B than in A. This could lead to error reductions in period 2 that outweigh the costs of those first period proceedings for bad defendants in B.

3.3.4 Legal costs

Consider two regimes with different legal costs and specifically $c^A + k^A < c^B + k^B$, but no other differences and in particular no difference in relative legal costs ($\frac{k}{D}$). A experiences under these assumptions a lower cost of achieving

rule change and reductions in judicial error and judges that are more willing to conduct positive expected value proceedings to consider rule change in period 1. For both reasons, welfare is higher in regime A.

Now consider regimes that differ in relative legal costs ($\frac{k}{D}$), either because of a difference in absolute legal costs, damages or both. Relative legal costs affect defendants' decisions about whether or not to invest in proposing rule-change. As relative legal costs increase, there are fewer circumstances in which bad defendants are willing to invest; if relative legal costs get high enough, even good defendants are unwilling to invest. If relative legal costs in the two regimes lead the same mix of defendants to invest (all good in both or all good and bad in both), then the legal regimes will see no difference in social welfare coming from differences in the extent of rule change or judicial error; a social welfare differential will arise only through differences in absolute legal costs. If relative legal costs in A are low enough to encourage good defendants to invest, while those in B are too high, the relatively low-cost regime A will clearly be better off given the assumption that $W_1^A > W^e$ and the observation that because no defendants are willing to seek rule change in regime B welfare in that regime is just W^e.

The ambiguous case comes if relative legal costs in A are sufficiently low to cause bad defendants to seek rule change, which they are unwilling to do in the higher cost regime B. Then A experiences fewer proceedings with good defendants (because judges are less willing to risk hearing a defense given the presence of bad defendants in the pool of those seeking rule change) and also endures proceedings with bad defendants. These two effects reduce social welfare in A relative to B. There are two potential offsetting effects, however. First, if lower relative legal costs in A are due to significantly lower

absolute legal costs k, each proceeding is less costly. Moreover, and probably more importantly, as shown in Proposition 8, more legal human capital may accumulate in period 1 in A than B. This higher level of human capital accumulation would produce lower errors in period 2 in A and this period 2 benefit could be sufficient to lead to overall higher welfare in A.

Proposition 9 summarizes the above results.

Proposition 9 *Consider two regimes, A and B, both of which would benefit from rule change in period 1: $W_1 > W^e$. Ceteris paribus, regime A will enjoy a weakly higher level of social welfare under any of the following conditions:*

$$a.\ \ i^A(\Delta) > i^B(\Delta)$$

$$b.\ G^A(\varphi_1^*) < G^B(\varphi_1^*)$$

$$c. K_1^A > K_1^B \text{ and not } \beta_1^A < \frac{k}{D} < \beta_1^B$$

$$d.\ k^A < k^B$$

$$e. c^A < c^B$$

$$f.\ (\frac{k}{D})^A < (1-\alpha_1) < (\frac{k}{D})^B$$

Regime A may experience higher or lower welfare than regime B under the following conditions:

$$g.\ \ K_1^A > K_1^B \text{ and } \beta_1^A < \frac{k}{D} < \beta_1^B$$

$$h.\ \ (\frac{k}{D})^A < \beta_1 < (\frac{k}{D})^B < (1-\alpha_1).$$

3.4 Welfare gains only from rule change in period 2

The more interesting case in which to examine the comparative benefits of different regime attributes is the case in which initial levels of judicial error are sufficiently high that rule change is not warranted on the basis of outcomes in period 1 alone. As stated in Lemma 7 there exist circumstances in which proceedings to consider potential rule change in period 1 will nonetheless generate sufficient welfare gains in period 2, as a result of the accumulation of legal human capital and the reduction in error in period 2.

Consider two regimes A and B in both of which $W_1 < W^e$. We can continue to reach unambiguous policy conclusions for some potential differences between two regimes. Clearly if A has more effective information processing ($i^A(\Delta) > i^B(\Delta)$) period 1 rule change will be justified (achieving $W_1 + W_2 > 2w^e$) in a wider range of circumstances than will be the case in regime B. Moreover, even if rule change is also justified in B, A will experience higher social welfare in period 2. It is also clear that if defendants' absolute (but not relative) costs of a proceeding (k) are lower in A than in B, period 1 rule change in A will be justified in a wider range of circumstances and higher social welfare achieved from period 1 rule change. Again, differences in relative legal costs alone will not affect social welfare if they do not lead to a divergence in the mix of defendants seeking rule change in the two regimes. If, however, higher relative legal costs in B mean that good defendants are unwilling to seek rule change in B but are willing in A, then again we can unambiguously conclude that A will experience valuable rule change and higher social welfare in a wider range of circumstances: B is stuck at the existing rule.

Parameter differences that produce more extensive proceedings in period 1, however, will have ambiguous welfare effects, even assuming that the least well off regime still produces positive welfare gains relative to the existing rule in period 2. This is because increasing the extent of potential rule change in period 1 increases total legal human capital and period 2 error reductions but also increases the costs of achieving these effects. Total social welfare will then depend on balancing the costs incurred in period 1 with benefits generated in period 2. Thus a regime with higher initial legal human capital, lower trial costs or higher judicial rewards may do better, but it may also overinvest in period 1 rule change.

The potential for overinvestment in period 1 also leads to the possibility that a regime may even do worse overall with better information processing and lower relative legal costs. This possibility arises when, even in the better regime, period 2 welfare is still below the level achieved with the existing rule ($W_2 < W^e$). Then any proceedings have negative expected value and the fewer the better. Under these conditions, only if defendants' absolute legal costs, k, (but not relative legal costs) are lower in regime A can we unambiguously conclude that A will be better off.

Propositions 10 and 11 summarize these results.

Proposition 10 *Consider two legal regimes, A and B in both of which $W_1 < W^e$ and confine consideration to cases in which $W_2 > W^e$ in at least one of the regimes. Ceteris paribus, proceedings to conside rule change produce welfare gains in a wider range of circumstances and lead to higher total social welfare in A under any of the following conditions:*

a. $i^A(\Delta) > i^B(\Delta)$

b. $k^A < k^B$

c. $(\frac{k}{D})^A < (1-\alpha_1) < (\frac{k}{D})^B$

Rule change may or may not be justified in a wider range of circumstances and lead to higher total social welfare in A under any of the following conditions:

d. $c^A < c^B$

e. $G^A(\varphi_1^*) < G^B(\varphi_1^*)$

f. $K_1^A > K_1^B$

Proposition 11 *Consider two legal regimes A and B and assume that* $W_1 \leq W_2 < W^e$ *in at least one of the regimes. Then A unambiguously achieves higher social welfare than B only if*

$$k^A < k^B.$$

4 Conclusion

We began with the question of which legal regimes better support economic growth and the development of markets. The analysis in this paper suggests that making progress on that question will require moving beyond the simple dichotomy between common law and civil code regimes that has thus far dominated the literature. In this model the important distinctions between legal regimes are found not in the reliance on code versus caselaw but rather in the institutional determinants of judicial incentives and the capacity for a legal regime to generate investments in legal human capital that reduce legal error. Furthermore, there is more to the development of an effective legal regime than the legislation of optimal (static) legal rules and the alignment of

judicial incentives with social welfare. Even good faith judges face the problem of solving the difficult challenge of correctly analyzing and implementing legal rules, particularly when the environment is changing over time and space.

I have identified five parameters that shape the capacity of a legal regime to adapt law to local and changing conditions so as to promote social welfare: (1) the distribution of judicial rewards for rule-adaptation; (2) the cost of producing evidence and legal argument for presentation to a court; (3) the level of damages; (4) the initial or exogenous level of judicial error and (5) the extent to which the legal regime transforms individual case information into informative–error-reducing–shared legal human capital. Each of these parameters is linked in important ways to the institutional environment that defines a legal regime. Judicial rewards for rule-adaptation, for example, are a function of the organization of the judiciary and the nature of the information available to those who make up a judge's audience. A civil service judiciary for example (common in civil code countries) arguably has a more insular, professional audience that is focused on legal reasoning–senior judges–than does a common law judiciary that is evaluated by a wide public audience that is more interested in the consequences of legal outcomes than the competence of legal argument. Judges in a civil service judiciary also enter the judiciary as junior magistrates, fresh out of law school, and face more systematic and frequent evaluation and promotion than do common law judges, arguably generating a system which rewards higher levels of rule-following and less individual creativity (Ramseyer and Rasmussen 1997, Posner 2005). Certainly this is the way in which the philosophy of judging is thought to differ as between common law and civil code regimes (Merryman 1985) [5] . My analysis here suggests that

[5] As Merryman explains: "The basic difference is epitomized in [a] quotation from

there are institutional attributes that generate the judicial behavior otherwise explained by ideology or culture.

Moreover, the analysis emphasizes that the phenomenon of judicial orientation to rule-following and rule-adaptation is not merely explained by the institutional determinants of judicial rewards. Even judges who face excellent incentives to adapt the law to new information may, quite rationally, elect not to do so in light of what they recognize is their limited knowledge about what constitutes a welfare-improving change in the law. And even if judges are willing to risk rule-adaptation, they are dependent on the willingness of litigants to make the costly investments (at risk of being wasted if they do not secure the desired legal rule change) in information and legal argument on which the accuracy of judicial decisionmaking depends. It is this dynamic interaction between the incentives of judges and litigants that shapes the evolution of legal human capital and judicial error and thus the capacity of a legal regime to move towards welfare-improving rule changes. Thus what we observe

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the German legal scientist Rudolph Sohm: "A rule of law may be worked out either by developing the consequences that it involves, or by developing the wider principles that it presupposes...The more important of these two methods of procedure is the second, i.e., the method by which, from given rules of law, we ascertain the major premises they presuppose." . . . An American legal realist would resist the implication that rules of law should be the principal objects of his study or the suggestion that there are only these two ways of studying them. But if pushed to Sohm's choice, most law professors, judges, and lawyers in the United States would easily and quickly choose the first of his two methods. Most civil lawyers would still choose the second." (p. 67) Elsewhere Merryman states simply: "The civil law has [ ] sacrificed flexibility for certainty. In contrast, the common law tends to strike the balance between them more equally."

behaviorally–the extent to which judges in fact stick to existing rules or adapt them to new information–is also importantly dependent on the institutions that determine legal costs–such as the organization and regulation of the legal profession (Hadfield 2000); exogenous judicial error–such as the use of formal judicial training or requirements of extensive practice experience as a lawyer; and judicial information-processing–such as opinion-writing, publication and expert commentary practices. (Common law regimes, for example, tend to produce extensive, publicly available judicial opinions laying out factual findings and legal reasoning; civil code regimes tend to produce detailed academic commentary, published alongside short, relatively opaque, legal opinions with extensive judidical analysis sometimes confined to documents distributed only within the judiciary (Lasser 2004).)

The potentially ambiguous welfare effects of what we might expect to be clearly beneficial attributes of a legal regime facing a novel environment–lower rates of error or legal costs, for example–demonstrates that ultimately our understanding of how legal systems evolve and how they can be manipulated to evolve more effectively will depend on empirical analysis. In a companion paper (Hadfield 2008) I explore what cross-country information we have about the institutional determinants of the parameters of this model. The paucity of data on these parameters, in light of the results here showing the role they may play in legal adaptation, highlights the need for two critical empirical projects. First, we clearly need to deepen our attention to the specifics of the institutional environments in different countries that affect judicial incentives and the accumulation of legal human capital. Classifying regimes as either civil code or common law is not likely to prove helpful. Rather, we need to know far more, country-by-country, about the structure of judicial rewards and the

information available to those who judge the performance of judges and hence influence the structure of judicial rewards and penalties. This suggests a far more refined comparative project than the one that currently engages comparative scholars. The model in this paper suggests that the key variables include the identity of those who evaluate judges and thus determine their reward structure (senior judges? politicians? lawyers? journalists?) and the information available to those evaluators (are decisions published? with what level of detail on factual findings and reasoning? is the information filtered by a judge or available in its original form as verbatim testimony and exhibits?). The structure of courts is important (are judges identified? do they sit alone or in panels? how collegial are courts? are opinions attributable to individual judges? who determines evidentiary questions?) The exposure of judges to the welfare effects of their decisions may also be important (have judges been exposed to the practical problems of clients? do they enter the judiciary directly from their legal education or only after a period of practice? what training do judges have in evaluating evidence about the impact of legal rules and assessing policy questions?) And, critically, how is information learned by judges in a particular case diffused through the system (again, are decisions published and how detailed is the presentation of facts and reasoning?)

With a more refined descriptive catalogue of differences between legal regimes, we will be in a position to conduct the central empirical project: more careful study of the relationship between these institutional variables and economic growth. As many have noted, the classification of regimes on the basis of legal origins is somewhat crude and makes it difficult to sort out the effect of a particular legal history from other cultural or human capital imports. The analysis in this paper suggests more specific legal variables–which undoubtedly

vary across countries that are otherwise classified as belonging to a particular legal family and over time within countries–on which empirical work can focus in the effort to assess the role of legal factors in economic growth and development. Not only might this help disentangle confounding effects from the inheritance of legal rules bundled with human capital and other cultural attributes, but it may also help to increase the precision of our estimation techniques, as we can make use of the substantial variability in legal regimes, variability that is masked by the macro division into legal families.

Further theoretical work is also clearly needed. I have only been able to sketch how the more complex dynamics at work may play out, both in positive and normative terms, in particular environments. Moreover, in order to simplify the analysis, I have suppressed several features of litigation and the response to litigation that clearly will have an impact on the incentives of judges, the accumulation of legal human capital and the path of legal evolution. Settlement behavior is obviously a critical component of litigation and as many have noted, settlement is not random. It has a systematic effect on the nature of the cases that reach final decision in a court and thus on the information available to courts. Hylton (2006) considers some of these effects of settlement on evolution. Legal rules also affect activity levels, the behavioral choices plaintiffs and defendants make about the conduct implicated by a legal rule. As I have argued elsewhere (Hadfield 1992), this will also affect the information set reaching a court.

A more general model would also relax the assumption that only defendants present evidence and argument, and analyze the strategic behavior that surrounds information revelation to a court. Several economists have explored in particular the impact of signaling, strategic revelation and the competition

between plaintiff and defendants on the nature and amount of the evidence presented to a court. (See, for example, Milgrom and Roberts 1986, Shin 1994, Shin 1998, Posner 1999, Daughety and Reinganum 2000) This work has focused on the impact of strategic behavior on the accuracy of a court's determination of the facts in a given case. The model presented in this paper identifies another important effect that may flow from strategic evidentiary behavior, namely the effect on the informative quality of the legal human capital stock and thus on the likelihood of error in the legal system as it evolves. And although I have de-emphasized the importance of the relative reliance on statutes or regulation as opposed to judge-made law because of the exaggeration of this difference in the existing literature, it will ultimately be important in a fuller model to situate the analysis of learning through litigation in the context of legislative determinations about the extent to which regulation will be accomplished through courts as opposed to legislatures and agencies. If, for example, there are significant obstacles to the accumulation of legal human capital that do not confront the development of bureaucratic expertise in legislatures and agencies, optimal legal regulation may involve heavier reliance on statutes and regulations. In the end however, even the most refined statutes require interpretation and application and hence depend on the quality of legal human capital available to judges.

Finally, it will be important for further work to assess more carefully the trade-offs between controlling corruption within courts and facilitating the capacity of judges to engage in welfare-promoting rule adaptation. The effort to control corruption is a key reason for many of the institutional features that this analysis identifies as critical to the capacity of a legal regime to learn and adapt over time. But the trade-offs may not be as stark as they first appear. The

capacity of a system to detect corruption is also dependent on the level of legal human capital: indeed, this is one of the principal justifications for public and reasoned decisionmaking. Like rule adaptation, the elimination of corruption may be best analyzed as a dynamic problem of structuring the mechanisms that contribute to the organic accumulation of legal human capital.

One of the theoretical issue that I have suppressed in this model is a critical one for our understanding of the dynamics of the adaptation of legal rules, namely the extent to which judges shift their understanding of which rule is the 'existing' rule as a result of observing that other judges have adopted a new rule. Most legal regimes, in fact, appear to have some notion of precedent–whether it takes one decision (as is putatively true in common law jurisdictions) or several (as in countries with a practice of *jurisprudence constante*) to cause judges to change their belief about which rule to follow if they wish to be rule-followers and not rule-changers. The particular structure of this model makes it difficult to predict the effect of introducing the concept of precedent. Indeed, it shows the difficulty of conceptualizing precedent once we recognize that precedent–rule-following–is a behavior and not an institution. We might think that a strict notion of precedent simply eliminates any reward for following the older rule, in which case all judges conduct proceedings. As we have seen, that would lead to higher social welfare in a legal regime if the expected value of any proeeding is positive–if the probability of accurately finding good defendants not liable is worth the risk of type 2 errors and the total costs of proceedings. But if first period returns alone do not justify proceedings, having all judges conduct proceedings is likely to result in lower welfare than in a regime that confines the experimentation with the new rule to a subset of judges. A similar observation could be made about any notion

of precedent that can be characterized as a reduction in the (relative) benefit of following the old versus experimenting with the new rule. Furthermore, following Landes and Posner (1976) a model that builds in precedent would need to consider the impact of a stock of precedent (subject to depreciation) on the predictions and decisions potential litigants make and thus (Hadfield 1992) the sample of information available to courts in the adaptation process. I leave a treatment of these subtle and important issues to future work.

To the extent that there are policy prescriptions flowing from the simplified analysis I have presented they suggest that the choice facing transition and developing economies is not between writing codes or borrowing volumes of caselaw. Rather it is a series of choices about institutional attributes such as the publication and expansiveness of legal opinions, the institutional structuring of judicial incentives for rule adaptation and the mechanisms by which information about the welfare effects of particular rules (or, more to the point, particular interpretations of statutory provisions) makes its way to judges and those who evaluate judges. The model also links the effectiveness of courts to the organization and regulation of the legal profession, which influences the cost of legal proceedings to both litigants and courts (Hadfield 2000). The model also suggests that countries attempting to transition quickly to a legal regime that supports economic growth and market development may need to take specific steps to overcome both inadequate judicial incentives and an initially high level of legal error. Particularly in systems transitioning from socialist or communist governance to market democracy, it is likely that the shared level of legal human capital about the relationship between legal rules and outcomes will be low by virtue of the lack of experience with markets. In these settings, policy efforts to effectively import legal human capital into the

profession and judiciary may be necessary. This has implications, for example, for the rules governing the access of foreign lawyers and law firms to practice in the new regime as well as for the access the profession and judiciary has to the work of lawyers and courts in other jurisdictions.

The principal lesson is that law that supports economic growth and market development has to be seen in dynamic terms, as an organic entity that evolves over time in response to local and changing conditions. In order for that process to take place, it is necessary for judges to face incentives that support welfare-improving rule adaptation and for litigants to invest in presenting to courts the evidence and arguments they need to evaluate proposed rules or statutory interpretations. The institutions that structure incentives for judges and litigants to learn over time and the mechanisms by which this learning is translated into shared legal human capital play an important role in determining the dynamic quality of a legal regime.

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Appendix

Proof of Proposition6

PROOF. We need to show $W_2 > W_1$.

$$\begin{aligned} W_2 - W_1 &= (1 - G(\varphi_2^*)) \left[p(1-\alpha_2)W^* - (1-\hat{p}_2)\beta_2 W^* - k - c\right] - (1 - G(\varphi_1^*)) \left[p(1-\alpha_1)W^* - (1 - \right. \\ &= (1 - G(\varphi_1^*)) \left[p\left[(1-\alpha_2) - (1-\alpha_1)\right]W^* + \left[(1-\hat{p}_1)\beta_1 - (1-\hat{p}_2)\beta_2\right]W^*\right] + \left[G(\varphi_1^*) - G(\right. \end{aligned}$$

Then, assuming $i' > 0$ we have that

$$\begin{aligned} &\alpha_2 \leq \alpha_1 \\ &\beta_2 \leq \beta_1 \\ &\varphi_1^* \leq \varphi_1^*. \end{aligned}$$

which implies, among other things, that $\hat{p}_2 \leq \hat{p}_1$. Then $W_2 > W_1$ iff

$$\left[G(\varphi_1^*) - G(\varphi_2^*)\right] \left[p(1-\alpha_2)W^* - (1-\hat{p}_2)\beta_2 W^* - k - c\right] > 0.$$

This condition holds because

$$[p(1-\alpha_2)W^* - (1-\hat{p}_2)\beta_2 W^* - k - c] \geq [p(1-\alpha_1)W^* - (1-\hat{p}_1)\beta_1 W^* - k - c].$$

Then from Lemma 5 we can conclude from the assumption that $W_1 > W^e$ that the RHS of the above expression is positive.

Proof of Proposition 8

PROOF. (demonstrating using uniform distribution that $\Delta^B > \Delta^A$ can obtain; to be supplied)