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Legal efficiency and consistency☆

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ABSTRACT

We analyze the efficiency and consistency of court decisions under common and civil law. As a leading example, we study the enforcement of property rights. Judges are of two types: some are conservative and follow the precedent or the statute, while others maximize social welfare. When courts intervene ex-post, after the relevant economic choices have been made, welfare-maximizing courts face a "commitment problem." Such an ex-post bias has implications on the relative "consistency" and efficiency of each legal system. Surprisingly, we find that court decisions are more consistent under common law than under civil law. The welfare comparison between the two systems is, instead, ambiguous. However, in changing economic environments, common law is more likely to dominate civil law because of its greater adaptability.

1. Introduction

In the last two decades, a large empirical literature has investigated the implications of "legal origins" on a wide range of economic variables, such as investor protection, contract enforcement and labour market regulation.[1] As pointed out by La Porta et al. (2004), "...despite the evidence, the exact mechanism through which legal origin matters has remained uncertain." To investigate this issue, this paper models in a stylized way judicial decision making under common and civil law. We compute the welfare consequences of the two legal regimes and investigate the conditions under which one regime is preferable to the other. Besides efficiency, we also identify an additional desideratum of the legal system: the "uniformity"

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[1] In a nutshell "legal origins" is a short-hand for whether a country's legal system can be traced back to British common law or French civil law. See La Porta et al. (1997, 1998, 1999), Acemoglu and Johnson (2004), Beck et al. (2003b), Spamann (2010), Djankov et al. (2002), Rajan and Zingales (2003), Botero et al. (2004), Lamoreaux and Rosenthal (2005), La Porta et al. (2008) and Nunn (2009) among many others.

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or "consistency" of the law as embodied by court decisions.[2] We ask whether legal consistency is achieved under the two legal systems and whether there is a trade-off between legal consistency on the one hand and equitable decisions and flexibility on the other.

Following traditional comparative law doctrine, we assume that common law is established by judicial precedents and decisions.[3] *Stare decisis* is what requires courts under common law to conform to decisions reached by previous courts.[4] Conversely, under civil law the center of authority is the legislature, and the role of civil law judges is to interpret and apply a body of statutes and administrataive regulations.[5] We recognize that in practice it is hard to identify "pure" forms of either system (Zweigert and Kötz, 1998). Under common law the body of statutes has expanded dramatically through time (Calabresi, 1982) and precedents play some role also under civil law (Hondius, 2005). Nevertheless, we believe that our analysis can shed new light on the relative merits of precedents and statutes.[6]

We assume that judges can be of two types. A fraction of judges are "conservative" and mechanically follow the precedent (under common law) or the statute (under civil law). The remaining judges are "active" and maximize social welfare. To some extent, this distinction captures the two main legal theories in jurisprudence (Summers, 1982). On the one hand, proponents of legal formalism argue that judicial discretion poses a threat to legal certainty and to democratic legitimacy.[7] On the other hand, the followers of instrumentalism believe that judges retain a considerable amount of discretion to fill in the gaps in existing laws and that the law should be used as a tool to balance competing societal interests.

A key feature of our analysis is that "active" judges suffer from time-consistency problems. Consider an environment in which the ex-ante optimal law is suboptimal ex-post, when the relevant economic choices are *sunk*. Such an *ex-post bias* generates a hold-up problem and may have serious consequences on economic outcomes. A leading example is the enforcement of property rights. Consider a possible investment that increases output. Active courts have the incentive to announce strict property-right enforcement in order to encourage investment. However, after investment has been sunk, judges are tempted to choose a weaker ruling. Foreseeing this, investment will be sub-optimally low.[8] As we show below, the common and civil law regimes deal differently with the ex-post bias. This has novel implications in terms of relative efficiency and consistency.

While the literature has devoted considerable attention to the study of judicial partisan bias, stemming from courts that have preferences favoring one of the two sides in the legal dispute,[9] time-inconsistency problems in court decision-making remain relatively understudied. Anderlini et al. (2014) analyzes the implications of time-inconsistency problems that afflict courts in the common law regime, and is in some sense a point of departure for this paper.[10]

Aside from numerous modeling differences, the main contribution of this paper relative to Anderlini et al. (2014) is twofold. First, we provide a model of the civil law regime. This allows us to compare the two legal traditions. Given that time-consistency problems are pervasive in courts, we believe that our comparative analysis constitutes a meaningful extension to the legal-origin literature. Second, we introduce stochastic shocks which change the optimal law. This modeling choice is novel and distinguishes our paper from most of the related literature which assumes that the optimal law is constant (see for example Ponzetto and Fernandez, 2008; Gennaioli and Shleifer, 2007a; Gennaioli and Ponzetto, 2017). By considering a time-varying optimal policy, we are able to identify the degree of adaptability of the two legal traditions. The "adaptability" channel is often put forward to explain why legal institutions have real consequences (Beck et al., 2003a; Beck et al., 2005). A widespread view (Hayek, 1973) is that judge-made law is more responsive than statutes to changing economics circumstances. Our set up in this paper allows this claim to be tested.

Civil law partly solves time-inconsistency problems by limiting court discretion. Decisions by courts must lie in an interval centered around the written statute. This assumption captures the idea that judicial discretion can be limited but it cannot be completely taken away from civil law judges. We show that under civil law, the statute is set strategically to offset

[2] Terminology is somewhat tricky here. It is common to refer to "legal certainty" in the legal tradition. In our set up, there is no randomness in the decisions of any court, and therefore this seems an inappropriate term in our context. Here, we focus on a closely related concept. By "consistency" or "uniformity" we mean the degree to which similar cases (identical ones in fact) will yield a similar (or indeed the same) court decision. To avoid confusion, from now on we will refer to this property of a legal system as "consistency" without further comments.

[3] See Calabresi, (1982) ch. 9, for a discussion of the democratic legitimacy of court-made law.

[4] *Stare decisis* is a Latin term which literally means "to stand by things decided." The meaning of this rule is well captured by Radin (1933): "If a court follows a previous decision, because a revered master has uttered it, because it is the right decision, because it is logical, because it is just, […] that is not an application of stare decisis. To make the act such an application, the previous decision must be followed because it is a previous decision and for no other reason." See also Peters (1996).

[5] Civil law refuses any binding effect to previous judicial interpretation. According to Von Mehren (1957), ch. 16, this principle holds in France, where even precedents by a hierarchically superior court are never binding, and to a lesser degree in Germany. On the German law, see also Oppermann (2018).

[6] There are, of course, other (unmodeled) differences between the two legal traditions. For instance, the two systems differ in the ways of exposing evidence in court: adversarial (under common law) vs. inquisitorial procedure (under civil law). Moreover, judges under common law are elected or appointed by the executive (usually the legislative body must confirm the appointment), while under civil law there is a career judiciary with training and promotion inside the ranks.

[7] "The main danger in judicial interpretation […] is that judges will mistake their own predilections for the law," Scalia (1989).

[8] There are many other examples of environments in which there is a potential time-inconsistency in judicial decisions. Consider a court that examines a patent infringement case. Ex-ante, the optimal breadth of the patent takes into account the incentives to invest in R&D. Ex-post, however, it is optimal to open the market to competition. In tort law, an ex-post bias might also arise when courts apply the "economic loss rule" (see Niblett et al., 2010).

[9] See, for instance, Gennaioli and Shleifer (2007b), Ponzetto and Fernandez (2008), Guerriero (2016a), Guerriero (2016b).

[10] We return to the relationship between this paper and Anderlini et al. (2014) in greater details in Section 2 below.

the incentives of active courts to deviate ex-post. In anticipation of the application of the law, statutes prescribe "stricter" rules than the ex-ante optimum. This improves civil law welfare, but cannot generally lead to full efficiency. We show that the application of the law is not uniform. Conservative judges are excessively strict because they interpret the law literally, while the active ones are excessively lenient. Judicial heterogeneity leads to legal inconsistency in the sense we have discussed above.[11]

Under common law, instead, lawmaking power has been delegated to judges, making time-consistency problems potentially severe. We show that the rule of precedent has a disciplinary role. The threat that in the future conservative judges will follow inefficient precedents helps sustain the ex-ante optimal law. The disciplinary role of stare decisis is more effective when the proportion of conservative judges is higher, because this implies that deviations from the ex-ante optimal decision have more lasting consequences. We also show that the rule of precedent helps achieve legal consistency by linking current judicial decisions to future ones. Thanks to *stare decisis*, all types of common law court enforce the same decisions, making common law more consistent.

However, the welfare comparison of the two legal systems is ambiguous. We show below that civil law dominates in terms of efficiency when judges are relatively homogenous (that is, they are mostly conservative or mostly active) and/or when judicial latitude under civil law is sufficiently narrow. On the other hand, we show that in the context of our model, common law is unambiguously better in achieving legal consistency than civil law. Notice that this result goes against the common view, especially among civil law advocates, that statutes lead to greater consistency in the law than precedents.[12] We emphasize that this result is obtained in a model where judges have the same preferences, but differ with respect to their legal reasoning (some judges are conservative, while others maximize welfare). This drives the difference between our findings and those in the literature that studies partisan judges.

In the second part of the paper, we introduce shocks to the environment that change the optimal law and study how the two legal traditions adapt. Shocks introduce a fundamental trade-off between commitment and flexibility: on the one hand, rules (either statutes or precedents) provide valuable commitment, thus limiting inefficient decisions. But on the other hand, there is a cost of reduced flexibility as rules cannot be made contingent on every single shock or contingency, and some discretion may be optimal. In the context of our stylized model, we find that civil law courts do not respond to shocks to the environment. Conversely, the common law regime does innovate, but it proceeds by "slow advances".[13] Because of the inertia introduced by the rule of precedent, common law courts are cautious in changing the precedent when facing a shock because they are afraid that in the next period — when a new shock occurs — this new precedent may not be justified. With respect to the "size" of the adjustment, what matters is the persistence of the shock (common law courts change the law by a smaller amount after a temporary shock) as well as the proportion of judges that strictly apply the rule of precedent (if this proportion is high, the expected inertia of common law is stronger and current adjustments are smaller as a result). We find that when shocks are persistent, welfare under common law is strictly higher, because of its greater adaptability, than welfare under civil law for a broader range of parameters.

It is generally believed that precedents are more adaptable than statutes to changing economic conditions. Such adaptability might account for the findings of La Porta et al. (1998) of the superior development of financial markets in common-law compared to the civil-law countries. This paper shows that common law courts respond to shocks more than civil law courts, but less than optimally, especially when shocks are temporary.

The remainder of the paper is organized as follows. Section 2 reviews the literature. The model is introduced in Section 3. Section 4 and 5 solve the model under common law and under civil law. In Section 6 we compare the two regimes while in Section 7 we analyze how the two legal traditions adapt to changing economic conditions. Section 8 concludes. For ease of exposition, all proofs have been relegated in the Appendix.

2. Literature review

The hypothesis that common law is efficient (and, possibly, superior to civil law) has been widely investigated by the literature on law and economics. According to Posner (2003), possibly the most influential scholar to endorse this view, judge-made laws are more efficient than statutes, mainly because courts, unlike legislators, have personal incentives to maximize efficiency.[14] Evolutionary models of common law have called attention to explanations other than judical preferences. For instance, it has been argued that case law moves towards efficiency because inefficient rules are more often (Priest, 1977 and Rubin, 1977) or more intensively (Goodman, 1978) challenged in courts than efficient ones. Gennaioli and Shleifer (2007b) build a model of precedent formation by appellate courts and show that common law evolves towards better legal rules only under special conditions. In their model, the evolution of precedents is driven by judicial partisan bias, and new information is added as precedents evolve. The intuition for this result is that polarized judges have

[11] See Footnote 2 above.

[12] For a discussion, see Merryman (2007) and Garoupa and Morriss (2012). See also again Footnote 2 above on the use of the term consistency.

[13] Referring to the role of the judge, Cardozo famously wrote: "Justice is not to be taken by storm. She is to be wooed by slow advances", Cardozo (1924) p. 133.

[14] In Hadfield (1992) however, efficiency-oriented courts may fail to make efficient rules because of the bias in the sample of cases observed by courts.

stronger incentives to distinguish the existing precedent in order to correct the bias of the previous court.[15] As in Gennaioli and Shleifer (2007b) common law courts in our model should be viewed as appellate courts since they have the ability to change the state of precedents.[16] In a fully dynamic model where courts have to spend time and resources investigating a case, Baker and Mezzetti (2012) find that precedents might converge to an inefficient set of legal rules.[17] Fon and Parisi (2006) study the dynamics of precedents under civil law. In their model, civil law courts take past decisions into account when there is a sufficient level of consistency in past judicial decisions ("jurisprudence constante").[18]

Other papers have explicitly compared judge-made laws and statutes. In a pioneering paper, Glaeser and Shleifer (2002) analyze common law (independent juries) and civil law (bright line rules) in a static model with particular emphasis on the ability of each system to control law enforcers. Ponzetto and Fernandez (2008) study a setting where judges have idiosyncratic preferences and overruling is costly. They show that case law converges to an asymptotic distribution with mean equal to the efficient rule. In the long run, as precedents become more consistent, case law eventually dominates statute law by making better and more predictable decisions. Recently, Guerriero (2016a,b) has also compared common law and civil law and shown that common law is preferable when preferences are heterogeneous and/or political institutions are inefficient.

The disciplinary role of *stare decisis* has been pointed out by Anderlini et al. (2014). However, this paper differs from Anderlini et al. (2014) in a number of important aspects, some of which we already mentioned above. First, this paper proposes a model of the civil law regime, while Anderlini et al. (2014) focuses exclusively on the common law regime. Second, this paper simplifies the rule of precedent with respect to Anderlini et al. (2014). In particular, in the latter paper the common-law equilibrium is generally in mixed strategies. By simplifying the precedent technology we are able to consider a continuum of judicial policies, while in Anderlini et al. (2014) the law only takes two values. Third, in Anderlini et al. (2014) court payoffs are exogenously given, while in this paper they are micro-founded by having a simple model of investment decisions. Fourth, compared to Anderlini et al. (2014), our focus is not only on legal efficiency, but also on legal consistency. Finally, in this paper we introduce economic shocks and study the adaptability of each legal system.[19]

The related literature on rules versus standards (Posner, 1990; Kaplow, 1992; Sunstein, 1995) has focused on other merits of rules. For instance, the benefit of predictability, which is likely to result in more adherence to norms, more productive behavior, fewer disputes, and more settlements. Rules reduce arbitrariness and bias: they bind a decision maker to respond in a determinate way to some specific triggering facts. Finally, rules reduce the cost of enforcement: they minimize the need of time-consuming balancing of all relevant interests and facts.[20]

Finally, this paper is also related to a recent political economy literature which endogenises property rights and studies the relation between the political structure and the extent of property right protection. Acemoglu (2009), chapter 22, Besley and Ghatak (2010) and Besley (2018) among many others analyze property right enforcement in the presence of a commitment (or hold-up) problem that is similar to the one studied here.[21] In all of these contributions, the lack of property rights (or of their enforcement) can be thought of as leading to an *expropriation* of the proceeds of one party's investment by a third one, with the consequent suboptimal incentives to invest.

In another vein Guerriero (2016c, 2018) focuses on other considerations shaping the choice of the optimal level of property right protection.[22] In the presence of transaction costs that impede trade, he shows that strong property right protection is generally inefficient because it implies misallocation, that is some high-valuation buyers are excluded from trade. Interestingly, Guerriero (2016c) finds that the strength of property rights should increase with preference heterogeneity.

3. The model

We build a stylized model to capture the courts' trade-off between providing incentives and ex-post efficiency. Consider an economy with a continuum of locations distributed on the interval [0,1]. Time is indexed by t with $t = 1, \ldots, \infty$. Complete

[15] Judicial bias is interpreted in a broad sense that ranges from "idiosyncracies" in the judges' preferences (Bond, 2009; Gennaioli and Ponzetto, 2017) to plain "corruption" of the courts (Ayres, 1997; Bond, 2008; Legros and Newman, 2002 among others).

[16] The efficiency rationale for an appeal system has been extensively studied (e.g., Daughety and Reinganum, 1999; Daughety and Reinganum, 2000; Levy, 2005; Shavell, 1995; Spitzer and Talley, 2000), but its differential impact in civil and common law is far from obvious, both theoretically and empirically.

[17] See also Callander and Clark (2017) who study common law dynamics in a model with judicial learning. Gennaioli and Ponzetto (2017), instead, study the two-way feedback loop between legal rules and the economy.

[18] For an analysis of the implications of either persuasive or binding precedents on the courts' incentives to acquire information see Chen and Eraslan (2016).

[19] See also Anderlini et al. (2013) for an analysis of the implications of full discretion and commitment to an incomplete law in an endogenous growth model with vertical innovation. That paper, however, focuses on a rather different question: the rate of growth under different legal regimes. It also does not analyze the rule of precedent, there is no judicial heterogeneity and civil law judges do not have any latitude in interpreting the code.

[20] Shavell (2007) studies the optimal scope of discretion of a rule, which should balance the informational advantage of adjudicators and the cost of delegation due to the adjudicators' bias. Kaplow (1992) argues that when the frequency with which similar cases arise is high, it is better to incur the one-time, up-front investment to create a rule.

[21] See also Cervellati et al. (2007) and Diermeier et al. (2017). Of course pointing out the centrality of the hold-up problem goes back to Grossman and Hart (1986) and Hart and Moore (1990).

[22] See also Bar-Gill and Persico (2016) and Segal and Michael (2016).

information of preferences and of the structure of the game form is assumed throughout. The model includes two types of players: private agents and courts.

3.1. Private agents

In each location $i \in [0, 1]$ there are two private agents, A and B, who live for one period. Agents are assumed to be homogeneous across locations. At the end of each period, A and B are replaced by two agents with the same characteristics. The population size of both types of agents is normalized to one. Agent A in location i makes a costly and non-contractible investment $e_{i,t} \in [0, 1]$ that increases output.

Agent B does not take any action. We denote by $p_t \in [0, 1]$ the law that is enforced in the economy at time t. We will discuss law-making in Sections 4 and 5 below. For tractability we assume the following utilities for all $i \in [0, 1]$:

$$u_i^A(e_{i,t}, p_t) = p_t e_{i,t} - \frac{1}{2} e_{i,t}^2, \tag{1}$$

$$u_i^B(e_{i,t}, p_t) = (1 - p_t) e_{i,t}. \tag{2}$$

The first term of (1) is the benefit of A's investment choice $e_{i,t}$ to A himself. The second term is A's cost of investment. We interpret the first term as a "gross return" from investment $e_{i,t}$, multiplied by the share p_t of such return that A is able to appropriate, to which we will return shortly.

From (2), we define B's payoff as the gross return from A's investment, multiplied by the share 1 - p_t of such gross return that B is able to expropriate from A.[23]

With this interpretation of the payoffs in (1) and (2) the parameter p_t represents the level of property rights protection that is enforced in the economy.[24] In particular, $p_t = 1$ stands for "absolute" property rights so that A appropriates the entire gross return from his investment. At the opposite extreme, when $p_t = 0$, B is able to expropriate the entire gross return from A's investment — property right protection is as weak as can be in this case.[25]

From (1) we compute the optimal investment decision of party A for a given law:

$$e_{i,t} = p_t. \tag{3}$$

The higher p_t is, the higher is A's investment. Weak property rights decrease investment because they represent a tax on A agents, that see the return on their investment partially seized by B.[26] The key channel through which the law affects economic outcomes in our model is captured by Eq. (3).

3.2. Courts

The law for the entire economy is enforced by an infinitely-lived court.[27] In each period, the identity of the court enforcing the law is randomly drawn from the pool of courts and is observed by A agents before they undertake investments. There are two types of courts. A fraction $\gamma \in [0, 1]$ of courts are *conservative* (denoted by c) and make decisions in a mechanical way. Under common law, conservative judges strictly follow the precedent, which coincides with the enforced law from the previous period. Under civil law, conservative judges strictly follow the statute. There are different reasons why judges are conservative: because they adhere to *legal formalism* (that is, they believe that the law consists of a body of rules and judges have no authority to act outside these rules), because there might be some cost (e.g, career concerns) of deviating from the code or precedent, or because judges follow simple behavioural rules.[28]

A fraction $(1 - \gamma)$ of judges are *active* (denoted by a) and select the law to balance competing societal interests under the constraints that are specific to each legal regime. We will discuss in more detail the two legal regimes in Sections 4

[23] For further concreteness we could think of A as owning a plot of land and deciding how much to invest, which in turn generates some gross output and has a cost, as in (1). Then B, whose land surrounds A's plot, can literally expropriate (or not as property rights protection allows) the gross output as it crosses his land to reach the market. Examples of expropriation (or "tunneling") allowed by courts are discussed in Johnson et al. (2000).

[24] The thrust of our results remains unchanged under a variety of specifications for (1) and (2). For a different specification, see a working paper version of this article (Anderlini et al., 2016), where B's payoff is separable in the two terms that represent the external effect that A's investment produces and the parameter p_t governing the level of property rights protection.

[25] See Levine (2005) for a review of the literature on law and property rights. There is a large body of work that analyzes conditions under which the allocation of property rights restores efficiency in models where private agents lack commitment (see, for instance, Maskin and Tirole, 1999). This literature, however, assumes that active courts can fully commit to future actions.

[26] As discussed in Besley (1995), there are other possible explanations for the positive relation between property right protection and investment. For instance, better rights make it easier to use their property as collateral, which diminishes the constraints on funding investments. Alternatively, investment is encouraged if improved transfer rights make it easier for individuals to rent or sell their land.

[27] Whether or not parties actually go to court is not essential for our arguments. The level of property right protection that is observed in the economy is the one that judges would choose if parties had gone to court. If this were not the case, given that the two parties have opposite preferences about p, and provided that going to court is not costly, one of the two parties would bring the other to court.

[28] "[When judges] are trained to think in mechanical and doctrinal rather than functional and substantive terms, mental habits are developed that stand in the way of the perception requisite to a truly functional approach." Von Mehren (1957), p. 825.

and 5 below. Let $\mathbf{e_t}$ denote the vector of investments by all agents, we assume that the per-period utility of active courts is

$$W(\mathbf{e_t}, p_t) = \int u_i^A di + z \int u_i^B di \tag{4}$$

In other words, active courts aggregate the payoffs of all agents in the economy. The welfare weight on agents B is denoted by z. Throughout the paper, we will assume $z > 1$: agents B have more weight than agents A.[29] Clearly this is but one possibility in terms of the objective function of active courts. It is, however, the interesting case as far as our analysis is concerned. As it is intuitive, and will be clear below as we proceed with the analysis, if we had $z \leq 1$ so that agents B do not have more weight than agents A, then the optimal level of property rights protection would be $p_t = 1$. Whenever this is the case, the time-inconsistency problem of courts also disappears. The infinitely-lived court in the economy discounts the future at a positive rate. We denote by $\delta \in [0, 1)$ its discount factor. Finally, notice that we assume that all active judges have the same preferences and thus abstract from judicial partisanship.[30]

The timing of events during a period is as follows. At the beginning of period t the value of p_{t-1} — the state of precedents in common law, and the statute in civil law — is given. The type of court (active or not) that enforces the law at time t is randomly drawn and is publicly revealed. Afterwards, A agents undertake investments. Finally, the court enforces the law for the entire economy. Notice that, given that the identity of the court is observed before the investment decision, agents correctly foresee the level of property right protection that will be enforced. At time $t + 1$ the timing of events is repeated as for t,[31] with a new i.i.d. draw selecting the court's type.

We focus on the subgame perfect equilibria of the dynamic game(s) associated with our set up.[32] As it is well known in dynamic games the set of subgame perfect equilibria is generally very large. To cut down the set of equilibria, we will focus on *symmetric Markov perfect* equilibria.[33] It should be noted that in the remainder of this Section and in Section 4 below there is no "payoff relevant" Markov state, and so our attention will be restricted to *stationary symmetric* equilibria. In Section 5 the payoff relevant Markov state is the state of precedents p_{t-1}, although it is directly relevant at t only to a class of players that in effect do not take any decisions in the period. Finally in Section 7 the full-blown definition of Markov perfect equilibrium has force. In this Section we consider stochastic (Markov) changes in the environment (in the weight z) and examine the adaptability and other properties of common and civil law in this new environment.

As a benchmark, we identify the *optimal law* under commitment at time t. More specifically, we assume that the law is chosen by a social planner *before* A agents undertake investments. Under commitment, the planner correctly internalizes that the law affects investment through (3). Assume that the social planner's welfare function is given by (4). Since we focus on symmetric equilibria, we can easily aggregate agents' payoffs and write the planner's problem in each period:

$$p_t^* \in \arg\max_{p_t \in [0,1]} \frac{1}{2} p_t^2 + (1 - p_t) p_t z. \tag{5}$$

We state without proof the following result.

Proposition 1 (Optimal Law)**.** When courts can commit to a law before the investment decision, the optimal law is constant over time and equal to

$$p_t^* = \frac{z}{2z - 1}. \tag{6}$$

Since $z > 1$ it must be that $p_t^* < 1$: it is never optimal to commit to "absolute" enforcement of property rights. Moreover, p_t^* is decreasing in z. Intuitively, when agents B are weighted relatively more, the optimal level of property-right protection becomes weaker. In our stylized model the optimal law is uniquely pinned down by the trade-off between providing incentives and ex-post efficiency.

In the next three sections, we analyze law-making without commitment and investigate whether the enforced law in the two legal regimes is close to the optimal one. Since we focus on stationary symmetric equilibria we are able to suppress the explicit time index t without causing any ambiguity.

[29] In a world with transferable utilities this has the same effect as saying that individuals B value the good more than the legal owners (individuals A). As shown by the "misallocation literature" (see the last paragraph of Section 2 above), this might justify weak property right protection.

[30] It is quite difficult to assess the extent of judicial partisanship in the data because the cases that go to court constitute a selected sample. Ashenfelter et al. (1995) control for this selection bias and find little evidence of judicial partisanship, at least in US Federal Courts. Surprisingly, they find that the characteristics of the judge and the political party of the judge's appointing president are not significant predictor of judicial decisions. Judicial bias, however, might be more severe in countries with weaker institutions (e.g., see Lambert-Mogiliansky et al., 2007).

[31] The law of motion governing the evolution of p_t will be different between the common law and the civil law case.

[32] We solve the game under "commitment" in both common law and civil law in the sense specified below.

[33] See Maskin and Tirole (2001).

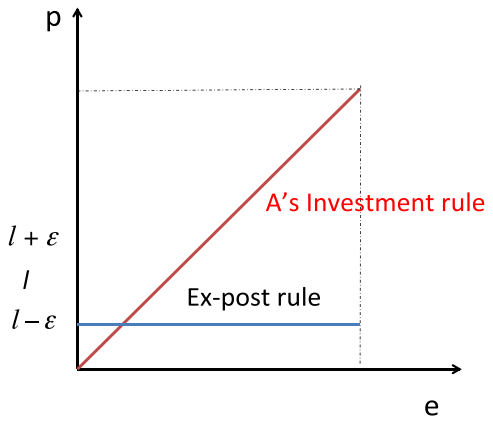


Fig. 1. Civil law.

4. Civil law

Under civil law the role of judges is to interpret and apply a body of statutes and administrative regulations. We denote the statute by $l \in [0, 1]$. We assume that the statute is written once and for all at the beginning of time 1.[34] We initially take l as given and we discuss the choice of the statute at the end of this section. In this paper we assume that civil law courts must choose p in the interval $[l-\varepsilon, l+\varepsilon]$. The parameter $\varepsilon \in (0, 1/2]$ is a measure of the courts' *latitude* in interpreting the statute. The parameter ε might be related to the specific issue discussed in the law (for example, ambiguous matters may give judges more discretion) or to the capacity of the legislative and executive branches to control the judicial branch.

Notice that under civil law past decisions do not affect current decisions and, consequently, are not payoff relevant. Since we focus on stationary Markov perfect equilibria, this implies that there is no dynamic link across periods, so that the problem of civil law courts is de facto static.[35]

Conservative courts are not strategic players since they simply apply the statute. Therefore, for civil law courts of type a a strategy is a mapping from aggregate effort to the law: $p^a : [0, 1] \to [l-\varepsilon, l+\varepsilon]$. For agent A in location i, a stationary strategy under the enforcement of court $j \in \{a, c\}$ is an investment decision $e_i^j \in [0, 1]$.

The equilibrium outcome under civil law is given by the vector $(p_S^c, p_S^a, e_S^c, e_S^a)$, which specifies equilibrium laws and aggregate investments under the enforcement of court $j \in \{a, c\}$. In equilibrium, the following conditions must hold.

(i) The law chosen by conservative courts coincides with the statute: $p_S^c = l$.
(ii) Given aggregate effort e_S^a, the law chosen by active courts solves the court's ex-post problem:

$$p_S^a \in \underset{p \in [l-\varepsilon, l+\varepsilon] \cap [0,1]}{\arg\max} \; p e_S^a - \frac{1}{2}(e_S^a)^2 + (1-p) e_S^a z. \tag{7}$$

(iii) Given expected enforcement p_S^j, agents A optimally choose investment:

$$e_S^j \in \underset{e_i^j \in [0,1]}{\arg\max} \; u_i^A(e_i^j, p_S^j). \tag{8}$$

Comparing problems (5) and (7), notice that after investment has been undertaken, active courts do not internalize that strong property right protection encourages investment. Since judicial decisions are expected to be "weak", equilibrium investment will be low. In essence, this is a manifestation of the so-called hold-up problem.

We determine the ex-post rule when judges must choose the law in the interval $[l-\varepsilon, l+\varepsilon]$. It can be easily observed from (7) that the ex-post utility is decreasing in p. As a result, courts choose the weakest ruling among the feasible ones and the constraint $p \geq l-\varepsilon$ is binding. The ex-post rule is horizontal at $p = l-\varepsilon$.

The equilibrium outcome, as depicted in Fig. 1 below, is then given by the intersection of the ex-post rule with the aggregate investment rule, which coincides with the 45 degree line. As we narrow judicial latitude ε, equilibrium law and investment get closer to l. When instead judges have broader latitude, the ex-post rule shifts down, making the hold-up problem more severe.

[34] On this point, Cooley (1868) writes: "[I]t is said that which distinguishes a judicial from a legislative act is that the one is a determination of what the existing law is in relation to some existing thing already done or happened, while the other is a predetermination of what the law shall be for the regulation of all future cases."

[35] This would not be the case if we allowed judges to use history-dependent strategies, but this is precluded by our restricting attention to Markov perfect equilibria. Since precedents are not a primary source of law under civil law, we believe the assumption that courts' strategies do not condition on past decisions to be compelling.

Proposition 2 (Civil Law). *Let any statute $l \in [0, 1]$ be given. When an active judge enforces the law, the equilibrium outcome (p^a_S, e^a_S) is equal to $(l-\varepsilon, l-\varepsilon)$ when $l > \varepsilon$ and (0,0) when $l \leq \varepsilon$. When a conservative judge enforces the law, the equilibrium outcome (p^c_S, e^c_S) is given by (l, l).*

So far we have taken the statute as exogenous. Our next step is to analyze the benchmark case of a statute that is chosen under the veil of ignorance by a legislature that maximizes the same welfare function as active courts (4).[36] This constitutes a useful benchmark. At the same time, we recognize that in practice statutes might be written in a biased manner. This occurs, for instance, when one of the two groups of agents is politically powerful.[37]

The statute is written at the beginning of $t = 1$ knowing that with probability γ the court will follow l, but with probability $1-\gamma$ the court will optimize. We let $W(e, p)$ denote welfare under civil law when aggregate effort is e and the law is p. We show (see the proof of Proposition 3 in the Appendix) that given our parameter restrictions, the planner does not find it profitable to set the code below ε. Therefore, using Proposition 2, the optimal statute solves the following static problem:

$$\max_{l \in [0,1]} \ \gamma\, W(l, l) + (1-\gamma)\, W(l-\varepsilon, l-\varepsilon). \tag{9}$$

It is now immediate to find the optimal statute for extreme values of γ. When γ is either zero or one, civil law reaches full efficiency. If $\gamma = 1$ (all courts are conservative), the optimal statute prescribes $l = p^*$,[38] which is enforced by all judges. If $\gamma = 0$ (all courts are active), the civil law implements the optimal law by *overshooting* and setting $l = p^* + \varepsilon$. If $\gamma \in (0, 1)$, welfare under civil law is below the first-best level.

Proposition 3 (Optimal Statute). *Under civil law, the code is optimally set above the optimal law p^*:*

$$l = p^* + (1-\gamma)\varepsilon. \tag{10}$$

The law is optimally set between p^* and $p^* + \varepsilon$ and the solution of problem (9) has the simple expression (10). Notice that the enforced law alternates between l (with probability γ) and $l - \varepsilon$ (with probability $1-\gamma$). Judicial heterogeneity leads to legal inconsistency: similar cases are treated differently.

It is interesting to notice that, at least in expectation, the enforced law is efficient. In fact, the expected law is given by $E(p) = \gamma l + (1-\gamma)(l-\varepsilon) = p^*$. However, when $\varepsilon > 0$ and $\gamma \in (0, 1)$, the optimal law is never implemented. Conservative (respectively active) judges enforce property right protection above (respectively below) the optimal level. We stress that the "overshooting result" of Proposition 3 holds even when the statute writer does not maximize social welfare. In this case, the statute would be set above the one preferred by the biased statute writer (see the proof of Proposition 3 in the Appendix).

We provide some support to our claim that statutes are written in anticipation of the application of the law by looking at the conception of property rights in France. Article 544 of the French Napoleonic Code famously states that ownership is the right to use and dispose of property in the most absolute way. In the French revolutionary reform program, having individual sovereignty over property was regarded as the most effective barrier against the power of the state. The idea that property rights should be absolute was soon challenged because of its antisocial implications. Even if the French Code kept proclaiming an absolute proprietary freedom, French courts escaped from a literal interpretation of the Code. Comparing nuisance laws in France and England, Weir writes: "French law initially gives a broad right by statute and then restricts its antisocial use by the courts; in England, when it is the courts who announce the rights, they do it so very restrictively that there is little need for an equitable temperance of their exercise."[39] This suggests that the law often sets stricter rules than the ex ante optimum, so that the ex-post courts' decisions are closer to the optimum.

5. Common law

Common law is established by judicial precedents and decisions. We assume that active judges can potentially make any decision p in the entire interval [0, 1]. In other words, past decisions do not restrict the set of feasible judgements of active courts.[40] Notice that, for simplicity, we make the following two assumptions on the evolution of precedents. We assume that conservative courts have no effect on precedents — this seems uncontroversial since they only enforce the law as they inherit it from the past. By contrast, active courts change the state of precedents in a "complete" way. If an active court chooses a particular level of p, say $\tilde{p}$, then the precedent immediately changes to $\tilde{p}$ from that point on, and only another active court decision (different from $\tilde{p}$) can change it again.

As before, restricting attention to symmetric equilibria tells us that we only need to consider paths in which all A agents undertake the same investment.[41] We let p_{-1} denote the current precedent. Suppose first that a conservative court is drawn

[36] In a similar vein Cardozo writes: "Substitute statute for [judicial] decision, and you shift the center of authority, but add no quota of inspired wisdom", (Cardozo, 1924, p. 133).

[37] See Guerriero (2016a).

[38] Recall that p^* is the optimal level of enforcement under commitment as computed in Proposition 1.

[39] Weir in (Catala and Weir, 1964, p.238).

[40] To the best of our knowledge no common law judge has even been impeached for not following precedent not even when precedent was set by a superior court.

[41] This does not mean that we restrict agents to choose the same action. Indeed, A agents can choose any investment in the interval [0,1]. In a symmetric equilibrium, however, it is optimal for identical agents to choose the same action.

to enforce the law. Because conservative courts uphold the precedent, p_{-1} is a payoff-relevant state for the investment decision. For agent A in location i, a strategy under court c is a mapping $e_i^c : [0,1] \to [0,1]$, where $e_i^c(p_{-1})$ is the investment decision by i given the current precedent.

Suppose instead that an active court is drawn to enforce the law. Since we restrict attention to Markov equilibria, for agent A in location i a strategy is an investment decision $e_i^a \in [0,1]$. Recall that active courts are not restricted at all by p_{-1} in the set of *feasible* decisions. Hence for common law courts of type a a strategy is a mapping p^a: $[0,1] \to [0,1]$, where $p^a(e)$ is the law chosen by active courts given aggregate effort e. We denote by $e^c(p_{-1})$ and e^a the aggregate investment rule under conservative and active courts, respectively.

Since conservative judges uphold the current precedent, active courts recognize that their decisions will affect future decisions through a change of precedents. Let any aggregate investment e be given, the dynamic problem of an active court can be formulated recursively:

$$V^a(e) = \max_{p \in [0,1]} \{W(p,e) + \delta(1-\gamma)V^a(e^a) + \delta\gamma V^c(p, e^c(p))\}, \tag{11}$$

where V^a and V^c are the value function of an active judge when, respectively, an active court and a conservative court are recognized to enforce the law. Since a conservative judge always keeps the precedent, one obtains

$$V^c(p, e^c(p)) = W(p, e^c(p)) + \delta(1-\gamma)V^a(e^a) + \delta\gamma V^c(p, e^c(p)). \tag{12}$$

In the equilibrium under common law, the following conditions must hold.

(i) For all p_{-1} and e the law chosen by conservative courts coincides with the precedent: $p^c(p_{-1}, e) = p_{-1}$.
(ii) For all e, the policy rule of active courts $p^a(e)$ solves the right-hand side of (11).
(iii) Given expected enforcement, A's investment is optimal:

$$e^c(p_{-1}) \in \arg\max_{e_i^c \in [0,1]} u_i^A(e_i^c, p^c(p_{-1}, e^c)) \quad \text{and} \quad e^a \in \arg\max_{e_i^a \in [0,1]} u_i^A(e_i^a, p^a(e^a)) \tag{13}$$

The first order conditions for an active court are then given by:[42]

$$e(z-1) = \frac{\delta\gamma}{(1-\delta\gamma)}(p + z - 2pz) \tag{14}$$

The court's trade-off is intuitive. The left side of (14) is the court's present bias: after the investment by A is sunk, the active court wants to weaken property right protection if it looks only at today's payoff. On the other hand, if it looks forward, via precedents, the court wants to make the optimal decision to encourage investment. The right side of (14) is the marginal cost of "worsening" the precedents. The higher the proportion of conservative judges, the higher the cost of choosing weak property right protection. This is because a higher γ prolongs the cost of a deviation from the ex-ante optimal decision.

Solving for p in Eq. (14) we obtain:

$$p = \frac{z\delta\gamma}{(2z-1)\gamma\delta} - \frac{e(z-1)(1-\gamma\delta)}{(2z-1)\gamma\delta}. \tag{15}$$

The court's ex-post rule (15) is decreasing in e and does not depend on p_{-1}. As before, the equilibrium law chosen by an active court is at the intersection between the investment rule (3) and the court's reaction function (15) (see Fig. 2 below). We let p_C denote the law chosen by an active court. As soon as an active court is recognized to enforce the law, the precedent settles to p_C.

Proposition 4 (Common Law)**.** *Under common law, starting from any $p_{-1} \in [0,1]$ as soon as an active court makes a decision, the precedent settles to*

$$p_C = \frac{\delta\gamma z}{(1-\delta\gamma)(z-1) + \gamma\delta(2z-1)}. \tag{16}$$

Notice that $p_C < p_t^*$ and as $\delta\gamma \to 1$ the law under common law converges to the optimal one. However, to the extent that $\delta < 1$, common law is bounded away from efficiency.

High values of γ are associated with higher investment levels and higher expected welfare. A potential objection stems from the observation that if most judges are conservative, it takes more time to reverse a "bad" initial precedent at $t = 1$. A straightforward way to address this concern is to assume that in the first period all judges are active because there is no previous ruling on which to base the current decision. The observation that high values of γ might lengthen the transition to the efficient rule will be relevant when we assume that there are shocks to the optimal law. In Section 7 below we will indeed show that common law welfare is not always increasing in γ.

[42] See the proof of Proposition 4 in the Appendix.

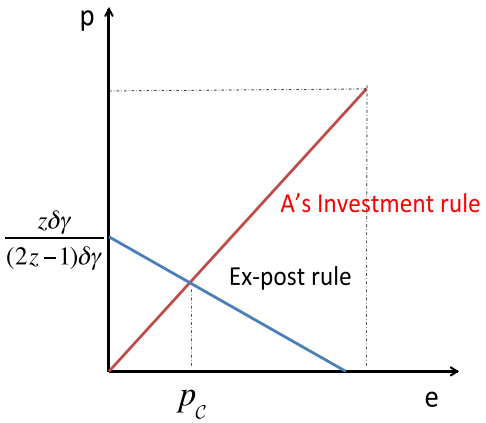


Fig. 2. Common law.

Before concluding, we stress that in our model the state variable only includes the previous judicial decision.[43] If instead we assumed that all past decisions matter, the solution would be considerably more involved. Since the effect of each judicial decision would be less dramatic, we expect that the disciplinary role of *stare decisis* will be diminished. Courts will have the temptation to free-ride on others' responsibility, leading to weaker property right protection. If, however, there are economic shocks, as in Section 7, we expect judges to be more flexible and adapt to changing economic conditions.[44]

6. Common law vs civil law: efficiency and consistency

In this section, we compare common law and civil law along two dimensions of interest: the consistency of legal decisions and overall efficiency.

Concerning the variability of legal decisions, notice that as soon as the law is enforced by an active court, common law will reach an "absorbing state" and both types of courts select the same law. Under civil law, however, the law is not applied uniformly and there is variability of legal decisions. We stress that this result is obtained in a model where judges face an ex-post bias and differ only with respect to their legal reasoning (some judges are conservative, while others maximize welfare). If we introduced judicial partisan bias, the variance of common law decisions would also be positive.[45] An empirical test of whether common law is more consistent than civil law is well beyond the scope of this paper. The empirical evidence on this question is quite limited though. On the one hand, Djankov et al. (2003) find that common law courts are more consistent than civil law courts, in line with the results of this paper.[46] On the other hand, Niblett et al. (2010) show that common law decisions do not converge over time to any resting point.

To consider the relative efficiency of the two regimes, we compute the expected welfare in both legal systems. In Figs. 3 and 4 below we draw the welfare under common law assuming, as we discussed in the previous section, that at $t = 1$ — when there is no previous precedent on which to base the current decision — all judges are active.

Welfare under civil law reaches full efficiency when $\gamma = 0$ and $\gamma = 1$ and is at its minimum when judicial heterogeneity is maximal, $\gamma = 1/2$. Judicial independence (measured by ε) is welfare reducing since it increases credibility problems when an active judge decides and induces the legislature to increase l compared to the optimal p^*,[47] which is costly when a conservative judge decides. Notice that welfare under common law is increasing in γ. However, to the extent that the discount factor is less than 1, common law is bounded away from full efficiency (see also Anderlini et al., 2014). Common law can be quite far from the optimum, but at least it is consistent and treats similar people similarly. This shows that there might exist a trade-off between legal consistency and efficiency.

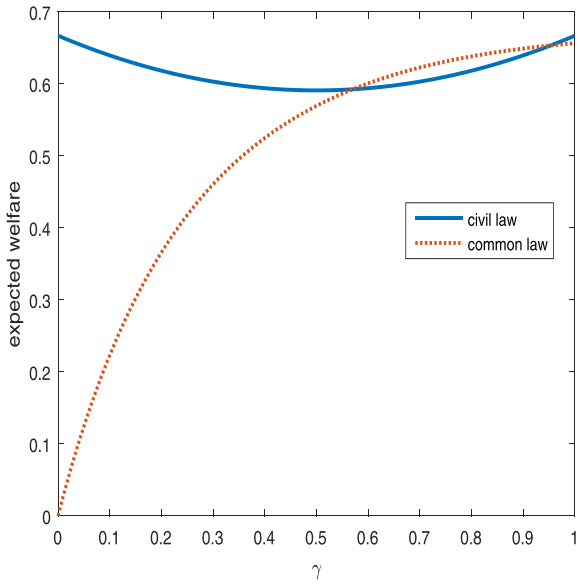
[43] This implies that a single decision (even a "wrong" one) will affect judicial decisions. We believe that this assumption captures an important feature of stare decisis. As recognized by Justice Scalia (Hubbard v. United States (94–172), 514 U.S. 695, 1995), "the doctrine [of stare decisis] would be no doctrine at all" if it did not require overruling judges to "give reasons, that go beyond mere demonstration that the overruled opinion was wrong." Along similar lines, Padden (1994) writes: "If wrongness were a sufficient basis for overruling precedent, each Justice could decide each case as if it were one of first impression and entirely disregard any precedent."

[44] We are grateful to an anonymous referee for this point.

[45] See Section 8 of Anderlini et al. (2016) for the derivation of this result.

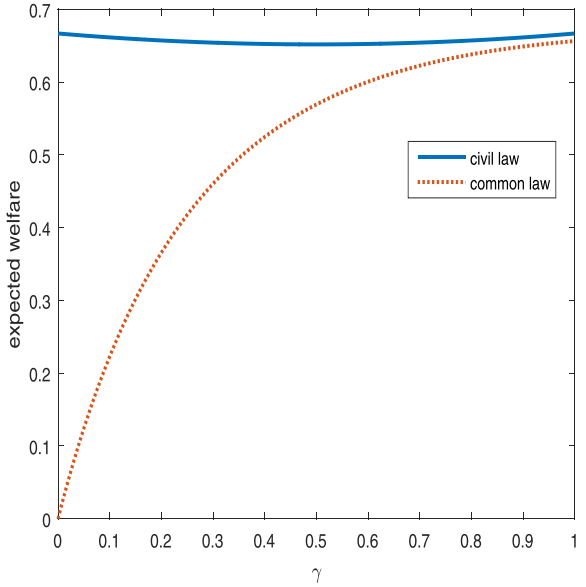
[46] Notice, however, that the assumption that legal traditions can be measured through legal origins dummies has been challenged, among others, by Rosenthal and Voeten (2007).

[47] As defined in Proposition 1.



$$\varepsilon = 0.45, \delta = 0.95, z = 2$$

Fig. 3. Welfare: High ε.



$$\varepsilon = 0.2, \delta = 0.95, z = 2$$

Fig. 4. Welfare: Low ε.

We can show that if judicial latitude is sufficiently broad, welfare under common law is strictly above welfare under civil law when γ is not too large, but not too small either (see Fig. 3). When instead ε is sufficiently low, civil law strictly dominates (see Fig. 4).

Proposition 5 (Welfare Comparison)**.** When ε is sufficiently small, civil law strictly dominates common law. When instead ε is sufficiently large and δ is sufficiently close to 1, there is an interior range of values of γ for which common law dominates civil law.

7. Legal adaptability

In the previous section, the only source of uncertainty in the economy concerned the type of court making decisions. In this section, we introduce an additional source of uncertainty by assuming that there are shocks that change the optimal law p^* of Proposition 1. It is often argued that common law deals better with an uncertain environment and allows for a perfect mix between change and continuity. This section tests this claim.

We focus on shocks to the parameter z. In each t, the parameter z can either be z_H or z_L with $z_H > z_L$. We assume that the shock at time t is observed by all players at the beginning of the period. Shocks are distributed according to a discrete Markov chain with transition probability: $\pi_{ji} = \text{Prob}\{z_i \mid z_j\}$ and $\sum_{i=1}^{2} \pi_{ji} = 1$, with $j,\ i \in \{H, L\}$. Knowing the transition probability, we can compute the stationary probabilities of z_H and z_L, denoted by π_H and π_L:[48]

$$\pi_H = \frac{\pi_{LH}}{\pi_{LH} + \pi_{HL}} \qquad \pi_L = \frac{\pi_{HL}}{\pi_{LH} + \pi_{HL}} \tag{17}$$

To simplify the algebra, we henceforth make the assumption that the transition-probability matrix is symmetric. The elements along the main diagonal of the transition matrix measure the probabilities that a state does not change. If economic shocks exhibit no persistance, the probabilities of remaining in a particular state or transiting to the other state would all be equal to 1/2. Shock persistence is hence measured by $\rho \equiv \pi_{LL} = \pi_{HH} \in [1/2, 1]$.

Following the incomplete contracts literature, we assume that the code or the precedent cannot be contingent on these shocks. We justify this assumption by postulating that these shocks are difficult to describe in advance, even if their consequences and probabilities are known by all players.[49]

7.1. Adaptability under civil law

Under civil law the statute is written under a double veil of ignorance: without knowing which judge will enforce the law in each period and without knowing which shock will occur in each period. Since the code is written before the $t = 1$ shock is realized, the stationary probabilities π_H and π_L are used to compute the expected payoffs. Notice that shocks to z do not change the court's reaction function in Fig. 1. Hence, they do not change the intersection with the investment rule. We therefore obtain that civil law judges are totally unresponsive to shocks. To understand the intuition of why shocks do not affect courts' decisions, recall that the constraint $p \geq l - \varepsilon$ is binding for active judges, who choose the weakest ruling among the feasible ones. Shocks to the economic environment make this constraint more or less binding, but they do not affect courts' decisions. Solving for the optimal code, we therefore obtain

$$l = \frac{\pi_L z_L}{2z_L - 1} + \frac{\pi_H z_H}{2z_H - 1} + (1 - \gamma)\varepsilon. \tag{18}$$

Similarly to Proposition 3, the statute is set above the expected optimal law. Conservative judges choose $p = l$, while active judges select $p = l - \varepsilon$. Notice that the code internalizes the occurrence of the shocks to z, but civil law does not adapt. The variability of the law does not arise because judges respond to changing economic conditions, but, as in Section 4, it arises because of judicial heterogeneity. Therefore, similarly to what we found in an economy without shocks, under civil law welfare is at its maximum when there is no judicial heterogeneity (that is, judges are either all conservative or all active).[50]

7.2. Adaptability under common law

Common law is potentially more adaptable to shocks than civil law as active courts can choose any law in the interval [0,1]. However, common law courts must be cautious in changing the law. Since the precedent cannot be made contingent on economic conditions, changing the precedent is costly. Indeed, if tomorrow's shock is different and a conservative court enforces the law, the previous precedent will be confirmed, even if it was intended for a different value of z. As we show below, the lower the shock's persistence, the weaker and more cautious the response of common law courts.

In an economic environment without shocks, we showed that having more conservative judges is welfare increasing under common law (Proposition 4). With shocks, the optimal amount of "conservativeness" is not necessarily the maximum one. On the one hand, as in the model without shocks, a larger share of conservative judges provides commitment and pushes the laws towards their optimal values (*disciplinary effect*). On the other hand, when economic conditions change, a higher γ increases the probability that a "bad" precedent stays in place, making courts more cautious in changing the law (*incongruity effect*).

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[48] See, for instance, (Howard, 1960 ch. 1).

[49] The notion of "undescribable events" has been advanced by Anderlini and Felli (1994) and Al-Najjar et al. (2006). Notice that we are not claiming that in the real world all shocks are undescribable. We focus on undescribable shocks because, if courts were facing describable shocks, the analysis here would be identical to the one in the previous sections, after we define the decision space as $[0, 1] \times \{z_H, z_L\}$. Similarly, we do not consider shocks that were not foreseen at $t = 0$. Under such shocks the welfare comparison between the two regimes would not be very interesting, as the common law, by making decision sequentially, would likely dominate.

[50] In this paper, we assume that the statute is written once-and-for-all. At first sight, this assumption seems to hinder welfare under civil law, especially when shocks are persistent. Notice, however, that if writing new statutes were costless and if statutes were retroactive, in all periods the statute would be changed ex-post, so that equilibrium investment would be zero as in a model with full discretion.

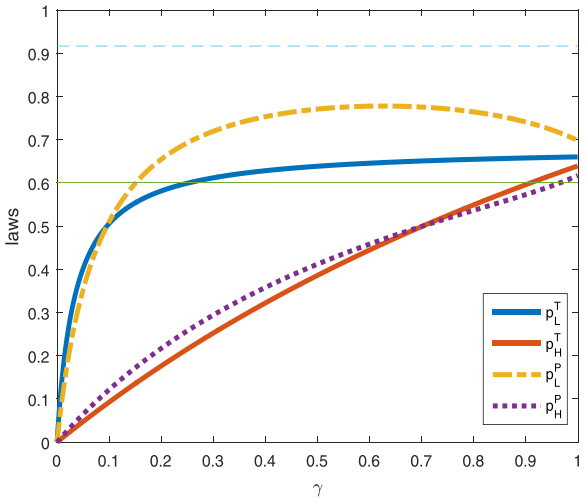


Fig. 5. Common law.

Shocks to z change the dynamic trade-off faced by active courts. Recalling that the ex-post bias is given by $e(z-1)$, a higher z raises the current temptation of weakening property-right protection. However, when the shock is persistent, a higher z lowers the law that is expected to be optimal in the future.

In Fig. 5 below we compute the laws chosen by active courts in the two states as a function of the proportion of conservative judges.[51] We consider two different levels of shock persistence ($\rho = 0.5$ and $\rho = 0.95$) and the following two levels of z: $z_L = 1.1$ and $z_H = 3$. From Proposition 1, we know that the optimal law is equal to 0.92 in the low state and is equal to 0.6 in the high state. In Fig. 5, the optimal laws are represented by two horizontal lines. We denote by p_L^T and p_H^T the laws chosen by active judges in state L and H, respectively, when shocks are fully transitory (that is $\rho = 0.5$), while we denote by p_L^P and p_H^P the laws chosen by active judges in state L and H when the shocks are persistent (that is $\rho = 0.95$).

Fig. 5 illustrates that when z_L occurs, courts choose a law that is closer to the static optimum (0.92) when shocks are persistent than when they are temporary. The reason is given by the incongruity effect. When the shock has low persistence, judges are afraid of choosing the law that is optimal in the current state ($p = 0.92$) because they realize that the state is temporary and that in the future conservative judges will enforce the current law even when economic conditions change. As a result, common law judges implement the law that is optimal on average, not the one that is currently optimal.

Notice that judicial inertia has a non-monotone effect on judicial adaptability, measured by the vertical distance between the laws chosen by active courts in the two states. Common law courts adapt more to changing economic conditions when γ is intermediate. To understand this, notice that when γ is close to one, there is "too much" inertia under common law. As a result, courts are cautious and choose similar laws in both states. When γ is close to zero common law courts make similar decisions for a different reason. When there are no conservative judges, *stare decisis* cannot play a disciplinary role. Consequently, active judges behave myopically and the equilibrium law coincides with the static law without commitment, which is equal to zero in both states.

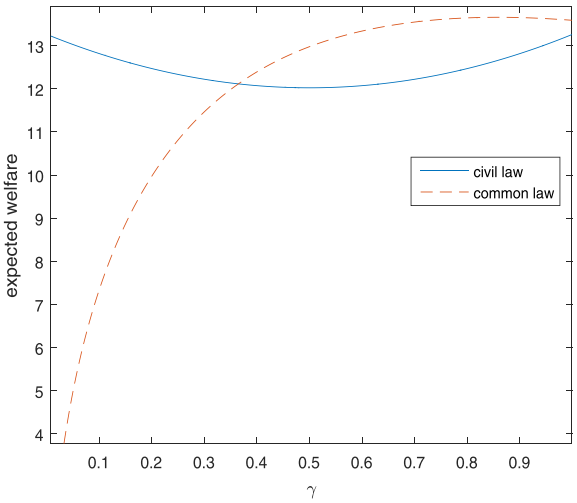
It is often argued that the rule of precedent makes common law adaptable to changing economic conditions (see Beck et al., 2003a; Beck et al., 2005). This section shows that common law courts indeed respond to shocks, but less than optimally, especially when shocks are temporary.

7.3. Common law vs civil law: A comparison

Fig. 6 below compares ex-ante welfare in the two legal systems. When shocks are persistent common law might dominate civil law even when civil law judges have no discretion ($\varepsilon = 0$) because it is more adaptable. Fig. 6 illustrates that when γ is equal to 1, common law welfare might be strictly higher than civil law welfare.

Notice that in an economy without shocks to z, this possibility never arises: Figs. 3 and 4 show that when $\gamma = 1$ civil law strictly dominates common law. Further, we find that expected welfare under common law is not necessarily monotone in γ. As discussed before, when there are many conservative judges, "bad" precedents might stay in place for long periods. This effect might induce judges to respond less to shocks and counterbalances the positive disciplinary effect of a higher γ.

[51] In the Appendix we provide the conditions that implicitly define the laws chosen by active courts in the two states. Simple analytical solutions can be obtained for limiting cases, when shocks are fully transitory.



$$\delta = 0.95, z_L = 1.1, z_H = 3, \varepsilon = 0.4, \rho = 0.95$$

Fig. 6. Welfare.

Our numerical computations show that when shocks are persistent, common law welfare is maximized when γ is less than one. In Fig. 6 the value of γ which optimally trades-off commitment against flexibility is 0.8.

Proposition 6 (Welfare Comparison with Shocks)**.** Assume that $\delta\gamma$ is sufficiently close to 1. When shocks are sufficiently persistent (ρ is sufficiently close to 1) welfare under common law is greater than welfare under civil law for any level of judicial latitude ε.

8. Conclusions

This paper sets up a stylized model to analyze judicial decision making. The related literature has mostly focused on judicial partisan bias. Instead, here we focus on another source of judicial bias. We analyze a setting in which courts face commitment problems in enforcing the law. We compare court decisions under common and the civil law regimes. Our model generates different economic implications under the two legal systems which are not based on differences in preferences between judges and legislatures.

Overall, we show that common law is generally more consistent and predictable than civil law. With respect to efficiency, our analysis indicates no clear answer to the question of which is the most efficient legal system. Among other things, the answer depends on the degree of persistence of shocks, on the composition of the judiciary, and on the extent of judicial independence. This is probably the reason why legal systems continuously evolve over time (Berkowitz et al., 2003, Guerriero, 2006b). The U.S. legal system is no exception. As pointed out by Calabresi (1982), "The last fifty to eighty years have seen a fundamental change in American law. In this time we have gone from a legal system dominated by the common law, divined by courts, to one in which statutes, enacted by legislatures, have become the primary source of law." More recently, Ferejohn (2002) sees a shift in lawmaking power away from legislatures and a rise of the centrality of courts. Since any adjustment to the judicial-legislative balance is up to society, one should model in a more realistic way the political decision process. As a further step toward realism, the assumption that judges and legislatures maximize the same objective should be re-examined. We leave this extension for future work.

Appendix

Proof of Proposition 2. Let any $l \in [0, 1]$ be given. We show that when an active court decides, the equilibrium without commitment is (0,0) or $(l - \varepsilon, l - \varepsilon)$.

We need to show that the ex-post rule intersects the investment rule at $l - \varepsilon$ if $l - \varepsilon \geq 0$ and at 0 if $l < \varepsilon$.

It can be easily checked that when $z > 1$ the ex-post payoff is decreasing in p. Therefore, the court chooses the lowest feasible law. Then, given a code $l \in [0, 1]$ and given $e \geq 0$, we can write the reaction function of the court: for all $e \in [0, 1]$ we have $p^{ex} = \{l - \varepsilon, 0\}$. It is easy to verify that in all possible cases the ex-post rule intersects the 45 degree line at either 0 (when $0 \leq l < \varepsilon$) or $l - \varepsilon$ (when $0 < l - \varepsilon$). □

Proof of Proposition 3. First, we show that the social planner does not find it optimal to choose $l < \varepsilon$. A sufficient condition for this is that the optimal law is sufficiently large:

$$\frac{z}{2z-1} > \varepsilon \tag{19}$$

In this case, choosing $l < \varepsilon$ is clearly suboptimal. In fact, by writing a "higher" code, the legislator could increase her utility when a conservative judge is drawn, without affecting the legal decision of active courts. The above inequality holds for all $z > 1$ when $\varepsilon \leq 1/2$, as required.

Given that $l > \varepsilon$, we can write the legislator's problem as

$$\max_{l\in[0,1]} \gamma\left[\frac{l^2}{2} + (1-l)lz\right] + (1-\gamma)\left[\frac{(l-\varepsilon)^2}{2} + (1-l+\varepsilon)(l-\varepsilon)z\right] \tag{20}$$

Taking the first-order conditions and using Proposition 1, the optimal code can be written as

$$l = p^* + (1-\gamma)\varepsilon. \tag{21}$$

Notice that provided that $z > 1$, this result holds regardless of the z of the legislator. We denote by p_z^* the optimal policy under commitment of the biased legislator. Following similar steps, we obtain that the statute would be $l = p_z^* + (1-\gamma)\varepsilon$. □

Proof of Proposition 4. From (12) we obtain

$$V^c(p, e^c(p)) = \frac{1}{1-\delta\gamma} W(p, e^c(p)) + \frac{\delta(1-\gamma)}{1-\delta\gamma} V^a(e^a) \tag{22}$$

We can therefore rewrite the Bellman equation as

$$V^a(e) = \max_{p\in[0,1]} \left\{ W(p,e) + \frac{\delta\gamma}{(1-\delta\gamma)} W(p, e^c(p)) + \frac{\delta^2\gamma(1-\gamma)}{(1-\delta\gamma)} V^a(e^a) + \delta(1-\gamma)V^a(e^a) \right\}. \tag{23}$$

or

$$V^a(e) = \max_{p\in[0,1]} \left\{ W(p,e) + \frac{\delta\gamma}{(1-\delta\gamma)} W(p, e^c(p)) + \frac{\delta(1-\gamma)}{(1-\delta\gamma)} V^a(e^a) \right\}. \tag{24}$$

Using (3) we know that $e^c(p) = p$. The derivative of $V^a(e)$ with respect to the current precedent p is zero. This is because the current precedent does not constrain the choice of an active court. Thus, the first order condition of an active court is given by the expression (14) in the main text. To find the law chosen by an active court, we solve a system between $e = p$ and (15), which gives us $p_{\mathcal{C}}$, as stated in Proposition 4. □

Proof of Proposition 5. We write down welfare under common law. Assuming that at time zero all judges are active (so that the steady state is reached at once), one obtains

$$\mathcal{W}_{\mathcal{C}} = \frac{p_{\mathcal{C}}^2}{2} + (1-p_{\mathcal{C}})p_{\mathcal{C}}z \tag{25}$$

where $p_{\mathcal{C}}$ is given by Proposition 4.

Expected welfare under civil law is:

$$\mathcal{W}_{\mathcal{S}} = \gamma\left[\frac{l^2}{2} + (1-\theta)(1-l)lz\right] + \left[\frac{(l-\varepsilon)^2}{2} + (1-(l-\varepsilon))(l-\varepsilon)z\right] \tag{26}$$

where, using Proposition 3, $l = \frac{z}{2z-1} + (1-\gamma)\varepsilon$.

We are now ready to prove Proposition 5. First, we prove that common law is dominated by civil law when γ is either close to 1 or 0. Notice that when $\gamma = 0$, from Proposition 4, $p_{\mathcal{C}} = 0$, which implies that investment is also zero. Welfare under common law is then zero. On the other hand, when $\gamma = 0$ civil law reaches full efficiency, by simply setting $l = p^* + \varepsilon$. Similarly, when $\gamma = 1$ civil law reaches full efficiency, but not common law (provided that $\delta < 1$). By continuity, when γ is close to 0 and 1, civil law is a superior legal tradition.

We now show that there is a interior range of values of γ such that common law dominates civil law. To that end, we first compute the derivative of $\mathcal{W}_{\mathcal{S}}$ at $\gamma = 1$. After some algebra, one obtains

$$\left.\frac{\partial \mathcal{W}_{\mathcal{S}}}{\partial\gamma}\right|_{\gamma=1} = \left(z - \frac{1}{2}\right)\varepsilon^2 \tag{27}$$

Next, we compute the derivative of $\mathcal{W}_{\mathcal{C}}$ with respect to γ:

$$\frac{\partial \mathcal{W}_{\mathcal{C}}}{\partial\gamma} = \frac{\partial p_{\mathcal{C}}}{\partial\gamma}(p_{\mathcal{C}} + z + 2zp_{\mathcal{C}}) = \frac{\gamma z[(1-\gamma\delta)(z-1)) + \gamma\delta(z-1)]}{((1-\gamma\delta)(z-1)) + \gamma\delta(2z-1))^2}(p_{\mathcal{C}} + z + 2zp_{\mathcal{C}}) \tag{28}$$

Note that at $\gamma = 1$, civil law welfare is strictly higher than common law welfare: for all $\delta < 1$ we have $\mathcal{W}_{\mathcal{S}}\big|_{\gamma=1} > \mathcal{W}_{\mathcal{C}}\big|_{\gamma=1}$. As $\gamma\delta$ approches 1, we have that $\mathcal{W}_{\mathcal{C}}$ converges to $\mathcal{W}_{\mathcal{S}}$ from below. Second, note that the derivative of $\mathcal{W}_{\mathcal{S}}$ at $\gamma = 1$ is strictly

positive and increasing in ε. On the other hand, as δ approches 1, the derivative of $\mathcal{W}_{\mathcal{C}}$ at $\gamma = 1$ approaches zero. This is a consequence of the Envelope Theorem. Then, $\mathcal{W}_{\mathcal{S}} < \mathcal{W}_{\mathcal{C}}$ for some $\gamma < 1$. □

Legal Adaptability: Bellman Equation and Value Functions

The current shock is a payoff-relevant state. Investment rules are now a function of the current state as well. We denote by p^i the law chosen by active courts in the i state. When shock z_i occurs, with $i = 1, 2$, the Bellman equation of an active court becomes:

$$V^a(e, z_i) = \max_{p^i \in [0,1]} \left\{ W(p, e, z_i) + \delta \sum_{j=L,H} \pi_{ij} \left[(1-\gamma) V^a(e^a(z_j), z_j) + \gamma V^c(p, e^c(p, z_j), z_j) \right] \right\}. \tag{29}$$

We denote $V^c(p, e^c(p, z_i), z_i)$ and $W(p, e^c(p, z_i), z_i)$ by, respectively, $V^c(z_i)$ and $W(z_i)$. The equilibrium effort $e^a(z_j)$ in state j is denoted by e^L. After some algebra, for any $i = 1, 2$ and $j \neq i$, we obtain

$$V^c(z_i) = \frac{\left[W(z_i) + \delta\pi_{ij}(1-\gamma) V(z_j) + \delta\pi_{ii}(1-\gamma) V(z_i) \right](1 - \delta\gamma\pi_{jj})}{(1-\gamma\delta\pi_{jj})(1-\gamma\delta\pi_{ii}) - \gamma^2\delta^2\pi_{ij}\pi_{ji}} + \frac{\delta\gamma\pi_{ij}\left[W(z_j) + \delta\pi_{jj}(1-\gamma) V(z_j) + \delta\pi_{ji}(1-\gamma) V(z_i) \right]}{(1-\gamma\delta\pi_{jj})(1-\gamma\delta\pi_{ii}) - \gamma^2\delta^2\pi_{ij}\pi_{ji}}.$$

These expressions allow to write down the first-order conditions of active courts. The first-order condition when z_L occurs is

$$\left(e^L - z_L e^L\right) - \frac{\delta\gamma\pi_{LH}(1-\gamma\delta\pi_{LL}) + \delta^2\gamma^2\pi_{LL}\pi_{LH}}{(1-\gamma\delta\pi_{LL})(1-\gamma\delta\pi_{HH}) - \delta^2\gamma^2\pi_{HL}\pi_{LH}} (p^L + z_H - 2p^L z_H) - \frac{\delta^2\gamma^2\pi_{LH}\pi_{HL} + \delta\gamma\pi_{LL}(1-\gamma\delta\pi_{HH})}{(1-\gamma\delta\pi_{LL})(1-\gamma\delta\pi_{HH}) - \delta^2\gamma^2\pi_{LH}\pi_{HH}} (p^L + z_L - 2p^L z_L) = 0 \tag{30}$$

The first-order condition when z_H occurs is symmetric. When states are transitory ($\pi_{ji} = 1/2$ for all $i, j = 1, 2$), the first-order condition of an active judge when z_L occurs is

$$\left(e^L - z_L e^L\right) = \pi_H \frac{\delta\gamma}{1-\delta\gamma} (p^L + z_H - 2p^L z_H) + \pi_L \frac{\delta\gamma}{1-\delta\gamma} (p^L + z_L - 2p^L z_L). \tag{31}$$

When z_H occurs, the first-order condition is

$$\left(e^H - z_H e^H\right) = \pi_H \frac{\delta\gamma}{1-\delta\gamma} (p^H + z_H - 2p^H z_H) + \pi_L \frac{\delta\gamma}{1-\delta\gamma} (p^H + z_L - 2p^H z_L). \tag{32}$$

In equilibrium, $e^j = p^j$. We can therefore solve the systems of two equations and find the optimal p^H and p^L.

Proof of Proposition 6. We provide the welfare definitions under common and civil law. Recalling that the transition probability matrix is symmetric, one obtains $\pi_H = \pi_L = 1/2$. Then, civil law welfare under the veil of ignorance (before time 0 shock) is

$$\mathcal{W}'_{\mathcal{S}} = \frac{1}{2}[\gamma W(l, l; z_L) + (1-\gamma) W(l-\varepsilon, l-\varepsilon; z_L) + \gamma W(l, l; z_H) + (1-\gamma) W(l-\varepsilon, l-\varepsilon; z_H)], \tag{33}$$

where l is given by (18).

Under common law, we keep assuming that at $t = 0$, when there is no precedent, all judges are active. Expected common law welfare is defined as follows:

$$\mathcal{W}'_{\mathcal{C}} = (1-\delta)\frac{1}{2}\left[W(p^L, p^L; z_L) + \delta \sum_{j=H,L} \pi_{Lj}\left[(1-\gamma) V^a(z_j) + \gamma V^c(p^L; z_j) \right] \right] + \frac{1}{2}\left[W(p^H, p^H; z_H) + \delta \sum_{j=H,L} \pi_{Hj}\left[(1-\gamma) V^a(z_j) + \gamma V^c(p^H; z_j) \right] \right]$$

Notice that under civil law decisions are not affected by ρ: in both states, active judges select $l - \varepsilon$. Because civil law is not adaptable, civil law welfare is strictly below the first-best level. Consider now common law judges. From the first-order conditions in the common law problem – e.g., Eq. (30)–, notice that as $\gamma\delta$ and ρ go to 1, the enforced laws converge to the optimal ones. Then, in that range of parameters, common law strictly dominates civil law regardless of ε. □

Supplementary material

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.euroecorev.2019.103323

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