Standardized Enforcement: Access to Justice vs Legal Innovation [♣]

Nicola Gennaioli (CREI, UPF)

Enrico Perotti (U Amsterdam and CEPR)

April 2009

Abstract

The use of standard contracts is usually explained by generic transaction costs. In a model where more resourceful parties can distort enforcement, we show that standard contracts reduce enforcement distortions by simplifying judicial interpretation of preset terms, training judges on a subset of admissible evidence. In this setup, the introduction of a standard contract statically expands the volume of trade but it hampers legal and contractual innovation by crowding out the use of non-standard contracts. We rationalize the large scale standardization effort (by commercial codification and private standards) that occurred in Civil and Common Law systems in the XIX century during a period of booming commerce and long distance trade.

[♣] We are grateful to Michael Fishman, Luigi Zingales, John Armour, Ronald Gilson, Raj Iyer, Giuseppe Dari Mattiacci as well as participants at the University of Chicago Business School, Northwestern, Columbia Law School and Oxford University for useful comments. Stefano Mosso and Chantal Mak provided able research assistance. We cannot thank enough Katharina Pistor for extensive discussions and insight. Gennaioli thanks the Spanish Ministerio de Ciencia y Tecnologia and the Barcelona Graduate School of Economics for financial support

0. Introduction

Individuals and firms mostly rely on standard terms for contract and security design. The common explanation is the presence of generic drafting or other transaction costs. Asymmetric information provides additional explanations, as less contingent contracts may be chosen by less informed agents (Gorton and Pennacchi, 1990). These arguments on private choices over contract form do not however explain why specific contracts as well as their enforcement are often codified in public commercial codes (La Porta et al. 1998) or in the statutes of private arbitration tribunals (Bernstein 2001). To capture the role of legal enforcement in observed standardization patterns, we present a theory where contract standardization is viewed as a way to simplify the enforcement process.

Our starting point is that, due to limited judicial expertise, contract adjudication can be swayed by the party better able to collect favorable evidence. This may reflect inequality in resources or in ex-post information, for instance related to the location where key evidence must be gathered. Such inequality in litigation strength distorts the enforcement of contingent contracts, especially for novel transactions. When the litigation advantage of a party is known (e.g. large corporation vs. consumer), the optimal contract grants better terms to the weaker party. Yet, since incentives remain distorted, very unequal parties may not contract altogether.

One solution to this problem is the creation of a contract whose enforcement is standardized, in the sense that only certain pieces of evidence – those that judges have been trained to recognize in advance – are admissible. Standardized enforcement may be achieved by legislation, e.g. by enactment of a commercial code, or by a private association mandating uniform enforcement of standard terms. With respect to pure private contracting, standardization allows judges to be trained to recognize specific evidence in advance, which is difficult for atomistic parties to do.[1] Of course, even without standardization, judges can learn to recognize specific evidence by settling disputes on non-standard contracts, increasing over time the predictability of contract enforcement as shown empirically by Niblett (2009).[2] To study the properties of legal *standardization*, we thus compare it against this alternative *laissez faire* regime.

[1] Scale economies make it hard to achieve judicial training and monitoring via an individual contract.
[2] Much legal training in Common and Civil Law systems indeed focuses on precedents or jurisprudence (e.g. Von Mehren 1957). In some cases precedents may increase ambiguity, but most scholars conclude that they tend to clarify judicial interpretation (Holmes 1881, Kaplow 1992). Unlike in Rubin (1977), the benefit of precedent in our model does not rely on judges in eventually making efficient decision.

Our main results can be summarized as follows. After a standard contract is introduced, parties trade off the lower enforcement distortions granted by it against the flexibility of more precise nonstandard contracts. By narrowing down the scope of litigation to a few, if imprecise terms, the standard contract avoids the distortions due to parties' unequal ability to seek favorable evidence. Crucially, this implies that standardization statically benefits two groups of parties. The first group consists of highly unequal parties, who would otherwise choose not to trade. Standardization guarantees them positive gains from trade, unambiguously increasing the scale of transactions. The second group consists instead of parties with a moderate level of inequality. These parties would trade using non-standard contracts, but once a standard contract is introduced they switch to it, as it improves incentives.

These effects shape the static and dynamic impact of standardization. On the one hand, standardization statically improves welfare by expanding the volume of trade among very unequal parties. On the other hand, standardization hinders autonomous legal evolution and thus judicial learning by crowding out the use and litigation of non-standard contracts. This latter effect limits the ability to write better contracts exploiting prior judicial rulings.

Early on, the beneficial effect of standardization on trade volume dominates. This is because under *laissez faire* the private interest of litigants to supply evidence in court initially confines judicial learning to little informative evidence, slowing down effective legal evolution. Eventually, though, continued legal evolution allows parties to use first best contracts, and the dynamic cost of standardization is precisely to hamper this process. In sum, while under *laissez faire* convergence to the first best is slow because litigation is narrow, under *standardization* judges' ability to enforce the standard discourages the use of innovative contracts. If inequality is large and expanding the volume of trade is a pressing concern, it is thus worthwhile to establish a reasonable standard, even if this comes with less innovation in the lung run.

Our model suggests that standardization is valuable when new trade opportunities arise but strong inequality or legal uncertainty prevent parties to take advantage of them. The role of standard contracts in supporting new markets is consistent with early thinking by legal scholars such as Isaacs (1917), Kessler (1943) and the father of the U.S. Uniform Commercial Code Karl Llewellyn (1931). In Section 6 we discuss that this idea can shed light on the so called "golden age of commercial codification" (Gutteridge 1935), a movement toward commercial

codification that took place in the XIX century in Common Law countries, which introduced commercial standards by statutes, both in mother countries and in the colonies, to support booming commerce and long distance trade.

There is to date no direct evidence on the innovation-suffocating role of codification, but there are many examples of delayed diffusion of novel contracts in Civil Law systems, where contract law is codified.[3] The most closely related evidence is offered by Lerner and Schoar (2005), who document that in Civil Law countries venture capitalists rely on a combination of standard leverage and high equity control while common law countries use contingent funding arrangements which allow a finer allocation of control and income rights. More generally, we rationalize why commercial codes appear to affect economic outcomes (La Porta et al. 1998) even though parties are often legally allowed to contractually opt out of them. The reason we adduce is that nonstandard contracts are plagued by enforcement uncertainty.

The paper is organized as follows. Section 2.1 shows how unequal resources distort enforcement and contracting even if bias is anticipated ex-ante. Section 2.2 studies at optimal contracting under standardization. Section 3 studies the dynamic effects of standardization. Section 4 presents two extensions. Section 5 reviews some real world standardization episodes in light of our hypothesis. Section 6 concludes.

Literature Review

Few papers study the legal determinants of standardization. One exception is Franks and Sussman (2005) on the history of the standardization of U.K. debt contracts, who do not consider its effect on the use of nonstandard contracts. Gennaioli and Shleifer (2007) study common law evolution in a model where biased judges distort precedents (for earlier papers without judicial decision-making see Priest 19977 and Rubin 1977). Related contributions are Anderlini, Felli and Riboni (2007), Fernandez and Ponzetto (2007). Hadfield (2006) models the constraints imposed by gradual human capital accumulation by judges. None of these papers studies the dynamic interaction between legal evolution and contracting. The argument that case law allows more adaptability of legal practice has been made, but

[3] A classic example is leasing, which originated in common law countries. By combining features of a sale and a rental contract, it suffered from unclear enforcement in civil law countries which slowed down its diffusion (in some cases, national codification was required). In similar spirit, Tufano (2003) suggests that the 19th century decisions of U.S. judges to reorganize failed railroad in spite of creditors' foreclosure rights was a key stimulus for the adoption of contingent charge securities and voting trusts.

no model has explicitly studied enforcement of novel *contracts*. Another contribution is to show that as selective evidence collection by parties implies that under laissez faire judges will first learn to recognize less informative evidence, a reasonable standard can help to jump start contracting by establishing a recognized interpretation. Other studies analyze the cause and consequences of judicial error. Gennaioli (2007) and Gennaioli and Shleifer (2008) study how biased judges enforce contracts and legal rules. Glaeser and Shleifer (2003) and Bond (2004) focus on corruption among law enforcers. The theoretical work on adjudication under inequality has focused on tort, dealing with remedies rather than ex ante contracting solutions. Daugherty and Reinganum (2000) stress that inequality in the parties' ability to present evidence in court results in distortion of justice in tort cases. Glaeser and Shleifer (2003) and Glaeser, Sheinkman and Shleifer (2003) argue that in the presence of inequality, regulatory solutions which appear rigid may be necessary to limit ex post manipulation (see also Glaeser and Shleifer, 2001).

1. The Basic Model

The building block of our model is a standard production relationship between the buyer and seller of a customized widget (e.g. Bolton and Dewatripont 2005, ch. 12). A buyer *B* and a seller *S* contract over a novel transaction, on which no history of legal decisions exists. Let this be the supply of a tailored widget. The widget's market value is 0. For *B*, though, the widget's value *v* is uniformly distributed in $[0,\bar{v}]$ where $\bar{v} \leq 1$. To produce the widget, at $t = 0$ the seller must undertake an unobservable human capital investment which costs $\bar{v}^2 k > 0$ to him. At $t = 1$, after *v* is realized and observed by all, *S* exerts a production effort $e \in [0,1]$ at cost $e^2/2$. At $t = 2$, the widget is produced with probability e. The timing is:

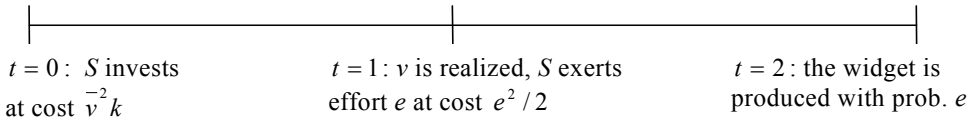


Figure 1.

A measure one of transactions is distributed according to $\bar{v}$ with p.d.f. $f_{\bar{v}}(\bar{v})$ in $[0,1]$. Variation in $\bar{v}$ is key because it captures ex-ante heterogeneity across transactions, which – as we shall see - is a key determinant of the use of standard contracts.

Consider a transaction of generic value $\bar{v}$. Conditional on investing at $t = 0$, after v is realized the socially optimal level of effort by the seller solves:

$$\max_{e(v)} ev - (1/2)e^2 \tag{1}$$

First best effort is equal to $e_{fb}(v) = v$, and ex-ante social welfare from production is:

$$\int_0^{\bar{v}} \left[e_{fb}(v)v - (1/2)e_{fb}(v)^2 \right](1/\bar{v})dv - \bar{v}^2 k = \bar{v}^2\left(\frac{1}{6} - k\right) \tag{2}$$

We study the case where it is socially profitable to produce the widget by assuming:

A.1.: $k < 1/6$

In the first best, S invests at $t = 0$ and at t=1 he exerts effort commensurate to the value of output $e_{fb}(v) = v$. Parties could try to implement this outcome by negotiating the delivery price of the widget at $t = 1$, after v is realized. This strategy, though, creates a standard hold-up problem (Grossman and Hart 1986). To show this in the starkest manner, we assume that B has all the bargaining power ex-post. Then, after v is realized, the buyer can set a delivery price $p = v$ for the widget and, contextually, tax the seller in a lump sum fashion at t=1. The delivery price induces S to exert first best effort while lump sum taxation allows B to extracts all surplus from him. Obviously then, in this arrangement S has no incentive to invest at t=0.

To avoid hold-up, parties can write a long-term contract committing B to pay only a delivery price $p(v) = v$. This contract avoids lump sum taxation of S at t=1, inducing first best effort and ex-ante investment by S. Crucially, this state-contingent contract relies on courts' ability to verify v.[4] We now study causes and consequences of courts' inability to verify v. We do so by introducing two novel ingredients in this otherwise standard setup: the measurement structure of v and judicial lack of expertise.

1.1 State Verification

State verification in our model is complex because in any transaction $\bar{v}$, the actual value v of the widget results from the realization of a measure $\bar{v}$ of signals s_i,

[4] In line with court practices and with Hart and Moore (1986), we assume that contracting is at will, namely that courts cannot force the parties to trade. If parties could write specific performance contracts, the first best might be attained even under imperfect verification of v by using options (e.g. Noldeke and Schmidt 1995). In reality, imperfect courts are likely to undermine specific performance contracts as well, for example by erring in implementing different allocations. To focus on the problems associated with verifying v, we assume specific performance contracts away.

where each s_i takes value in $\{0,1\}$. Each signal, as captured by its index $i \in [0, \bar{v}]$, can be viewed as one of the many factors contributing to determine the widget's value. Each signal is a piece of evidence in the sense that s_i is *verifiable* in court for all *i*.

After *v* is realized, a measure v of signals takes value 1, a measure $(\bar{v} - v)$ of signals takes value 0, and lower indexed signals are more likely to take value 0 than 1. Hence, the sum of all signals is always equal to the widget's realized value *v*. Crucially, at any realized value *v* some signals are more informative than others. We model this idea by assuming that signals with index $i \leq \bar{v} - v$ take value 0, signals with index $i > \bar{v} - v$ take value 1, as represented below for a generic transaction $\bar{v}$:

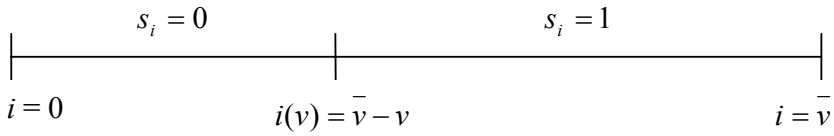


Figure 2.

The judge could then perfectly verify *v* by identifying only the "critical" signal with index $i(v) = \bar{v} - v$ (or better, a measure zero of signals around it), because the critical signal is fully informative about *v*. Parties could reach the first best by setting:

$$p(v) = \bar{v} - i(v) \tag{3}$$

We now study what happens if judges cannot recognize the critical signal ex-post.

1.2 Litigation and Adjudication

We assume that judges have limited expertise, in the sense that they cannot recognize the index *i* of a signal and thus which specific signal is critical, and that they face a cognitive limit as they can only use one signal (a measure zero of signals) in adjudication. The latter reasonable condition prevents judges from exploiting the law of large numbers, computing *v* by aggregating all signals. Crucially, Section 3 shows how judges can overcome this cognitive limit by learning over time. What is key for our purpose is that judges cannot immediately learn the transaction upon adjudicating it for the first time, otherwise legal evolution is trivial.[5]

Besides limited judicial expertise, we assume that parties have unequal ability to collect and present evidence in court. In the basic model, for any *v* the seller can

[5] This learning friction implies that parties cannot "instruct" judges by writing in an ex-ante contract what signals should judges use. Without prior training, judges will be unable to recognize those signals.

collect a measure $x_S v$ of signals taking value 1 (i.e. favourable to *S*), the buyer a measure $x_B(\bar{v} - v)$ of signals taking value 0 (i.e. favourable to *B*), where $x_S, x_B < 1$. If $x_S > x_B$, the seller is stronger than the buyer and vice versa. In Section 5 we derive this formulation from first principles in a model whit different signal collection costs.

Here, $\sigma = x_S / x_B$ measures the inequality between *B* and *S*. A higher σ captures the case where *S* is richer than *B* and thus able to "buy" more signals (*S* may be a large corporation, *B* a small firm or a consumer). *S* may hire more or better lawyers, or simply be more knowledgeable than *B* on how to collect favourable evidence.[6] We assume for now that σ is known in advance by parties. This case is quite natural for long distance trades where it is evident that there is differential access to fact finding, depending on location. Section 5 shows that similar results obtain when the parties' relative strength is ex-post random.

As the judge can learn only one signal, he adjudicates by picking one signal among those presented by the party offering more evidence. One can view litigation as a debate and signals as arguments. After the seller has presented a signal taking value 1, the buyer offsets it with a signal taking value 0, a counterargument. Since the judge cannot rank signals based on their informativeness, he ignores conflicting signals until one signal is not offset, and the party presenting it wins the case. This assumption yields convenient closed form solutions but Section 5 shows that similar results obtain if judges pick signals at random. The seller wins when:

$$x_S v \geq x_B(\bar{v} - v) \quad \Leftrightarrow \quad v \geq \hat{v} \equiv \frac{\bar{v}}{1+\sigma} \tag{4}$$

Two factors shape trial outcomes in this model: the case facts *v* and the inequality factor σ. The true state *v* affects trial outcomes by determining the likelihood that different parties collect favourable signals: *S* is more likely to win if *v* is high because in this state it is easier for him to find favourable signals with $s_i = 1$. On the other hand, *S* is more likely to win in any state the greater his strength σ. It is convenient to re-parameterize the model by defining $\beta = 1/(1+\sigma)$, which measure the pro-buyer bias. Adjudication is biased for the buyer if and only if $\beta > 1/2$ (i.e. $\sigma < 1$).

[6] Formally, one can interpret x_j as the probability with which party $j = S, B$ finds favorable evidence. In this context we view a party as being more informed when it finds, for the same amount of resources spent, a favorable signal with higher probability x_j.

2. Optimal Contracting under Imperfect State Verification

Section 2.1 considers the outcome attained by the parties under laissez faire. Section 2.2 focuses on the role of contract standardization.

2.1. Inequality and Contracting under Laissez Faire

At $t = 0$, parties decide whether to contract or not. If they do, the contract is enforced by a court at t = 1. Since judges cannot use more than one signal, parties can only specify two prices, a baseline payment p and a bonus Δ. The bonus is paid to *S* if and only if he wins, i.e. if the judge picks a signal taking value 1.

After writing contract (p, Δ), *S* learns v and – based on (4) – he predicts the outcome of the dispute. *S* expects to lose and obtain only p if $v < \hat{v}$, he expects to win and to obtain $p + \Delta$ if $v \geq \hat{v}$. The effort choice of *S* under laissez faire is thus:

$$e_{l.f.}(v) = \begin{cases} p & if \quad v \leq \hat{v} \\ p + \Delta & if \quad v > \hat{v} \end{cases} \tag{5}$$

By taking (5) into account, parties to transaction $\bar{v}$ write an ex-ante contract solving:

$$\max_{p,\Delta} \int_0^{\hat{v}} \left[pv - p^2/2 \right](1/\bar{v})dv + \int_{\hat{v}}^{\bar{v}} \left[(p+\Delta)v - (p+\Delta)^2/2 \right](1/\bar{v})dv \tag{6}$$

The above expression is simply the social surplus created by the seller's equilibrium effort in (5). By maximizing (5) we find that the optimal contract stipulates:

$$p = \beta(\bar{v}/2) \quad \Delta = \bar{v}/2 \tag{7}$$

Transactions with higher average value $\bar{v}/2$ specify a higher base price and bonus because in those transactions effort is on average more valuable. Crucially, a stronger pro-buyer bias β increases the base price. Intuitively when β is higher the buyer is able to pay the bonus less often, inducing the seller to under provide effort. To restore the seller's incentives, the parties stipulate a higher *p*. Social welfare under (7) is then:

$$W(\bar{v}, \beta) = \bar{v}^2 \left[\frac{1}{6} - k - \frac{1 - 3\beta + 3\beta^2}{24} \right], \tag{8}$$

The rightmost term in square brackets measures the welfare loss relative to the first best. Such loss is minimized at $\beta = 1/2$. Greater inequality $|\beta - 1/2|$ among parties reduces welfare because the resulting distortion in evidence collection reduces the ability of contracts to provide *S* with proper incentives. If inequality is huge (i.e. if β tends to 0 or 1), the optimal contract effectively induces a non-contingent payment

of $\bar{v}/2$ which is socially costly because the resulting production effort does not depend at all on the actual value of the widget. We find:

Proposition 1. *If $k > 15/96$, parties never contract. If $k \in (1/8, 15/96]$, there are two thresholds $\underline{\beta}$ and $\overline{\beta}$ with $\underline{\beta} < 1/2 < \overline{\beta}$, such that parties contract if and only if $\beta \in (\underline{\beta}, \overline{\beta})$. If $k \leq 1/8$, parties always contract. The welfare of contracting parties decreases in $|\beta - 1/2|$.*

Since adjudication is imperfect, even if parties are equal contracting only occurs if the transaction is sufficiently valuable (i.e. $k \leq 15/96$). To see the effect of β on contracting, consider the picture below, illustrating the case where $k \in (1/8, 15/96]$:

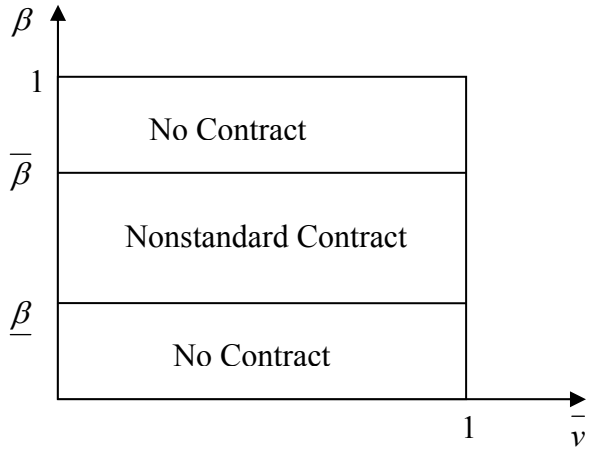


Figure 3.

For ease of exposition we call "non-standard" the contract used by the parties under laissez faire. Inequality among parties discourages contracting. The larger is inequality, the larger are enforcement distortions and the less efficient is the seller's effort. The distortion may be so severe to discourage the parties to contract altogether. Aggregate welfare when $k \in (1/8, 15/96]$ is then equal to:

$$\int_{\underline{\beta}}^{\overline{\beta}} \int_{0}^{1} W(\bar{v}, \beta) f_{v}(\bar{v}) f_{\beta}(\beta) d\bar{v} d\beta, \tag{9}$$

where $W(\bar{v}, \beta)$ is as in expression (8) while $f_{\beta}(\beta)$ is the density of interactions with adjudication bias β. A greater variance of β in the population captures greater inequality among contracting parties. Intuitively, since $W(\bar{v}, \beta)$ is quadratic in β, a greater variance of β reduces aggregate welfare. When β is more likely to take

extreme values, social welfare falls because: a) fewer buyer sellers pair find it profitable to contract, and b) enforcement distortions among contracting parties go up.

2.2 Contract Standardization

To reduce the above distortions, parties could contract on the procedural rules governing contract enforcement. This solution is however limited as public courts often refuse to enforce these contracts on the grounds that they violate the spirit of the law (e.g. Scott and Triantis 2005). The solution we consider consists in standardizing contract enforcement, by law or by a private association among trading partners. One key advantage of standardization over purely private solutions is that it can coordinate efforts to train judges on how to enforce predefined contract terms, reducing the costs of judges' limited expertise and cognitive limits (Kahn and Klausner, 1997).

We model the standard contract as consisting of two aspects. First, it uses a signal identified by index i_S that at the outset judges are trained to recognize. Second, judges are forbidden from using in enforcement any signal $i \neq i_S$ not explicitly included in the standard contract. Judicial training is costly, so only a few signals can be standardized, consistent with judges' cognitive limits. The difference with laissez faire is that contracting parties could not train judges while here, at some large cost, a public or a private authority can enforce this training. The restriction on admissible evidence is also crucial. Such restriction limits the flexibility of the standard contract, but it is fundamental to ensure that the strong party does not sway judges by presenting favourable but uninformative signals.

Since judges recognize the value of s_{i_S}, when enforcing the standard contract they can verify if v is greater or smaller than the state v_S in which contingency i_S is critical, as $v > v_S$ if and only if $i_S = 1$ by construction. Thus, under the standard contract judges predictably enforce bonus Δ if and only if $v > v_S$. In line with real-world standardization, we allow parties to use non-standard contracts if the want to do so. When will parties adopt the standard contract, and the non-standard contract outlined in the previous section?

To answer this question, note that the standard contract induces effort level:

$$e_{sta}(v) = \begin{cases} p & if \quad v \leq v_S \\ p + \Delta & if \quad v > v_S \end{cases} \tag{10}$$

The above expression shows one key implication of our model: in transactions where the standard signal is higher than the maximum value of the transaction, i.e. $\bar{v} \leq v_S$, the bonus is never enforced and effort is equal to the base price p. This immediately implies that when $\bar{v} \leq v_S$ the standard contract is never used.[7]

Generally speaking, the one-size-fits-all standard contract is unsuitable for transactions where i_S is never critical, such as those with $\bar{v} \leq v_S$. It would be optimal in this world to create different standard contracts for different transactions $\bar{v}$, but this would require extensive judicial training on a large number of signals. Recognizing judicial cognitive limits, we limit attention to the case of a single standard.

If $\bar{v} > v_S$ and the standard contract is used, parties set contract terms p, Δ so as to maximize their ex-ante welfare, which implies:

$$p = v_S / 2 \quad \Delta = \bar{v} / 2 . \tag{11}$$

The base price increases in v_S. Intuitively, if under the standard contract the bonus is enforced less often, parties write a higher base price to as to improve the seller's incentives. For $\bar{v} > v_S$, parties' welfare under the standard contract is:

$$W(\bar{v}, v_S) = \frac{\bar{v}^2}{6} - \bar{v}^2 k - \frac{\bar{v}^2 - 3\bar{v}v_S + 3{v_S}^2}{24} \tag{12}$$

Expression (12) shows that, in contrast with the non-standard contract, social welfare now does not depend on β but on v_S. Standardization thus allows parties to insulate their trade from inequality among them.

To study the choice between standard and non-standard contracts we focus on the extreme case where under laissez faire a high β induces parties not contract:

A.2: $k \in [1/8, 15/96]$.

Under A.2 high inequality undermines contracting and parties prefer the standard contract to no contract [i.e. expression (12) is positive] when:

$$\bar{v} \in \left[\frac{v_S}{\overline{\beta}}, \frac{v_S}{\underline{\beta}} \right], \tag{13}$$

where $\overline{\beta}$ and $\underline{\beta}$ are the thresholds of Proposition 1. Expression (13) says that when

[7] This can be seen by the fact that in the optimal non-standard contract of expression (7) the parties always find it profitable to specify a positive bonus $\Delta > 0$ irrespective of inequality β.

the optimal standard $\bar{v}/2$ for transaction $\bar{v}$ is much larger (smaller) than the actual standard v_S, the standard contract enforces the bonus too seldom (often), inducing an effort under-provision (over-provision) which is at least as large as the one caused by an extreme pro-buyer (pro-seller) bias β. As a result, parties prefer to write no contract at all than to write the standard contract.

More generally, considering also the choice between the standard and the non-standard contract, contract choice works as follows:

Proposition 2 *Given* v_S, *the standard contract is used when* $\bar{v} \in \left[v_S/\underline{\beta}, v_S/\bar{\beta}\right]$ *and when either* $\beta \geq \max\left[v_S/\bar{v}, 1-v_S/\bar{v}\right]$ *or* $\beta \leq \min\left[v_S/\bar{v}, 1-v_S/\bar{v}\right]$. *If instead* $\beta < \max\left[v_S/\bar{v}, 1-v_S/\bar{v}\right]$ *and* $\beta > \min\left[v_S/\bar{v}, 1-v_S/\bar{v}\right]$ *and/or* $\bar{v} \notin \left[v_S/\underline{\beta}, v_S/\bar{\beta}\right]$, *the parties' contract choice is the same as in Proposition* 1.

The proof is in the appendix. To aid the understanding of this result, consider Figure 4 below, which displays contract choice when $\underline{\beta} < v_S < 1/2$:

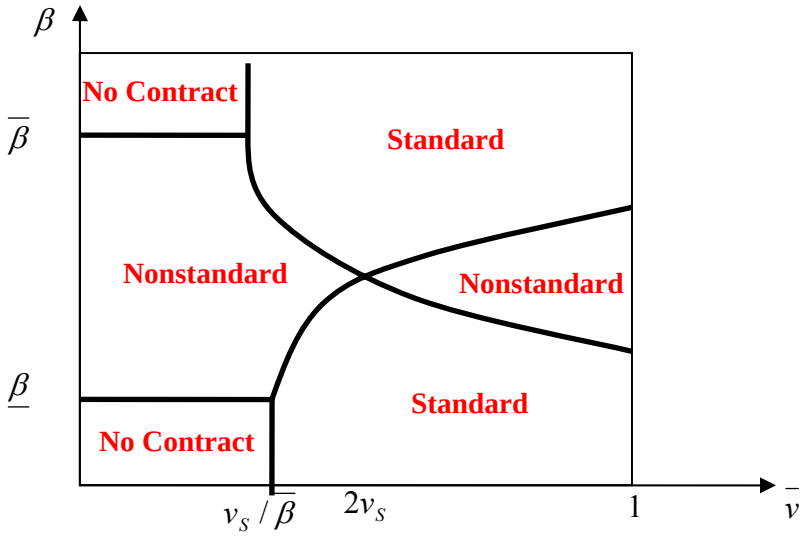


Figure 4

If $\bar{v} \leq v_S/\bar{\beta}$, the standard contract induces under-provision of effort and is not used. In this region, parties do not contract if inequality is large, just as in Figure 3, so that the introduction of the standard contract is irrelevant. If instead $\bar{v} > v_S/\bar{\beta}$, parties use the standard contract provided inequality is sufficiently large, namely in the lower and upper portions of Figure 4. In this region, the use of the standard contract falls as

$\bar{v}/2$ gets further away from v_S. Indeed, although here the standard contract is better than no contract, a non standard contract can still be optimal if the distortions caused by the standard contract are sufficiently large and inequality is sufficiently low.

Generally speaking, Proposition 2 says that the parties trade off the standard contract's inflexibility, namely its inability to deal with their specific transaction, with its ability to avoid enforcement distortions.[8] If parties are sufficiently equal and/or their transaction is sufficiently different from the standard contract, then the parties use the non-standard contract, perhaps at the cost of some enforcement distortions. If instead the parties are highly unequal, then they prefer to use the standard contract provided of course the discrepancy between the standard contract and their transaction is not too large, otherwise they prefer not to contract at all. In this sense, the inflexibility of the standard contract is the price to pay for avoiding enforcement distortions, for it is precisely by training judges on how to enforce a one size fits all standard that enforcement distortions are avoided.[9]

Although the standard contract is not always used, its introduction improves welfare because it expands parties' contracting options. In particular, we have that:

Corollary 1 *The introduction of standard contract v_S improves welfare, the more so the greater is the variance of β. Standardization beneficially allows: i) formerly non-contracting parties to contract and ii) some formerly contracting parties to improve their welfare. If the variance of β is sufficiently large, an increase in the mass of transactions with $\bar{v} > v_S / \overline{\beta}$ increases the benefit of standardization.*

The proof is in the appendix. Figure 5 below graphically illustrates this result:

[8] Formally, the non-standard contract is more flexible because the threshold $\hat{v} = \beta\bar{v}$ above which the bonus is enforced depends on the transaction specific value $\bar{v}$ as under a non-standard contract transaction specific contingencies are used in enforcement, at the cost of introducing bias β.

[9] Notice that the cost of the standard contract, namely its rigidity, is due to the assumption of cognitive limits in judicial learning: if judges could be cheaply trained to recognize all contingencies, then extensive standardization would allow the parties to reach the first best.

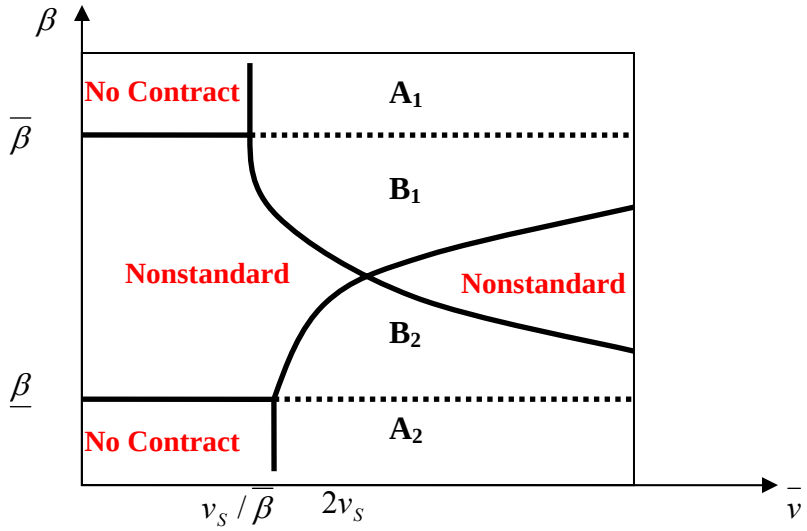


Figure 5

In regions A_1 and A_2 the standard contract improves welfare by allowing contracting among very unequal parties that would not contract under laissez faire. In regions B_1 and B_2 the standard contract improves the welfare of parties that would contract under laissez faire but, given their relatively high inequality, benefit from the reduction in enforcement distortions that standardization brings about.

Greater inequality among contracting parties, captured by a distribution of interactions $f_\beta(\beta)$ more concentrated on extreme values of β, increases the static benefit of contract standardization. Accordingly, when inequality is sufficiently large, an increase in the mass of transactions with value $\bar{v} > v_S / \overline{\beta}$ increases the benefit of standardization. First, at sufficiently high levels of inequality the presence of more transactions with $\bar{v} > v_S / \overline{\beta}$ increases the mass of interactions benefiting from standardization, those located in regions A_1, A_2, B_1, and B_2. Second, as the average value of transactions goes up, the disruption cause by inequality of weapons becomes larger and thus the benefit of standardization increases as well.[10]

Thus, contract standardization can be seen as a way to reduce the enforcement

[10] It is beyond the scope of this paper to provide a normative analysis of how the standard contract should optimally be set, but we studied this problem when $f_\beta(\beta)$ and $f_{\bar{v}}(\bar{v})$ are uniform in $[0,1]$. First, optimal setting of v_S trades off the concern for fostering contracting in high value transactions with that of expanding contracting in *all* transactions. Second, as inequality becomes more harmful (i.e. as $\underline{\beta}$ goes up) fostering contracting in all transaction becomes very difficult and thus preserving high value transactions becomes more important (so v_S goes up). Third, at the optimum $\underline{\beta} < v_S < 1/2$, which vindicates the assumption under which figures 4 and 5 are drawn.

distortion caused by inequality among litigants, especially in novel and complex transactions. By so doing, standardization statically boosts contracting and welfare – the more so in unequal societies – but crowds out the use of non-standard contracts.

3. The Evolution of Precedents and Contracts

The previous analysis highlighted that, from a static standpoint, standardizing a contingency is always beneficial because – by reducing enforcement distortions – it improves contracting by all parties. Yet, this overlooks that the private sector may autonomously reach this outcome over time, without any top-down standardization effort. In particular, judges may learn how to enforce specific contingencies as a by product of enforcing contracts. Litigation of contractual contingencies itself promotes an incremental process of precedent creation that fosters judicial learning, reducing enforcement distortions [see Kahn and Klausner (1997) for an empirical analysis of this effect]. Such spontaneous legal evolution plays a key role in virtually all legal systems around the world, especially but not exclusively in Common Law ones. How does this accumulation of precedents work? How does it affect the benefit of standardization? We address these questions in the next two sections.

Consider an infinite repetition of the previous transaction in continuous time. At each $t \geq 0$, buyer-seller pairs meet, contract and litigate. The stock of precedents is the relevant state variable, and consists of all signals used by judges to adjudicate past disputes. We model a precedent as a mapping between the index i of a signal previously used by judges and a judicially attributed index $q \in [0,1]$. This feature captures the fact that judges may erroneously treat a signal i (even if uninformative) as critical, attributing to it an incorrect index $q \neq i$. Hence, any benefit of precedent accumulation in our model does not mechanically rely on judges taking efficient decisions, as judicial misattribution of index persist into case law. The key role of precedents is that, unlike the signals' true index i, the judicially attributed index q is contractible because judges have learned to recognize the corresponding signal.

In our model, legal evolution results from the accumulation of signals used in disputes that vary with respect to the inequality among litigants β, the widget's value v and the type of transaction $\bar{v}$. Hence, the dynamics of precedent may in principle be very complex. To render the problem tractable, we only focus on the case $\bar{v} = 1$, which does not entail a loss in generality if precedents are transaction specific, namely

if a precedent collected in transaction $\bar{v}$ cannot be used in transaction $\bar{v}' \neq \bar{v}$.[11]

What precedents accumulate over time depends on what signals parties find it profitable to present in court. In this respect, note that it is (weakly) ex-post optimal for buyers to always collect signals with the lowest index *i* and sellers to collect signals with the highest index *i*. Intuitively, the former signals take value 0 and are favourable to the buyer while the latter signals take value 1 and are favourable to the seller. Parties cannot commit to presenting the critical signal because the losing litigant would have the incentive to bring many extreme signals favourable to him. Since judges cannot recognize signals by their informativeness, this strategy increases such litigant's probability of winning. This logic confirms that parties will tend to present signals with extreme indices, stressing one problem of autonomous judicial learning: due to the selective production of evidence, litigation initially tends to produce narrow and little informative signals. Thus, the stock of precedents at *t* is:

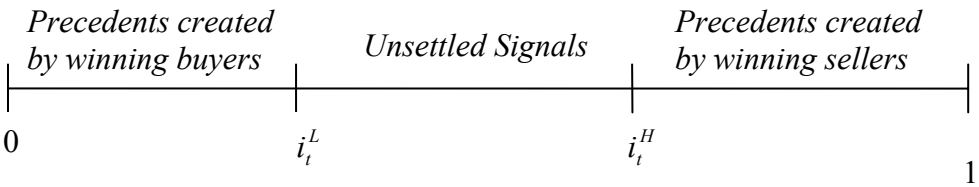


Figure 6.

Crucially, Figure 6 displays signals' true index *i*, not the index *q* attributed by judges, which is irrelevant for efficiency (although it affects contract form). The stock of precedents at *t* includes all signals whose index is lower than threshold i_t^L and those whose index is higher than threshold i_t^H, where i_t^L and i_t^H are to be determined.

3.1 Contracting and Legal Evolution under Laissez Faire

Consider now how private contracting works when at time *t* signals with $i \leq i_t^L$ and $i \geq i_t^H$ are embodied into precedents and judges can recognize them by their attributed index *q*. One question is: can misattribution of *q* impair the parties' ability to contract? The answer is no, as parties can contract around judicial errors.

To see this, suppose that the mapping between a signal's true and attributed index is $q = q(i)$. Parties can then write a contract telling judges to use signal $q(i)$ the

[11] That is, while judges are instructed to always enforce the standard contract, they may refuse to enforce a precedent in a different transaction from the one where the precedent was collected, on the grounds that the two transactions differ in too many aspects.

same way as signal *i* should be optimally used. For instance, the contract can say that if signal $q(i-\varepsilon)$ takes value 0 and signal $q(i+\varepsilon)$ takes value 1 for small ε, then the judge should enforce $p = 1-i$. Intuitively, in this case signal *i* is critical and $1-i$ equals the widget's value *v*. By exploiting judges' ability to recognize signals by index *q*, parties can induce them to identify all critical signals laying in $\left[0, i_t^L\right)$ or in $\left(i_t^H, 1\right]$. The proof of Proposition 3 describes what contract allows parties to do that, but the general idea is that if parties can contract around judicial errors the accumulation of precedents generates beneficial predictability even if past judicial decisions are incorrect.

Given the structure of critical signals, the parties' contract can induce judges to perfectly verify *v* and thus to enforce the first best price in (3) when $v \le \underline{v}_t \equiv 1 - i_t^H$ and $v \ge \bar{v}_t \equiv i_t^L$, relegating all legal uncertainty to the range $v \in \left[\underline{v}_t, \bar{v}_t\right]$ shown below:

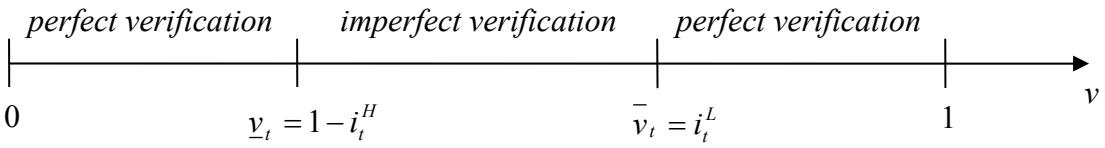


Figure 7

Legal evolution expands the contract space, allowing parties to write more contingent contracts that attain the first best for $v \notin \left[\underline{v}_t, \bar{v}_t\right]$. How does contracting work for $v \in \left[\underline{v}_t, \bar{v}_t\right]$? As in Section 2, in this range parties can at most have judges enforce a base price p_t when *v* is in sub-interval $\left[\underline{v}_t, \hat{v}_t\right]$ and award also bonus Δ_t on top of it when *v* is in sub-interval $\left[\hat{v}_t, \bar{v}_t\right]$. Here $\hat{v}_t$ is endogenously determined as the threshold above which the seller wins the case when $v \in \left[\underline{v}_t, \bar{v}_t\right]$. Since in this range the buyer presents $x_B(\bar{v}_t - v)$ signals taking value 1, and the seller presents $x_S(v - \underline{v}_t)$ signals taking value zero, the seller wins whenever:

$$v \ge \hat{v}_t \equiv (1-\beta)\underline{v}_t + \beta\bar{v}_t \tag{14}$$

The stronger is the buyer, the lower is the probability that the seller obtains the bonus. Denote by $g_t \equiv \bar{v}_t - \underline{v}_t$ the extent of legal uncertainty. The larger is g_t, the smaller is the stock of precedents. Then, since as we will soon see in equilibrium precedents accumulate symmetrically [i.e. $\underline{v}_t = 1 - \bar{v}_t$], we can rewrite (14) as:

$$\hat{v}_t \equiv \frac{1}{2} + \left(\beta - \frac{1}{2}\right) g_t \tag{15}$$

By taking $\hat{v}_t$ into account, parties set the base price p_t and the bonus Δ_t to maximize expected social welfare in $\left[\underline{v}_t, \bar{v}_t\right]$:

$$\max_{p,\Delta} \int_{\underline{v}_t}^{\hat{v}_t} \left[pv - p^2/2\right] dv + \int_{\hat{v}_t}^{\bar{v}_t} \left[(p+\Delta)v - (p+\Delta)^2/2\right] dv$$

These are in turn equal to:

$$p_t = 1 - (1-\beta) g_t \quad \Delta_t = g_t / 2 \tag{16}$$

As in Section 2, the base price increases in β, but it is now adjusted upward because it is enforced only for values of *v* above $\underline{v}_t$. The bonus is positive but smaller than in Section 2, as now the effort gap and thus the required incentive is smaller. Since for $v \notin \left[\underline{v}_t, \bar{v}_t\right]$ parties attain the first best, social welfare is now equal to:

$$\frac{1}{6} - k - g_t^3 \frac{1 - 3\hat{v}_t + 3\hat{v}_t^2}{24} \tag{17}$$

In the absence of precedents (g_t=1), expression (17) is identical to previous expression (8) evaluated at $\bar{v} = 1$. However, precedents improve welfare by allowing parties to write more detailed contracts, reducing the range over which the strong party can distort enforcement. If precedents exhaust all signals ($g_t = 0$), parties attain the first best irrespective of inequality β. What is the implication of (17) for contracting under a laissez faire? In the appendix we prove that:

Proposition 3 *For every g_t, under laissez faire there are two thresholds $\underline{\beta}_t^{LF}$ and $\bar{\beta}_t^{LF}$ with $\underline{\beta}_t^{LF} \leq 1/2 \leq \bar{\beta}_t^{LF}$, such that parties contract if and only if $\beta \in \left(\underline{\beta}_t^{LF}, \bar{\beta}_t^{LF}\right)$. $\underline{\beta}_t^{LF}$ increases and $\bar{\beta}_t^{LF}$ decreases in g_t. At $g_t = 0$ parties attain first best welfare.*

Under laissez faire, legal evolution (lower g_t) expands the volume of contracting. By reducing enforcement distortions, judicial learning fosters the scope and efficiency of contracting among more unequal parties. In this sense, spontaneous legal evolution is a substitute of standardization.

Given the above contracting choices, we can solve for the path of legal evolution. Since under non-standard contracts each litigation episode is associated with the use of a novel signal, the total measure of new signals used by judges to

adjudicate cases is equal to the total volume of disputes a given period. Limited judicial learning then implies that in a given instant not all of these signals are learned and systematized into precedents. In particular, in an infinitesimal time interval dt only a fraction dt of these signals is converted into precedents. Given these considerations, after some algebra one can find that – if the distribution of pro-buyer bias $f(\beta)$ is symmetric around $\beta = 1/2$ – the total number of precedents accumulated in a given period and thus the reduction of legal uncertainty is equal to:

$$\dot{g}_t = -g_t\left[F(\overline{\beta}_t^{LF}) - F(\underline{\beta}_t^{LF})\right], \tag{18}$$

Where $F(\beta)$ is the distribution function of β. Thus, the measure of new precedents is equal to the total volume of contracting $\left|F(\overline{\beta}^{LF}) - F(\underline{\beta}^{LF})\right|$ times the extent of legal uncertainty g_t, as the latter determines the extent of litigation among contracting parties.[12] With the initial condition $g_0 = 1$ and the expressions for $\overline{\beta}_t^{LF}$ and $\underline{\beta}_t^{LF}$ derived in Proposition 3, expression (18) determines the time path of legal evolution.

One key property of (18) is that, as long as some contracting takes place at t = 0, legal uncertainty monotonically decreases over time and eventually disappears, as the unique steady state of (18) is $g = 0$. It is easy to see that expression (17) implies that – at any given level of inequality β – the welfare of contracting parties as well as the total volume of contracting increases over time, eventually reaching the first best. Thus, spontaneous legal evolution does not only substitute standardization, by spurring contractual innovation it eventually allows parties to reach the first best. By progressively incorporating new signals, the litigation of novel contract enriches the stock of precedents, refining the law over time. This increases predictability, progressively reducing enforcement distortions.

3.2 Contracting and Legal Evolution under Standardization

How does contract standardization work once the role of legal evolution in reducing enforcement distortions is taken into account? To answer this question, suppose that at time t=0 the standard contract v_S is introduced. At any point in time, and depending on the stock of accumulated precedents, parties can choose between the

[12] We are implicitly assuming that all litigants go to court. This simplifying assumption, which is shared by most of the recent literature on legal evolution, is however not crucial. Our main results only require that in each period a fraction of the cases in (18) goes to court.

standard contract and the non-standard contract. We then find:

Proposition 4 *If at t = 0 the standard contract* v_S *is introduced (with* $\underline{\beta} < v_S \leq 1/2$*), for every t≥0 there are two thresholds* $\underline{\beta}_t^S$ *and* $\overline{\beta}_t^S$*, so that the non-standard contract is used for* $\beta \in \left(\underline{\beta}_t^S, \overline{\beta}_t^S\right)$ *and the standard contract is used otherwise. This implies:*

i) Under standardization the non standard contract is used less than under laissez faire. Formally, for every t, $\underline{\beta}_t^{LF} \leq \underline{\beta}_t^S$ *and* $\overline{\beta}_t^{LF} \geq \overline{\beta}_t^S$.

ii) *Under standardization legal evolution is slower than under laissez faire. Formally, it follows the law of motion* $\dot{g}_t = -g_t\left[F(\overline{\beta}_t^S) - F(\underline{\beta}_t^S)\right]$

Consistent with Proposition 1, (and Figure 4), when the standard contract is introduced all parties to transaction $\bar{v} = 1$ contract even if they are very unequal. Intuitively, even in a dynamic setting the introduction of a standard contract expands the volume of trade relative to laissez faire, at least in the short run. In addition, and again consistent with Proposition 1, parties use the non-standard contract *only if* they are sufficiently equal, especially if the law is undeveloped (i.e. g_t is large).

The key messages of the above result concern points i) and ii). First, although standardization expands the volume of contracting, it also *reduces* the use of the non-standard contract. This effect can be immediately visualized in Figure 5. In moving from laissez faire to standardization, the moderately unequal parties that in Figure 5 lay in regions B_1 and B_2 switch from a non-standard to a standard contract. These parties are sufficiently equal that they would have contracted even in the absence of standardization. Yet, they are sufficiently unequal to benefit from the standard contract once the latter is introduced.

This crowding out effect captures the key difference between autonomous legal evolution and standardization. The standard contract crowds out non-standard contracts because the latter, whose enforcement relies on autonomous legal evolution, ultimately rely on the evidence presented by parties when litigating specific cases. This is problematic, though, as in early stages of legal evolution the signals presented by parties and incorporated into the law tend to be of relatively little informative content. By contrast, the standard contract is based ex-ante on a signal that is

imperfect but more informative than the evidence presented by parties ex-post. From this it follows that the latter contract works better, at least in early contracting rounds.

Point ii) then illustrates one important consequence of this effect. By reducing the use and thus the litigation of non-standard contracts, contract standardization reduces the *speed* at which precedents are accumulated. Indeed, it is precisely the litigation of innovative contracts that fosters legal evolution by bringing new signals to courts. By reducing legal evolution, standardization also reduces contractual innovation because it eventually reduces the number of new precedents or signals over which the parties can contract.[13]

In sum, our model shows that standardization statically expands the volume of trade by allowing very unequal parties to contract but it also slows down legal and contractual innovation by crowding out the use of non-standard contracts. Put differently, autonomous legal evolution is too slow because litigation is narrow and parochial, while standardization provides a safe harbour to the parties thereby reducing their incentive to experiment novel contracts. This dynamic cost of standardization is due to an externality: social optimality would require a sizeable number of parties to use non-standard contracts so as to foster legal evolution and thus future welfare. The problem, though, is that atomistic contracting pairs do not take the social consequences of their contracting choice into account. For them, the use of the non-standard contract comes with the cost of greater enforcement uncertainty but without direct benefits, which is precisely what stifles contractual innovation.

In theory, this effect may be so strong that if the standard contract is not appropriately designed its introduction may actually reduce social welfare in the long run. We now illustrate this possibility with a simple example.

Suppose that $k \leq 1/8$, and that the standard contract is $v_S = 1/2$. Since we are still in the case where $\bar{v} = 1$, it is easy to check if standard $v_S = 1/2$ is introduced, then the non-standard contract is never used, formally, $\overline{\beta}_0^S = \underline{\beta}_0^S = 1/2$. This implies that in this example under standardization there is no innovation whatsoever. In addition, if $k \leq 1/8$ then under laissez faire parties always contract irrespective of the inequality among them. Formally, at $t = 0$ $\overline{\beta}_0^{LF} = 1, \underline{\beta}_0^{LF} = 0$. This case purposely captures a

situation where: a) under standardization legal innovation is minimized and thus the standard contract only allows to avoid the cost of inequality, and b) under laissez faire legal innovation is maximized but inequality still entails costly enforcement distortions. In this case, Proposition 4 implies that legal uncertainty evolves according to the law $g_t^{LF} = e^{-t}$ under laissez faire and to the law $g_t^S = 1$ under standardization. The important aspect here is that the standardized regime falls into a low innovation trap: the standard contract prevents the use of the non-standard contract at $t = 0$, stifling any further legal and contractual innovation.

Consider the welfare impact of the two contractual regimes. With an inter-temporal discount rate of ρ discounted social welfare under laissez faire is equal to:

$$E_\beta\left\{\int_0^{+\infty}\left[\frac{1}{6}-k-e^{-3t}\,\frac{1/4+3(\beta-1/2)^2e^{-2t}}{24}\right]e^{-\rho t}dt\right\}= \\ =\frac{1/6-k}{\rho}-\frac{1}{96(3+\rho)}-\frac{\mathrm{var}(\beta)+\left[E(\beta)-1/2\right]^2}{8(2+\rho)} \tag{20}$$

Intuitively, social welfare under laissez faire is lower the more the distribution of pro debtor bias is dispersed [i.e. the higher its variance $\mathrm{var}(\beta)$] and the higher is the systematic bias in society, i.e. the more distant is the average bias $E(\beta)$ from 1/2.

By contrast, discounted social welfare under standardization is:

$$E_\beta\left\{\int_0^{+\infty}\left[\frac{1}{6}-k-\frac{1/4}{24}\right]e^{-\rho t}dt\right\}=\frac{1/6-k}{\rho}-\frac{1/4}{24\rho}, \tag{21}$$

which in this example is independent of social inequality because in this regime the non-standard contract is never used. By comparing (20) to (21) one finds that the introduction of standard contract $v_S = 1/2$ at t=0 reduces discounted social welfare if:

$$\mathrm{var}(\beta)+\left[E(\beta)-1/2\right]^2 \le \frac{(2+\rho)}{4\rho(3+\rho)} \tag{22}$$

In this example, discounted social welfare is lower under standardization than under laissez faire when the dispersion of biases is small, when the mean bias is small, or both. Intuitively, in those cases the social cost of enforcement distortions under laissez faire are small compared to the dynamic benefits that this regime brings about. The above condition is also more likely to hold the smaller is the discount factor because the more patient is society, the greater is the value of legal innovation under

[13] This result does not depend on the assumption that the standard contract does not evolve with precedents. On the contrary, if the standard contract incorporates newly created precedents, it would

laissez faire. Note that the logic of this result does not rely on the fact that in the current example under standardization completely kills innovation. As Proposition 4 shows, even if some innovation takes place it may still be the case that social welfare under standardization is lower than under laissez faire because in the latter regime legal evolution is much faster.

Of course, a proper welfare analysis requires a careful modelling of how an optimal standard is set. For example, the dynamic cost of standardization can be reduced by drafting a statically suboptimal standard $v_S \neq 1/2$, which fosters legal evolution. However, one key messages of the above analysis appear general. That is, the benefit of contract standardization is going to be larger the larger is inequality because in this case the dynamic benefit of laissez faire is not worth its static cost.

4 Extensions

4.1 Random Litigation Strength

Consider now our baseline model when at the time of contracting the pro-debtor bias β is randomly distributed in $[0,1]$. We solve the case where the parties contract over the range $[\underline{v},\bar{v}] \subseteq [0,1]$ to show that our results naturally extend also to the dynamic model. The parties set their ex-ante contract (p,Δ) by taking the entire distribution of β into account. That is, the parties maximize:

$$\max_{p,\Delta} \int_0^1 \int_{\underline{v}}^{\hat{v}(\beta)} \left[pv - p^2/2\right](1/\bar{v})dv + \int_{\hat{v}(\beta)}^{\bar{v}} \left[(p+\Delta)v - (p+\Delta)^2/2\right](1/\bar{v})dv f(\beta)d\beta \qquad (23)$$

where $\hat{v}(\beta) = (1-\beta)\underline{v} + \beta\bar{v}$ stresses the dependence of the litigation outcome on the realized β. The first order conditions of the above problem are:

$$E_\beta\left[\int_{\underline{v}}^{\hat{v}(\beta)} (v-p)(1/\bar{v})dv\right] = 0$$
$$E_\beta\left[\int_{\hat{v}(\beta)}^{\bar{v}} (v-p-\Delta)(1/\bar{v})dv\right] = 0 .$$

After some algebra, once can find that the two first order conditions above imply:

$$p = \frac{1}{2} + \frac{(\bar{v}-\underline{v})}{2}\frac{\mu_\beta^2 - \mu_\beta + \sigma_\beta}{\mu_\beta}$$
$$\Delta = \frac{(\bar{v}-\underline{v})}{2}\frac{\mu_\beta - \mu_\beta^2 - \sigma_\beta}{\mu_\beta - \mu_\beta^2}$$

---

stifle the use of non-standard contracts and thus legal evolution even more.

where $\mu_\beta = E(\beta)$ and $\sigma_\beta = \text{var}(\beta)$. Thus, it is still the case that when the buyer is on average stronger [i.e. μ_β goes up] the base price p increase. For $\sigma_\beta > 0$, however, a higher μ_β also affects the bonus, increasing it if and only if $\mu_\beta < 1/2$. Intuitively, randomness benefits weak buyers, requiring a higher bonus to induce *S* to exert effort. Finally, higher randomness σ_β reduces the effectiveness of incentives, thereby requiring an increase in the base payment and a reduction of the bonus.

It is straightforward to gauge the welfare impact of μ_β and σ_β. First, notice that expression (23) can be written as $E_\beta[V(\hat{v}(\beta))]$, where $V(\hat{v}(\beta))$ is the objective function inside the integral above, expressed as a function of β via the latter's impact on the litigation threshold $\hat{v}(\beta)$ [disregarding the indirect effect exerted by β through the optimal contract terms]. Then, it is easy to find that:

$$dV(\hat{v}(\beta))/d\beta = (\bar{v} - \underline{v})[p + \Delta/2 - \hat{v}(\beta)]$$
$$d^2V(\hat{v}(\beta))/d\beta^2 = -(\bar{v} - \underline{v})\Delta$$

By the envelope theorem, the first derivative tells us that social welfare in (23) increases in the average pro buyer bias when μ_β is below a certain threshold and decreases with average pro-buyer bias otherwise. This confirms the result of Section 5 that systematic inequality of weapons is detrimental to welfare. The second derivative instead indicates that social welfare is concave in pro-buyer bias β. As a result, greater randomness in pro-buyer bias σ_β reduces social welfare. This finding suggests that, like systematic bias, also random bias undermines contracting, confirming the results of Section 2 with respect to this new enforcement distortion.

5.2 Direct Cost of Gathering Signals

We now analyze the robustness of our baseline model of litigation to the assumptions that parties face explicit cost of gathering signals and that judges decide how to adjudicate by picking one signal at random (rather than by holding for the party brining a greater number of signals). Suppose that the buyer and seller's marginal cost of acquiring signals are equal to θ_B and θ_S, respectively, where $\sigma = \theta_B / \theta_S$ measures the relative strength of the seller in this new model.

Consider the enforcement of (p,Δ). If *B* presents n_B signals taking zero value and *S* presents n_S of signals taking value 1, when the judge randomly picks one signal the expected price paid to S is:

$$\frac{n_S}{n_S + n_B}\Delta + p \tag{18}$$

B and *S* draw signals randomly (that is without knowing a priori whether their value is 0 or 1). As a result, in any *v* the seller presents n_S signals taking value one by spending $\theta_S n_S /(v - \underline{v})$, the buyer presents n_B zero signals by spending $\theta_B n_B /(\bar{v} - v)$. This assumption allows us to capture the idea that it is harder to find new signals as legal uncertainty narrows down. Then, the equilibrium number of signals solves:

$$\max_{n_S} -\frac{n_S}{n_S + n_B}\Delta - p - \theta_S \frac{n_S}{(v - \underline{v})} \tag{19}$$

$$\max_{n_B} -\frac{n_S}{n_S + n_B}\Delta - p - \theta_B \frac{n_B}{(\bar{v} - v)} \tag{20}$$

Each party trades off the benefit of presenting more favourable signals with the cost of collecting them. The first order conditions of the race between *S* and *B* imply that in equilibrium in state *v* the bonus is enforced with probability:

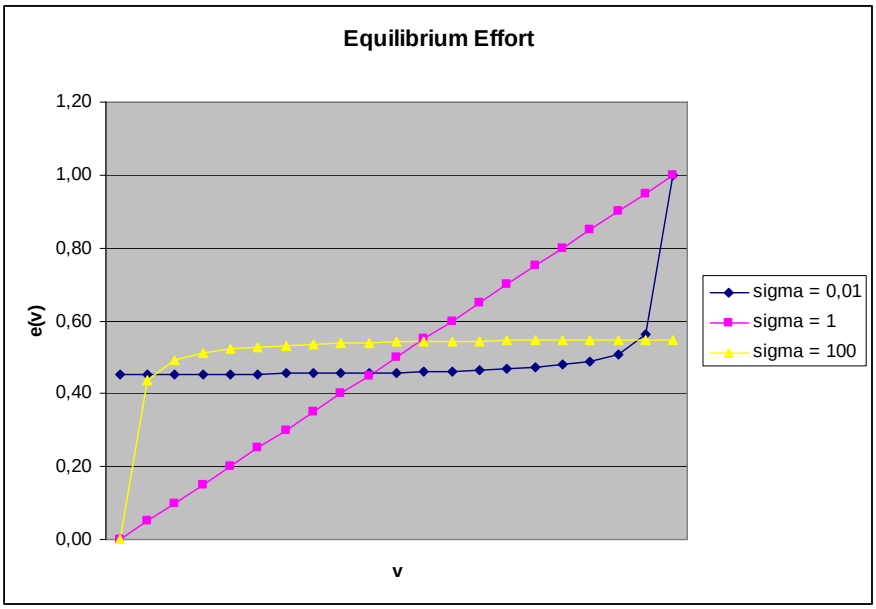
$$\frac{n_S}{n_B + n_S} \equiv \mu(v) = \frac{\sigma(v - \underline{v})}{\sigma(v - \underline{v}) + (\bar{v} - v)}, \tag{21}$$

which is identical to what one would obtain by substituting in the left hand side above the signal gathering policy assumed in Section 3, which confirms the validity of our earlier simplifications. By taking into account the way expression (21) affects the expected payment to the seller, it is possible to find that the optimal contract specifies $p = E(v) - \Delta E[\mu(v)]$ and $\Delta = \frac{\text{cov}[\mu(v), v]}{\text{var}[\mu(v)]}$, where expectations are computed for $v \in [\underline{v}, \bar{v}]$. The seller's optimal effort level is thus equal to:

$$e(v) = E(v) + \frac{\text{cov}[\mu(v), v]}{\text{var}[\mu(v), v]}\{\mu(v) - E[\mu(v)]\} \tag{22}$$

Expression (22) is complex to handle analytically (hence our shortcut assumption of Section 3), but the figure below – which simulates (22) for σ = 0,1 for σ = 1 and for σ = 100 – shows that the main properties resemble those of Section 3:[14]

[14] The figure plots the expression (22) against first best effort for a number of values of σ in $[0,+\infty)$.



Thus, inequality of weapons continues to distort the optimal effort, causing over-provision of effort at low values of v and under-provision at high values of v. Since the optimal contract tries to de-bias enforcement, this pattern occurs both when the seller is weak (i.e. when $\sigma = 0{,}1$) and when the seller is strong (i.e. when $\sigma = 100$). The main difference with the case studied in Section 3 is that now if $\sigma = 1$ parties attain the first best because judges' assessment is on average unbiased at any v. In general, it is still the case that inequality among litigants undermines the ability of the parties to write state contingent contracts (thereby reducing welfare).

5. Some Real World Episodes of Contract Standardization

The basic message of our model is that standardization is especially useful if novel trade opportunities arise and endemic inequality and/or legal uncertainty undermine contract enforcement, hindering the development of new markets. This role of standard contracts in supporting the development of new markets is consistent with early thinking on standardization by legal scholars such as Isaacs (1917), Kessler (1943) and Llewellyn (1931). [15] We now illustrate some historical episodes of contract standardization in light of this idea.

[15] In contrast, under a political or private interest perspective (Buchanan and Tullock 1962, Stigler 1971), public efforts at standardizing contracts may be simply viewed as an opportunistic and centralizing power grab by the executive in the interest of itself or powerful constituencies. As such, this view sharply differs from the efficiency considerations highlighted by our model. Reality is of course much more complicated. Codification of contract law is typically produced by a combination of distributional and efficiency considerations, whose mix varies from circumstance to circumstance.

We focus on extensive standardization efforts undertaken by the public legal system. In reality contract standardization is often also privately provided via arbitration tribunals and merchant courts. Bernstein (2002) argues the design of arbitration by the U.S. cotton industry association is deliberately aimed at facilitating trade through standardized enforcement, much in the spirit of our model. Our interest in public standardization is triggered by what is perhaps the largest movement toward codification of commercial and contract law in modern history, the so called "golden age of commercial codification" (Gutteridge 1935), which occurred in the XIX century in the leading world economies and in some of their colonies. In Britain, the standardization of financial contracts, started with the Bill of Exchange Act of 1872 (Diamond 1968), had a clear intent to reduce litigation and promote negotiability and liquidity. Standardization was also implemented by private associations, via listing requirements by stock exchanges or, more recently, the creation of standard forward contracts (futures) on derivative exchanges.[16]

While after the French revolution in Civil Law systems contract law was already substantially codified, partly due to the centralization of power associated with the rise of Napoleon, it is especially interesting to note that codification also took off in Common Law countries, involving mother countries such as Britain, British colonies such as India and later spreading to the U.S, which enacted uniform commercial legislations culminating in Llewellyn's Uniform Commercial Code. This latter trend toward commercial codification is more puzzling because Common Law systems are more decentralized and have historically relied much less in codification than their Civil Law counterparts.[17] Indeed, the leading view of legal historians in interpreting those events is precisely that codification of commercial law offered harmonization and standardization of sources, facilitating an understanding of the law to both judges and the public (Diamond, 1968).[18] Crucially, in historically more unequal societies codification was seen as providing the fundamental tool to eliminate en mass privileges and servitudes reflecting the traditional power of landowners, and

[16] Earlier examples are the emergence of new legal standards for business firms which limited litigation by creditors, such as the Italian commenda which introduced limited partners, and the first limited liability company in Amsterdam in 1603.

[17] Another important U.S. reform was also the Sales of Goods Act of 1893, which clarified how the issue of the quality of good delivered were to be interpreted in terms of the original intention of the parties, clearly indicating the rules by which intent was to be ascertained by the judge (Ilbert, 1920).

[18] The Prussian codification of 1900 was also an example of centralization, as in the case of the code Napoleon, but also – more in the spirit of our analysis – an example of systematization.

encumbered the active use and transfer of assets necessary for trade and industry (e.g. Horwitz 1977). In this sense, the efficiency considerations highlighted by our model may have played some role in triggering this "golden age of commercial codification" as the XIX century was precisely a period of booming industry and long distance trade, where creating a reliable contractual infrastructure was important to foster the development of new markets. We now review two specific episodes of contract codification to see in detail the main drivers and instruments of standardization.

The Indian Codification of Contract Law

The English admirers of the French Code Civil, including Bentham and Lord Macaulay, believed that – by producing fairer and more reliable enforcement – standardization would encourage trade across the diverse peoples and nations of British colonies. Under their influence, the British Empire strictly codified criminal and contract law in India in the XIX century to overhaul a chaotic juridical situation. Under the original Law Charters of India, English, Muslim and Hindu residents were to be governed by their own laws in matters of contract. Soon there was broad dissatisfaction with this principle. Traditional laws differed across religions and casts, and had minimal tradition of supporting formal contracting, while common law had a residual role. Contractual litigation was seen as producing arbitrary resolutions, and made contracting very difficult.[19] After a Penal Code based on a draft by Macaulay was enacted, its success led impulse to codify contract law.

The Indian Contract Act and the Evidence Act of 1872 imposed on Indian judges a strict statutory interpretation of contracts which took precedence on other sources of case law, including common, Hindu and Moslem law as well as local traditions. It stipulated general principles to define and resolve contractual conflicts, set explicit rules on supplying evidence to court, and provided templates in the form of "illustrations" to highlight how judicial decisions should be guided. The authors of the India Law Commission admitted that 'we have deemed it expedient to depart…. from English law in several particulars.' A main example was to encourage trade by eliminating excessive litigation arising from diverse sources of law. The Act simplified interpretation on specific issues relative to the more nuanced common law practice, such as in the area of contractual damages for non performance. In England,

[19] Macaulay supported his call for codification by defining commercial law as 'a mere lottery'.

judges had discretion on determining whether contractual provisions represented damages or penalties, which were enforced differently depending on circumstances. This required more extensive evidence gathering and legal argument.

The Indian Contract Act significantly simplified the enforcement of property transfers when a buyer in good faith acquired an asset from someone in possession who was not the legitimate owner (a form of *market ouvert*).[20] Codes drawn from the Indian Contract Act were subsequently introduced in East Africa and other colonies.

In this sense, and consistent with our model, contract standardization in India can be seen as an attempt to reduce legal uncertainty arising from standard of unclear interpretation, conflicting laws and more generally insufficient jurisprudence. Interestingly, the Indian Negotiable Instruments Act preceded the equivalent British Bills of Exchange Act (Encyclopedia Britannica, 1911). One possible explanation for this timing is that the greater inequality as well as lower judicial expertise prevailing in India made standardization more urgent there.

The Bills of Exchange Act of 1882

The Bills of Exchange Act of 1882, "codifies the greater portion of the common law relating to Bills of Exchange, Cheques, and Promissory Notes". Before this code, English law relative to bills of exchange, promissory notes and cheques was to be found in 17 statutes dealing with specific issues, and about 2600 cases scattered over some 300 volumes of reports. This codification remarkably simplified the law and reduced its ambiguity, and was certainly supportive of the diffusion of financial contracting (Diamond, 1968). The code also created template contracts which could be voluntarily chosen over general contracting under common law.

The extensive commentary to the Act allows some insight in identifying its effect on the common law contracting rules. In the British version the authors went at excruciating pain to restate the supremacy of the common law: *The rules of the common law, including the law merchant,* ***save in so far as they are inconsistent with the express provisions of this Act****, shall continue to apply..* Yet they also clearly indicated that *where a rule is laid out in express terms (in the Act)… the general (i.e. common law) rule ought not to be applied in ..limiting its effect…*

[20]The codification of Anglo-Hindu law was warmly received in India (Derret, 1968) as a more rational system of law. Even if its adoption was not voluntary in the sense given by Berkowitz, Pistor and

A clear case of innovation relative to common law practice is mentioned in the commentary to the Act and refers to §29(2), the case when under common law "a signature to a bill obtained by force and fear is valueless even in the hand of an innocent third part". In contrast, the Act establishes that any promissory note conform to the Act held by an acquirer in good faith is always valid independently from any irregularity in intermediate endorsements of the bill. Basically, this ensured entitlement by any holder, independently from the legitimacy of all previous transfers. Note that private parties could not have stipulated by contract that the claim remained valid even if transferred in violation to common law principles.[21] Another innovation of the Act is that it establishes the default rule that each bill of exchange is negotiable unless explicitly excluded by the text, while before negotiability had to be explicitly included in the text. The spirit of the Bill of Exchange Act is thus also consistent with the notion that contract standardization ensured access to justice and more reliable enforcement by reducing the uncertainties involved in contract litigation.

The emergence of limited partners

Finally, and aside from the large scale codification efforts discussed above, we now consider the example of the emergence of corporate standards which limited liability of financial investors and thus the scope of litigation in default. This case is interesting because it shows how systematic standardization can help extend the use of new commercial practices beyond the restricted merchant community in which they were first invented and used.

In the Italian commenda in the XI century passive partners were granted limited liability, while the active partner, which named the company, retained all residual responsibility. Merchant courts across Europe soon enforced this format among local members, but had no mandate for trade among those who were not members of their guild. Extending the principle of limited liability beyond the jurisdiction of the merchant courts thus required codification. In 1673 the French king

---

(2003), who document how legal transplantation was more successful if chosen by a local government rather than by colonists, the nationalist movement in India never considered overturning it.

[21] The British Act also stated that "when a clause introduces a change into the law, the change will not be assumed to go farther than its express term warrants in infringing the rules of the common law... When the Act does not lay down a rule, but implies that if such a rule exists, its application shall be as prescribed in the Act, the common law must be looked to, in order to know what are the circumstances in which it has effect". In other words, the common law remains the residual set of rules excluding those circumstances explicitly stated in the Act.

created a statute on societe en accomandite, making limited liability conditional on registration of the commenda agreement. Interestingly, initially most companies with passive capital investors chose to operate without registration, since the merchant court continued to enforce informal arrangements among its members (Kessler, 2007).[22] Yet tacit investment in an informal societe en accomandite created great risks, as investors were at the mercy of partners who may fail to recognize their rights. Camouflaging a partnership share as a loan had its risk too, as high interest rates were subject to usury laws. Only when trade needed to expand beyond the enforcement sphere of the Paris merchant court, firms started to use the standard registration, so that limited liability for passive partners would be recognized by all French courts. In the context of our model, one way to interpret these facts is that until transactions were local, capital providers and partners had similar litigation strengths and so firms could rely on the informal enforcement of the Paris merchant court. When however outside trade opportunities arose, firms begun to rely on standardized enforcement so as to reduce legal uncertainty vis a vis parties located in distant regions.

6. Conclusions

Our approach offers some rationalization for why commercial codes tighten procedural rules for the presentation and interpretation of evidence. We have shown that a very strict codification of contracts may contribute to a legal orientation which becomes rigid and formalistic, and suppresses contractual innovation (see Beck and Levine, 2005 and Botero et al, 2003 for some evidence). Contrasts between local law and a rigidly codified doctrine may hinder the efficient development and enforcement of contract law and practice, just as legal systems imposed by conquest perform much worse than those willingly adopted (Berkowitz, Pistor, and Richard, 2002). However, we have also shown that some degree of standardization which preserves a general freedom of contract is clearly beneficial in terms of access to the law and expansion in the scale of transacting, as the global move toward codification that occurred in the XIX century seems to suggest.

Our analysis suggests that two principles should be part of an optimal standardization strategy. First, one key ingredient of standardization should be the

[22] Kessler (2007) attributes this to the reluctance of the nobility to be seen as engaged in commerce. A related explanation is that the principle struggled against the ethical view that partnerships in profits implied some moral responsibility for losses, so passive partners preferred to remain anonimous.

simplification and formalization of local arrangements so as to incorporate early contractual innovations into standard terms and extend their use to a broader merchant community. Second, in order not to stifle contractual innovation prematurely, standardization should occur after market experimentation has created a reliable set of contractual instruments for the parties. This latter idea can help explain why the response of codification to economic changes tends to come with a lag relative to private arrangements.

More generally, we believe that the broad message of our model as well as of the experience of the "golden age of commercial codification" holds some relevance for the effort of many developing countries to strengthen their capacity for contract enforcement in light of endemic inequality and legal uncertainty. It may justify an approach to create standardized templates with narrowly defined enforcement to enhance trade opportunities and encourage contracting among strangers. This is a necessary mechanism for the emergence of an advanced division of labor and product specialization, and for the diffusion of tradable securities.

6. Appendix

Proof of Proposition 1. The parties' welfare under the non standard contract is:

$$W(\bar{v},\beta)=\bar{v}^{-2}\left[\frac{1}{6}-k-\frac{1-3\beta+3\beta^2}{24}\right]$$

Social welfare falls in $|\beta-1/2|$. As a result, no party contracts when $W(\bar{v},1/2)<0$, which yields the condition $k > 15/96$. By contrast, the parties always contract when $W(\bar{v},1)\geq 0$, which yields the condition $k\leq 1/8$. For $k\in(1/8,15/96]$, the parties contract if and only if inequality is sufficiently low. In particular, it is easy to see that there are two thresholds $\underline{\beta}$ and $\overline{\beta}$ with $\underline{\beta} < 1/2 < \overline{\beta}$, such that parties contract if and only if $\beta\geq\underline{\beta}$ and $\beta\leq\overline{\beta}$. It is easy to see that $\underline{\beta} + \overline{\beta} = 1$.

Proof of Proposition 2. By comparing (8) and (10), notice that parties prefer the standard contract over the non-standard one when $(\hat{v}-v_S)(\hat{v}+v_S)\geq\bar{v}(\hat{v}-v_S)$. If $\hat{v}\geq v_S$, the standard contract is preferred for $\bar{v}\leq\hat{v}+v_S$. If instead $\hat{v}<v_S$, the standard contract is preferred when $\bar{v}\geq\hat{v}+v_S$. These conditions imply that if $\beta\geq v_S/\bar{v}$ the standard contract is preferred for $\beta\geq 1-v_S/\bar{v}$. If instead $\beta<v_S/\bar{v}$, the standard contract is preferred for $\beta<1-v_S/\bar{v}$. The standard contract is preferred to no contract at all for $\bar{v}\in\left[v_S/\underline{\beta},v_S/\overline{\beta}\right]$. Consider the drawing of Figure 4. Recall that Figure 4 is drawn by assuming $\underline{\beta}<v_S<1/2$. In this case, the standard contract is preferred to no contract for $\bar{v}>v_S/\overline{\beta}$, which determines A_2 in intersection with area $\beta\notin\left[\underline{\beta},\overline{\beta}\right]$ (where in the absence of v_S parties do not contract). If $\beta\in\left[\underline{\beta},1/2\right]$ the standard contract is used for $\beta\leq\min\left[v_S/\bar{v},1-v_S/\bar{v}\right]$. This condition identifies the increasing curve $1-v_S/\bar{v}$ for $\bar{v}\leq 2v_S$ and the decreasing curve $v_S/\bar{v}$ otherwise. Those two curves delimit B_2. If $\beta\in\left[1/2,\overline{\beta}\right]$, the standard contract is used for $\beta\geq\max\left[v_S/\bar{v},1-v_S/\bar{v}\right]$. This condition identifies the decreasing curve $v_S/\bar{v}$ for $\bar{v}\leq 2v_S$ and the increasing curve $1-v_S/\bar{v}$ otherwise. Those two curves delimit B_1.

Proof of Corollary 1. The benefit of the standard contract is equal to the integral with respect to $\bar{v}$ of the gain $W(\bar{v},v_S)$ realized by parties who in the absence of the standard contract would not contract [i.e. parties such that $\beta\notin(\underline{\beta},\overline{\beta})$], and the integral with respect to $\bar{v}$ of the gain $W(\bar{v},v_S)-W(\bar{v},\beta)$ realized by parties who in the absence of the standard contract would use a non-standard contract [i.e. such that $\beta\in(\underline{\beta},\overline{\beta})$ and $\beta\geq\max\left[v_S/\bar{v},1-v_S/\bar{v}\right]$ or $\beta\leq\min\left[v_S/\bar{v},1-v_S/\bar{v}\right]$]. If the variance of distribution $f(\beta)$ increases (for given mean), then the benefit of contract standardization goes up because: a) the size of both areas above increases, and b) because the benefit from switching to the standard contract from a non-standard one increases as well [recall that $W(\bar{v},\beta)$ decreases in the variance of β].

Proof of Proposition 3. We first illustrate the form of the optimal non-standard contract for given $\underline{v}_t, \overline{v}_t$, and then study the parties' choice of whether and how to contract in different legal regimes. Suppose that the relation between the judicially attributed index q and the signals' true index i is described by a mapping $q(i):\left[0,i_t^L\right)\cup\left(i_t^H,1\right]\to[0,1]$. The parties then include in the contract the mapping $i=q^{-1}(q)$ associating to each attributed index q the signal's true index i. Then, the optimal ex-ante contract belongs to the family:

$$\begin{aligned} & i=q^{-1}(q) \\ & p(v)=1-i(v) \quad for \quad i(v)\in\left[0,i_t^L\right)\cup\left(i_t^H,1\right] \\ & (p_t,\Delta_t) \qquad\quad for \quad i(v)\notin\left[0,i_t^L\right)\cup\left(i_t^H,1\right] \end{aligned}$$

Intuitively, the ability of judges to recognize precedents implies that judges can also recognize the critical signal when the latter is one of the precedents. In those contingencies, the pricing of the widget is perfect. In the uncertain range instead, the parties can only specify a base payment and a bonus.

For given g_t and β, under an optimal contract belonging to the above family [i.e. for an optimal choice of (p_t,Δ_t)] the parties' welfare is equal to:

$$W(\beta,g_t)=\frac{1}{6}-k-g_t^3\,\frac{1-3\hat{v}_t+3\hat{v}_t^2}{24}$$

Which is obtained by substituting (15) into (17). The above expression decreases in g_t and in $|\beta-1/2|$. The parties prefer the non-standard contract to no contract when $W(\beta,g_t)\geq 0$. It is easy to see that this condition identifies two thresholds $\overline{\beta}_t^{LF}, \underline{\beta}_t^{LF}$ such that the parties prefer the non-standard contract if and only if $\beta\in\left(\underline{\beta}_t^{LF},\overline{\beta}_t^{LF}\right)$. Property $\underline{\beta}_t^{LF}\leq 1/2\leq\overline{\beta}_t^{LF}$ follows from the fact that for any g_t the welfare of contracting parties is maximized at $\beta=1/2$. For some parameter values, such as when $g_t=1$ and k > 15/96 nobody finds it profitable to contract and so $\underline{\beta}_t^{LF}=\overline{\beta}_t^{LF}=1/2$. Because the welfare of contracting parties is symmetric in $|\beta-1/2|$, it is always the case that $\underline{\beta}_t^{LF}+\overline{\beta}_t^{LF}=1$. Finally, since $W(\beta,g_t)$ increases in β for $\beta\geq 1/2$, $\underline{\beta}_t^{LF}$ increases and $\overline{\beta}_t^{LF}$ decrease in g_t.

Proof of Proposition 4.

Taking the Proof of Proposition 3 into account, consider now the choice between the standard and the non standard contract. Under v_S the parties' welfare is the same as expression (12) when evaluated at $\overline{v}=1$. As a result, the parties use the non-standard contract if and only if $W(\beta,g_t)\geq W(1,v_S)$. Previous arguments imply that there exist two thresholds $\underline{\beta}_t^S$ and $\overline{\beta}_t^S$ such that the non standard contract is used for $\beta\in\left(\underline{\beta}_t^S,\overline{\beta}_t^S\right)$. Previous arguments also imply that $\underline{\beta}_t^S\leq 1/2\leq\overline{\beta}_t^S$ and that $\underline{\beta}_t^S$ increases and $\overline{\beta}_t^S$ decrease in g_t. In addition, since parties' welfare under the standard contract falls with $|v_S-1/2|$, also the use of the standard contract does. It is

interesting to note that when $g_t = 1$, if $v_S = 1/2$ the parties strictly prefer the standard to the non standard contract for every $\beta \neq 1/2$ and they are indifferent for $\beta = 1/2$.

Expression (B) already shows the accumulation of low indexed precedents in cases where buyers win. Now consider the signals accumulated by winning sellers. The volume of litigation episodes won by buyers:

$$\int_{\underline{\beta}^X}^{\overline{\beta}^X} \int_{\hat{v}(\beta)}^{\bar{v}_t} f(\beta) dv d\beta = g_t \left[F(\overline{\beta}_t^X) - F(\underline{\beta}_t^X) \right] E\left[(1-\beta) \middle| \beta \in (\overline{\beta}^X - \underline{\beta}^X) \right], \qquad \text{(B)}$$

where $F(\beta)$ is the distribution function of β and $X = LF$, S indicates the legal regime the parties are in. As a result,

$$\dot{\bar{v}}_t = g_t \left[F(\overline{\beta}_t^X) - F(\underline{\beta}_t^X) \right] E\left[1-\beta \middle| \beta \in (\overline{\beta}_t^X - \underline{\beta}_t^X) \right] dt, \qquad \text{(C)}$$

When $f(\beta)$ is symmetric, $E\left[\beta \middle| \beta \in (\overline{\beta}^X - \underline{\beta}^X) \right] = E\left[1-\beta \middle| \beta \in (\overline{\beta}^X - \underline{\beta}^X) \right] = 1/2$. As a result the flow of precedents in (B) and (C) by winning buyers and sellers, respectively, is identical and thus $\underline{v}_t = 1 - \bar{v}_t$ for every t. The dynamics of legal uncertainty is then:

$$\dot{g}_t = \dot{\bar{v}}_t - \dot{\underline{v}}_t = -g_t \left[F(\overline{\beta}_t^X) - F(\underline{\beta}_t^X) \right] dt$$

References

Aghion, Philippe and Benjamin Hermalin (1990), "Legal Restrictions on Private Contracts Can Enhance Efficiency", *Journal of Law, Economics and Organization* Volume 6, Number 2 p. 381-409

Anderlini, Luca, Leonardo Felli and Andrea Riboni, (2007): "Case Law or Statute Law?" *mimeo*, London School of Economics

Barth, James R., Gerard Caprio Jr., and Ross Levine. 2006. *Rethinking Bank Regulation: Till Angels Govern.* Cambridge: Cambridge University Press.

Berkowitch, Daniel, Katharina Pistor and Jean-Francois Richard, (2003), "Economic Development, Legality and the Transplant Effect," *European Economic Review* 47(1): 165-195

Bernstein, Lisa (2001), "Private Commercial Arbitration Law in the Cotton Industry: Creating Cooperation through Rules, Norms and Institutions", *Michigan Law Review*.

Bolton, Patrick and Mathias Dewatripont, 2005, *Contract Theory*, MIT Press.

Botero, Juan Carlos, La Porta, Rafael, Lopez de Silanes, Florencio, Shleifer, Andrei and Volokh, Alexander, "Judicial Reform", *World Bank Research Observer*, Vol. 18, No. 1, pp. 61-88, Spring 2003

Daughety, Andrew and Jennifer Reinganum (1999), "On the Economics of Trials: Adversarial Process, Evidence and Equilibrium Bias", *Journal of Law, Economics and Organization*, Vol. 16(2), October 2000

Dawson, John, 1968, The Oracles of the Law, University of Michigan Law School, Ann Arbor, MI (Reprinted in 1986 by William S Hein & Co., Buffalo, New York

Derrett, J. Duncan M. 1968. *Religion, Law, and the State in India*. London: Faber & Faber

Diamond, Aubrey L. (1968) "Codification of the Law of Contract", *The Modern Law Review*, Vol. 31, No. 4 (Jul., 1968), pp. 361-389

Djankov, E. Glaeser, R. La Porta, F. Lopez-de-Silanes and A. Shleifer, "The New Comparative Economics", *Journal of Comparative Economics*, December, 2003.
Ehrlich, Isaac and Richard Posner, (1974), "An Economic Analysis of Legal Rulemaking", *Journal of Legal Studies* Vol 3, p. 257-286

Encyclopedia Britannica, Bill of Exchange, 1911 (www.1911encyclopedia.org/Bill_of_Exchange).

Franks, Julian and Oren Sussman, 2005, "Financial innovations and Corporate Bankruptcy, *Journal of Financial Intermediation*, 14, pp. 283-317.

Gennaioli, Nicola,(2007), "Optimal Contracts with Enforcement Risk", mimeo, UPF.

Gennaioli, Nicola and Andrei Shleifer, (2006) “The Evolution of Precedent”, *Journal of Political Economy*

Glaeser, Edward and Andrei Shleifer, 2003, “The Rise of the Regulatory State”, *Journal of Economic Literature*, pp. 401-425

Glaeser, Edward and Andrei Shleifer, 2001, "A Reason for Quantity Regulation”, *American Economic Review Papers and Proceedings*, May

Glaeser, Edward and Andrei Shleifer, 2002, “Legal Origins”, *Quarterly Journal of Economics* no 117, pp1193-1230

Glaeser, Edward, Jose Scheinkman and Andrei Shleifer, 2003, "The Injustice of Inequality", *Journal of Monetary Economics: Carnegie-Rochester Series on Public Policy*, January, 2003

Gorton, Gary and George Pennacchi (1990), “Financial Intermediaries and Liquidity Creation”, *The Journal of Finance*, March.

Hadfield, Gillian K (2006), “The Quality of Law: Judicial Incentives, Legal Human Capital and the Evolution of the Law”, mimeo

Hilbert, Courtenay, (1920) Unification of Commercial Law, *Journal of Comparative Legislation and International Law*, series 3, Vol 2 no 1, pp. 77-80

Horwitz, Morton, 1977, The Evolution of American Law, 1780-1850, Oxford University Press

Holmes, Oliver Wendell, 1981, *The Common Law*, 111-12.

Isaacs, Nathan, 1917, “The Standardizing of Contracts”, 27 *Yale Law Journal*, 34, pp. 34-48.

Kahn, Marcel and Michael Klausner, 1997, Standardization and Innovation in Corporate Contracting (or The Economics of Boilerplate), *Virginia Law Review*, 83.

Kaplow, Louis, 1992, “Rules versus Standards: An Economic Analysis”, *Duke Law Journal* vol 42, pp. 557-623

Kaplow, Louis (1995), “A Model of the Optimal Complexity of Legal Rules”, *Journal of Law Economics and Organization* vol 11, p. 150-163

Kessler, Friedrich, 1943, “Contracts of Adhesion – Some Thoughts About Freedom of Contract, 43 Columbia Law Review, 629, pp. 629-642.

Klerman, Daniel M. and Mahoney, Paul G., "Legal Origin?" (March 2007), University of Southern California CLEO Research Paper No. C07-5

LaPorta, Rafael, Florencio Lopez-de-Silanes and Andrei Shleifer, "The Economics Consequences of Legal Origins", *Journal of Economic Literature*, forthcoming, 2008

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer and Robert Vishny, "Law and Finance", *Journal of Political Economy*, (1998) 106:6, 1113-55.

Lerner, Josh and Antoinette Schoar, "Does Legal Enforcement Affect Financial Transactions? The Contractual Channel in Private Equity", Quarterly Journal of Economics, forthcoming

Levine, Ross and Thorsten Beck, "Legal Institutions and Financial Development", *Handbook for New Institutional Economics*, Eds: Claude Menard and Mary M. Shirley, Norwell MA: Kluwer Academic Publishers, 2005.

Llewellyn, Karl, 1931, "What Price Contract? – An Essay in Perspective", 40 Yale Law Journal, 704, pp. 704-751.

Niblett, Anthony, 2009, "Inconsistent Contract Enforcement", Harvard University, mimeo.

Noldecke, Georg and Klaus Schmidt (1995) "Option Contracts and Renegotiation: A Solution to the Hold-Up Problem," *RAND Journal of Economics* vol. 26(2), pages 163-179, Summer.

Pistor, Katharina and Chenggang, Xu (2003), "Incomplete Law", *New York University Journal of International Law and Politics* vol 35, p. 931-1013

Rajan, Raghuram, and Luigi Zingales. 2003b. *Saving capitalism from capitalists*. London, UK: Random House.

Rubin, Paul H. 1977. Why Is the Common Law Efficient. *Journal of Legal Studies* (6):51

Schlesinger, Rudolph, Hans Baade, Mirjam Damaska and Peter Herzog, (1988), *Comparative Law*, New York, The Foundation Press, Inc.

Scott, Robert and George Triantis, 2005, Incomplete Contracts and the Theory of Contract Design, *Case Western Law Review*, 56.

Tufano, Peter, 2003, "Financial Innovation", *Handbook of Economics and Finance*, Elsevier.