

CHOICE OF LAW AND LEGAL EVOLUTION: RETHINKING THE MARKET FOR LEGAL RULES

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ABSTRACT. In this paper we follow an evolutionary approach to explain the observed patterns of legal harmonization and legal competition. Countries choose their legal system with the aim to minimize legal differences worldwide (which fosters international trade). Firms choose the rules for their domestic and international contracts, trying to use the ones that maximize revenues from trade and minimize transaction costs. Our model presents multiple steady states. Some of them predict the universal diffusion of a single legal system. However, the legal principle becoming universally diffused is not necessarily the efficient one. When choice-of-law rules are sufficiently permissive, the evolutionary process might end up in a steady state where all countries adopt the inefficient legal system but all firms use the efficient rule, even if that is not the national law of any country anymore. We show that universal adoption of a unique rule and possibly its universal diffusion are the only type of steady - state equilibrium when countries and firms are relatively homogeneous. When heterogeneity is introduced, a steady state where legal systems coexist and firms use rules from all of them appears. This might explain the existence of legal families not as a transitory phenomenon but as a long-run equilibrium.

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1. INTRODUCTION

According to several scholars¹, competition between legal rules significantly affects the evolution of law. As pointed out by Ogus (2002), the globalization of business transactions and the practice of *forum shopping* allowed by more liberal choice-of-law rules enlarge the set of possible legal regimes that parties can apply to transactions and relationships. In general, it can be expected that more efficient rules win in the competition, where winning means not only that they are chosen more often by private parties but also that legislators design new laws according to the principles that are most often chosen, producing what most observers describe as a tendency of different legal systems to converge. Convergence can take place both by means of legal transplants, where one country imports principles from other jurisdictions, or by harmonization, where countries agree on common principles and rules (see Carbonara and Parisi, 2005).²

In this paper we study the process of convergence of legal rules when there is competition between different rules. We analyze the role played by choice-of-law regimes in the evolution of legal systems when rules of different efficiency compete. We define a legal principle as efficient when applied to a transaction if parties are able to obtain higher pay-offs by including that principle rather than any other principle. In a welfarist view, a state should substitute inefficient legal principles with efficient ones, coming from different jurisdictions. However, the key observation of this paper is that even legal principles that are not more efficient *per se* can become so if a sufficiently high number of countries adopt it. In other words there are network effects in the adoption of legal principles.³ As more countries adopt the same legal principles the expected profitability of contracts written using those principles is likely to increase, especially that of foreign contracts. Transaction costs decrease as the number of countries adopting similar legal systems increases, as partners to a contract don't face the extra cost of adapting to the different legal system. Moreover, working within the same legal system increases the frequency and the profitability of commercial transactions as it reduces the uncertainty stemming from not knowing the legal rules governing the contract.⁴ It is thus likely that a principle that not necessarily is more efficient than others is introduced in many national legal systems simply because it is widely adopted. On the other hand, if a critical mass of adopting countries is not reached, a

¹See Mattei (1997) and Ogus (1999).

²According to some authors (see Legrand, 1997), convergence is only apparent, as legal transplants and harmonization have only a limited impact on the original legal culture of a country.

³See Ogus, 2002.

⁴For an analysis of the cost reducing effects of legal convergence see Ribstein and Kobayashi (1996).

principle might not spread, no matter how efficient it is and might even disappear. In this process, choice-of-law regimes play a crucial role in favoring the diffusion of the efficient principle. Interestingly, we find that, contrary to that argued by many scholars, liberal choice-of-law regimes not necessarily lead to the "victory" of efficient rules, in the sense that legislators might still adopt inefficient rules in the equilibrium. This even if the efficient rule is the only one used in transactions.

Choice of law clauses allow parties to select the law of a particular jurisdiction for the interpretation and enforcement of their rights and obligations under the contract. The question as to whether, and to what extent, the parties are free to choose the law which regulates their actions and relationship is of primary relevance in international commercial law. Historically, an unqualified freedom of choice remained the general rule throughout nineteenth century England and characterized the French approach in the 1804 codification. Broad freedom for the parties' choice of law was generally recognized by nineteenth century German scholars.⁵

Later, both in Europe and in the United States, limitations to the parties' autonomy in their choice of law were introduced. This mainly to prevent parties from avoiding domestic⁶ legislation by adopting a different body of governing law. Several conditions were imposed, under which parties could validly select a governing law different from their domestic law. Nowadays, even the most liberal choice-of-law regimes (e.g., France) allow parties to adopt a foreign law only if the chosen law does not violate an essential policy rule of the domestic legal system. Other systems allow for contractual choice of law only if the agreement does not circumvent mandatory provisions of the domestic legal system (e.g. Austria). Many other jurisdictions tend to regulate choice of law with an intricate mix of standard-based and rule-based criteria (e.g., United States).

We consider choice-of-law regimes allowing for different degrees of the parties' freedom to choose a foreign law to govern their transactions. In practice, the most restrictive regime of choice of law is the one based on the *lois suppletive* test. According to this test, the parties are not allowed to select a governing law which deviates from mandatory provisions of the domestic legal system. They can only incorporate rules that they would have been allowed to draft as express contract terms, without renvoi to foreign law. According to such a restrictive regime, only suppletive rules of the domestic system can be substituted through choice of law. This almost results in an outright denial of freedom of choice. The *lois suppletive* test is barely in use nowadays.⁷

⁵For a historical analysis, see Lando, 1976.

⁶In what follows we indicate with the term "domestic" the legal system that would apply absent an express choice of law by the parties.

⁷See Parisi and Ribstein (1998).

A less restrictive regime is the one based on the *Ordre Public* test. According to such test, the parties' choice of law is validated so long as essential, non-derogable principles of the domestic legal system are not undermined. This approach is followed by several systems of the French-based tradition.⁸ A choice-of-law regime that allows a level of freedom that lies between the *lois suppletive* and the *Ordre Public* tests is the one based on the substantial relationship test. The chosen legal system has to bear a substantial relationship to the contracting parties or to their legal relationship. Such "substantial relationship" requirements generally grant much discretion to the courts in validating the contractual choice of law. This regime is applied in the United States.

In the model we present, legal competition and harmonization are analyzed in an evolutionary setting. We have two types of players; countries (legislators) and firms. Countries choose the legal system to adopt domestically. They do this with two goals in mind; first to reduce the costs due to the lack of worldwide legal harmonization, which impedes international trade increasing transaction costs. Second, to provide their economic agents with the legal rules they prefer, since using rules from other legal systems is costly. Firms choose which rule to use when they stipulate contracts, trying to use the efficient rule independently of their originary legal system. We find that our model presents multiple steady states. Some of them predict the universal diffusion of a single legal system. However, the legal principle becoming universally diffused is not necessarily the efficient one. When choice-of-law rules are sufficiently permissive, the evolutionary process might end up in a steady state where all countries adopt the inefficient legal system but all firms use the efficient rule, even if that is not the national law of any country anymore. We show that universal adoption of a unique rule and possibly its universal diffusion (when that same rule is also used by all firms) are the only type of steady - state equilibria when countries and firms are relatively homogeneous. When heterogeneity is introduced, a steady state where legal systems coexist and firms use rules from all of them appears. This might explain the existence of legal families not as a transitory phenomenon but as a long-run equilibrium.

The fact that the lack of legal harmonization is a source of substantial costs in terms of a reduced volume of international trade is quite established in the literature. Rodrik (2004) estimates that institutional barriers different from tariffs and other typical trade barriers account

⁸According to the strictest definition of *ordre public*, only fundamental principles of constitutional nature should not be violated. This version of *ordre public* is occasionally used to validate choice of law decisions across systems with pre-existing legal affinity. More commonly, the notion of *ordre public* includes other fundamental policies of a sub-constitutional nature. In general, the application of the *ordre public* test reveals a fundamental indeterminacy of the concept.

for a loss amounting to 35% in ad-valorem terms and this considering only advanced economies. The literature on international trade has been studying the so called "border effect" for many years now. The traditional view was that national borders matter in determining the volume of trade because of discriminatory policies, distance or different consumer tastes. Recent empirical literature has challenged this hypothesis, proving that national borders have a substantial negative impact on trade even between countries like Canada and the US, that have almost completely liberalized trade and are quite homogeneous culturally.⁹

The argument that is now being brought forward to explain this phenomenon is that national borders have a negative impact on trade mainly because they represent the boundary between different legal systems. Thus, legal differences seem to be the major responsables for reduced international trade. Turrini and van Ypersele (2006) find an even more striking result. Using data on trade among regions within a single country (France), they find that trade between a given pair of regions is higher by 24 per cent if commercial disputes between commercial partners from different regions are settled in the same courts of appeal.

The need to proceed to rapid harmonization and unification seems therefore supported by rather powerful empirical evidence. In a companion paper, Carbonara and Parisi (2006) show that the presence of switching costs can hinder the process of legal harmonization. Moreover, if countries are given the possibility to change their switching costs to facilitate the reduction of legal distance, they might actually choose to increase them thus reaching the paradoxical result that countries engaging in cooperative harmonization (*e.g.* by treaties) may end up with less harmonization than countries proceeding by unilateral, non-cooperative transplants.

Spontaneous harmonization, driven by the market, can be a solution that avoids the problems of the strategic behavior of countries. In this process, choice of law rules are therefore crucial. Whether to leave firms free to choose the rule that better suits their needs or to guide the process is a choice that heavily affects the speed and the cost of the harmonization process, the rule eventually adopted in the harmonized world and, ultimately, the efficiency of the equilibrium reached.

The paper is organized as follows. Section 2 introduces the model. Section 3 describes the equilibria of the evolutionary game between countries and firms choosing legal rules, proving the existence of multiple steady states. Section 4 considers the effects of introducing a liberal choice-of-law system. Section 5 considers heterogeneity in the groups of countries and firms, proving that an equilibrium with coexistence of legal rules might exist in that setting. Section 6 concludes.

⁹See Turrini and van Ypersele (2006) and references therein.

2. THE MODEL

Time is continuous and extends from zero to infinity. The world consists of a continuum of countries with mass N . There are two legal systems, A and B . As a consequence, countries are divided in two groups (or *legal families*). The first group consists of countries adopting legal system A and the second group of those adopting B . Let $n \in [0, 1]$ be the share of countries adopting legal system A , whereas $1 - n$ is the share of countries adopting system B .

Legal principle A is more efficient, *i.e.* it allows higher gains when applied in transactions. Specifically, we normalize the gross revenue for a firm from a contract written using rule A to 1, whereas a contract stipulated according to B yields $\varphi < 1$.

In each country a given number of economic agents (firms) operate. We assume that countries are symmetric in the number of firms they have, and each country has $m \geq 1$ firms.¹⁰ Firms commerce both with compatriote¹¹ and foreign firms. When trading with foreign firms, they can choose the legal rules to apply to the contracts regulating their transactions. Independently of the legal system in use in their country of origin, they can write contracts with either system A or B . Acquiring the ability to use a foreign legal system requires an initial, lump-sum investment $\lambda > 0$. Choosing to write contracts using the legal rules from both legal systems is costly for firms but it gives them the possibility to contract with other firms located all over the world. When a firm that has acquired such flexibility trades with a firm that uses only one rule (either A or B), the rule applied in their contract will be the only one used by the latter firm. So, for instance, if a firm using both rules trades with a firm using rule B only, their contract will be written using B . The rule chosen when a firm using both legal systems trades with another foreign firm that has acquired such flexibility depends on the choice-of-law rule.

In the population of firms there is a probability x that a firm is able to use rules from A , whereas with probability $1 - x$ the firm uses rules from B . This means that a fraction x of firms belonging to countries with legal system A chooses to use only rules from A whereas the remaining $1 - x$ chooses to bear the cost λ and to use also rules from B . Similarly, a fraction x of firms belonging to countries adopting B chooses to be able to use also rule A .

2.1. The matching process. In order to trade, firms are matched randomly in pairs. For example, a firm from a country adopting A will be matched with another firm from the same legal background with

¹⁰The cases where countries differ in the number of firms and where firms differ in their dimensions and/or volume of trade will be the object of future research.

¹¹We use the term "compatriote" in a laxest sense, to indicate a firm with the same legal background.

probability n and with a firm from legal system B with probability $\beta(1 - n)$, where $\beta \in (0, 1)$. The random matching procedure we devise implies that firms with different legal backgrounds meet less frequently and β represents the relative frequency. This is a non-uniform matching procedure and allows for an immediate definition of a two-region legal environment, where each region may correspond to a specific legal family.¹²

The parameter β represents an economic loss which firms (hence countries) bear because of the lack of legal harmonization and is therefore a cost of the international differences in legal systems.¹³ A firm is not matched with any other firm with probability $(1 - \beta)(1 - n)$. In that case no trade occurs and the loss to the firms and to their countries of origin is equal to the surplus they would have obtained from the contract minus transaction costs.

When two firms are matched, trade takes place if and only if they are able to write a contract, *i.e.* if they agree on common legal rules. This is another type of costs due to the lack of harmonization. For example, if a firm from a country with legal system A is matched with a firm from a country with B , they are able to trade if and only if either the firm with A has invested in legal flexibility and is able to contract using B or if the firm from B can use A .

A third cost from lack of harmonization is the lump-sum investment λ firms might choose to make in order to be able to trade internationally without losing potential trading partners.

The matching process and the rules chosen for the contract are represented in Table 1.¹⁴

2.2. Choice-of-law rules. Countries and firms interact in a game, where countries choose their legal system and firms choose whether to acquire flexibility or to stick to their original legal rule.

We consider three different choice-of-law regimes: 1) a very restrictive regime; 2) a semi-restrictive regime and 3) a "liberal" regime.

In the very restrictive regime, firms have no freedom to choose a rule different from the one adopted in their country of origin. Such regime is equivalent to a regime where choice-of-law clauses are validated according to a *lois suppletive* test and the rule object of choice-of-law is a fundamental one. As a result of such rule, firms basically are not allowed to write contracts using foreign rules and the rule they use plus their probability to trade is fully determined by their country's

¹²A similar non-uniform matching process is used in Matsuyama et al. (1993).

¹³The parameter β can represent the so called "border effect". This may be due, in a first instance, to higher transaction costs firms with different legal systems face when writing a contract. A second explanation might be that firms have to pay higher legal costs to sue a foreign partner that behaves opportunistically. See Turrini and van Ypersele (2006).

¹⁴We thank Dieter Schmidtchien for suggesting the use of Table 1.

legislative decisions. This boils down to the assumption that firms can only trade with other firms belonging to the same legal regime.

The semi-restrictive regime is equivalent to a regime where the substantial relationship test is applied. Since the chosen rule has to bear a close relationship with the parties or with the object of their contract, firms with the same legal background have to use their common rules, whereas they can choose a foreign rule if they write contracts with foreign firms. This implies that, when a firm is matched with another firm from the same legal system they use the legal rules they share. Freedom of choice applies only when a firm trades with a foreign party.¹⁵

In the "liberal" regime, choice-of-law clauses are validated according to the *Ordre Public* test. Firms are free to choose the legal regime they prefer, even when trading with partners within the same legal area. This insofar the rules they choose do not violate essential, non-derogable principles of their legal system of origin. Assuming that neither A nor B undermine essential, non-derogable principles, in the liberal regime, firms are free to choose the rule they prefer. Given that rule A yields higher returns when used in a contract, firms with the ability to use both rules will always choose A .

2.3. Payoffs. Payoff functions for firms depend on the choice-of-law rule.

In the very restrictive regime, no choice of rule is allowed to firms. Their payoff is fully determined by the rule adopted by their country of origin and is, respectively if their country of origin chooses A or B

$$(2.1) \quad \begin{aligned} \hat{\pi}_A &= n \\ \hat{\pi}_B &= \varphi(1 - n) \end{aligned}$$

Payoffs for countries in this regime are

$$(2.2) \quad \begin{aligned} \hat{V}_A &= m\hat{\pi}_A \\ \hat{V}_B &= m\hat{\pi}_B \end{aligned}$$

In the semi-restrictive regime, firms can choose a different rule when contracting with a foreign partner. Payoffs for firms are

$$(2.3) \quad \begin{aligned} \pi_{AA} &= n + x\beta(1 - n) \\ \pi_{AB} &= n + (1 - n)\beta[x + \varphi(1 - x)] - \lambda \\ \pi_{BA} &= (1 - n)\varphi + \beta n - \lambda \\ \pi_{BB} &= \varphi[(1 - n) + \beta n(1 - x)] \end{aligned}$$

¹⁵This is in line with common practice, where transactions inside a national market apply for its relating business law. The monopolizing attitude of many legislative bodies also relies on the idea that, inside a national (or harmonized) market the costs of lex and forum shopping would exceed the benefits.

where π_{ij} is the expected payoff from trade for a firm with legal background i that chooses to be able to write contracts using both rules i and j (where $i, j = A, B$). For example, the expected payoff for a firm with legal background A choosing to acquire ability to use B is π_{AB} as given in expression (2.3). This is because a firm with legal background A has two opportunities to use rule A in a contract, thus getting a revenue equal to one; either when it is matched with another firm from a country adopting A (with probability n) or when it is matched with a firm with legal system B (with probability $\beta(1-n)$) which uses also rule A (with probability x). Notice that firms always prefer flexibility if λ is not too large. For instance, $\pi_{AB} \geq \pi_{AA}$ if and only if $\lambda \leq (1-n)(1-x)\beta\varphi$, *i.e.* if and only if $x \leq \frac{(1-n)\varphi\beta-\lambda}{(1-n)\beta\varphi}$.

Therefore gains (or profit) from adopting either rule depend also on the number of countries and firms adopting it. There are (positive) network effects in the adoption of legal principles.

Payoffs for countries, respectively from choosing A or B are

$$(2.4) \quad \begin{aligned} V_A &= m(x\pi_{AA} + (1-x)\pi_{AB}) \\ V_B &= m(x\pi_{BA} + (1-x)\pi_{BB}) \end{aligned}$$

Finally, in the "liberal" regime, firms are free to choose the rule they want to use in a contract, no matter the partner's legal background. Given that rule A always yields a higher revenue, firms will always choose to use rule A if either them or their commercial partner are able to use that rule. This implies that all payoffs in expression (2.3) remain the same with the exception only the payoff for a firm from legal background B that has invested to use A is going to change, π_{BA} . This payoff becomes:

$$(2.5) \quad \tilde{\pi}_{BA} = (1-n_A)\varphi(1-x) + (1-n_A)x + \beta n_A - \lambda$$

The expressions for the countries' payoffs are the same as in expressions (2.4).

In the next section we are going to characterize the equilibria of the game. Before that two remarks are due. First, in this paper we are not going to model the process of lawmaking by a country. Countries might follow different procedures to implement new laws. Common law countries traditionally have judge made law, whereas in civil law countries new laws are promulgated by parliaments. Thus the time required to make changes and the costs of lawmaking might differ in the two types of legal systems. We are not going to focus on this particular aspect, however. Here we are interested in the decision to adopt a legal rule stemming from the need to reduce transaction costs, especially in international trade. Changing from one system to the other is likely to imply benefits on the one side and costs on the other. Such costs and benefits are endogenous in our model and are mainly due to network effects.

3. RULE COMPETITION AND THE EQUILIBRIUM CHOICE OF THE LEGAL RULE

In the analysis that follows we look for symmetric Nash equilibria. Firms observe the choice of the legal principles made by their own country and choose the rule(s) to write contracts given the principles chosen by other countries and the rules used by other firms.

We consider each choice-of-law regime separately. In the next Sections we will check which of these equilibria survive in an evolutive framework, becoming steady states of the dynamics.

3.1. The very restrictive choice-of-law regime. In the model characterized by the payoff functions given in (2.1) and (2.2) we have three Nash equilibria, two in pure strategies and one in mixed strategies.

- \hat{A} . *All countries choose rule A;*
- \hat{B} . *all countries choose rule B;*
- \hat{C} . *both rules are adopted by countries.*

We now prove the existence of these equilibria.

- \hat{A} . If all countries use A , then $n = 1$ and, from (2.1) and (2.2), $\hat{V}_A = m$, whereas $\hat{V}_B = 0$. Then unilateral deviation is not profitable and \hat{A} is a Nash equilibrium.
- \hat{B} . If all countries use B , then $n = 0$ and $\hat{V}_A = 0$, $\hat{V}_B = m\varphi$. This proves that \hat{B} is a Nash equilibrium.
- \hat{C} . Countries are indifferent between A and B when A is played with probability $\hat{n} = \frac{\varphi}{1+\varphi}$. Thus $\{\hat{n} = \frac{\varphi}{1+\varphi}; 1 - \hat{n} = \frac{1}{1+\varphi}\}$ is a mixed-strategy Nash equilibrium.

Therefore, when a proportion \hat{n} of countries adopts A and $1 - \hat{n}$ adopts B , rule coexistence is a (mixed-strategy) Nash equilibrium.

3.2. The semi-restrictive choice-of-law regime. In the model characterized by the payoff functions given in (2.3) and (2.4) we can have the following equilibria.

- A. *All countries choose rule A in equilibrium and all firms use A in transactions;*
- B. *all countries choose rule B in equilibrium and all firms use B in transactions;*
- E. *both rules are adopted by countries and used by firms.*

In the equilibria described under A. and B. we have the universal adoption of a unique rule. In equilibrium A. the rule universally adopted is the efficient one, whereas in the equilibrium B. the less efficient rule becomes universally adopted.

Equilibrium E is the most interesting one. In this equilibrium the inefficient legal rule coexists with the efficient one and both are used by firms. This equilibrium corresponds to a mixed-strategy Nash equilibrium.

Notice that situations where all countries adopt the efficient rule A whereas all firms coordinate on B or vice-versa, where all countries choose B but firms avoid using it and coordinate on the efficient A are not equilibria of our game. Below we provide an intuition for the results. We name case A. the efficient equilibrium whereas case B. is the inefficient equilibrium and case E. is the equilibrium with coexistence.

Given that a share n_A of countries adopting A , the expected payoff from A and B for a firm are, respectively

$$(3.1) \quad \pi_A = n\pi_{AA} + (1-n)\pi_{BA}$$

$$(3.2) \quad \pi_B = n\pi_{AB} + (1-n)\pi_{BB}$$

3.2.1. *Equilibrium A: only rule A is adopted and used.* We first consider the equilibrium in case A. above, in which:

- (a) *Given the percentage of countries adopting A, firms trade using rule A ($\pi_A > \pi_B$);*
- (b) *Countries choose legal rule A in the first stage ($V_A > V_B$).*

In this equilibrium, all firms use rule A in transaction and all countries choose rule A and thus $x = 1$ and $n = 1$. Payoffs for firms in this equilibrium are

$$(3.3) \quad \left. \begin{array}{l} \pi_A = \pi_{AA} = 1; \\ \pi_B = \pi_{AB} = 1 - \lambda. \end{array} \right\}$$

Payoffs for the countries are

$$(3.4) \quad \left. \begin{array}{l} V_A = m; \\ V_B = m(1 - \lambda). \end{array} \right\}$$

It is immediate to see that, given that all countries choose A and all firms use A , equilibrium A. is a Nash equilibrium. From (3.3) a firm would always choose to use rule A . Given the behavior of firms, no country would like to deviate unilaterally and choose B .

3.2.2. *Equilibrium B: only rule B is adopted and used.* We now turn to the possibility of the endogenous convergence to the inefficient legal rule, where not only countries transplant it in their legal systems but also firms use it in their transactions, notwithstanding the existence of a more efficient rule. In this case:

- (a) *Given n_A and x , firms trade using rule B ($\pi_B > \pi_A$);*
- (b) *Countries choose legal rule B ($V_B > V_A$).*

In this equilibrium, all firms use rule B in transactions and all countries either adopt or transplant rule B and thus $x = 0$ and $n = 0$. Payoffs for firms in this equilibrium are

$$(3.5) \quad \left. \begin{array}{l} \pi_A = \pi_{BA} = \phi - \lambda; \\ \pi_B = \pi_{BB} = \phi. \end{array} \right\}$$

Payoffs for the countries are

$$(3.6) \quad \left. \begin{array}{l} V_A = \pi_{AB} = m(\beta\phi - \lambda); \\ V_B = \pi_{BB} = m\phi. \end{array} \right\}$$

It is immediate to see that, given that all countries choose B and all firms use B , equilibrium B is a Nash equilibrium. From (3.5) a firm would choose B . Given the behavior of firms, no country would like to deviate unilaterally and choose A .

3.2.3. Equilibrium E : both rules are adopted and used. Finally, we consider the possibility that both rules are adopted by countries and used by firms in equilibrium. We are thus looking for a mixed-strategy Nash equilibrium, where:

- (a) Given n_A^* , firms are indifferent between rules A and B ($\pi_A = \pi_B$);
- (b) Given x^* , countries are indifferent between rules A and B ($V_B = V_A$).

This is a game with many players, and when computing the Nash equilibrium, each player takes other player's strategies as given. Assume that a proportion \bar{n}_A of countries choose A and a proportion x of firms use A . A country chooses n_A , the probability of playing d , in order to maximize $EV = nV_A + (1 - n)V_B$, which can be written as $EV = nm[\bar{x}(\bar{n} + x\beta(1 - \bar{n})) + (1 - \bar{x})(\bar{n} + (1 - \bar{n})\beta(\bar{x} + \varphi(1 - \bar{x})) - \lambda)] + (1 - n)m[\bar{x}((1 - \bar{n})\varphi + \beta\bar{n} - \lambda) + (1 - \bar{x})(\phi(1 - \bar{n}) + \phi\beta\bar{n}(1 - \bar{x}))]$ which is linear in n_A and yields

$$(3.7) \quad \begin{cases} n^* = 1 & \text{if } \bar{n} > n^n(x) \\ n^* \in [0, 1] & \text{if } \bar{n} = n^n(x) \\ n^* = 0 & \text{if } \bar{n} < n^n(x) \end{cases}$$

where

$$(3.8) \quad n^n(x) = \frac{x^2\beta\phi + x(\beta(1 - 2\phi) + 2\lambda) - \phi(1 - \beta) - \lambda}{2x\beta(1 - 2\phi) + 2x^2\beta\phi - \phi(1 - 2\beta) - 1}.$$

Similarly, a player from the weak group chooses x , the probability of playing A , so to maximize $E\pi = x\pi_A + (1 - x)\pi_B$, which can be written as

$E\pi = x[\bar{n}(\bar{n} + \bar{x}\beta(1 - \bar{n})) + (1 - \bar{n})((1 - \bar{n})\varphi + \beta\bar{n} - \lambda)] + (1 - x)[\bar{n}(\bar{n} + (1 - \bar{n})\beta(\bar{x} + \varphi(1 - \bar{x})) - \lambda) + (1 - \bar{n})(\varphi(1 - \bar{n}) + \phi\beta\bar{n}(1 - \bar{x}))]$ which is again linear in n_W , so that the weak's best response correspondence is

$$(3.9) \quad \begin{cases} x^* = 1 & \text{if } \bar{x} > n^x(x) \\ x^* \in [0, 1] & \text{if } \bar{x} = n^x(x) \\ x^* = 0 & \text{if } \bar{x} < n^x(x) \end{cases}$$

where

$$(3.10) \quad n^x(x) = \frac{\beta(1 - 2(1 - x)\phi) + 2\lambda - \sqrt{4\lambda^2 + \beta^2(1 - 2\phi(1 - x))^2}}{2\beta(1 - 2(1 - x)\phi)}$$

It is possible to show that the two best response functions (3.7) and (3.9) cross only once in the $\{x, n\}$ space, thus identifying the mixed -

strategy equilibrium, where countries and firms randomize, playing A and B respectively with probabilities n^* and x^* . Since the game is symmetric, all players in both populations play the same mixed strategy and, in the equilibrium, n^* and x^* represent the frequency of A and B . The three equilibria, A., B. and E. are represented in Figure 1.

Before analyzing the liberal choice-of-law regime we briefly show that, in the semi-restrictive regime, a case where all countries adopt *one* rule whereas all firms trade using *the other* is not an equilibrium of our two stage game.

Start with $n = 0$ and $x = 1$. In that case the payoffs for the countries is $V_A = m\pi_{AA} = m\beta$ and $V_B = m(\phi - \lambda)$. Hence countries play B if and only if $\phi - \lambda > \beta$. Payoffs for the firms are $\pi_A = \pi_{BA} = \phi - \lambda$; $\pi_B = \pi_{BB} = \phi$. It is immediate to see that firms would want to deviate and play B . This proves that a situation where all firms choose A if countries choose B is not an equilibrium.

Similarly, when $n = 1$ and $x = 0$ the payoffs for the countries are $V_A = m\pi_{AB} = 1 - \lambda$ and $V_B = m\pi_{BB} = \phi\beta$. Countries would choose A if and only if $1 - \lambda > \beta\phi$. Payoff for the firms are $\pi_A = \pi_{AA} = 1$; $\pi_B = \pi_{AB} = 1 - \lambda$. Firms would want to deviate unilaterally from strategy B . This is sufficient to prove that this situation cannot be an equilibrium.

3.3. The liberal choice-of-law regime. When a firm from B meets another firm from B , they contract using B only when both of them are not able to use A . If a firm from B has invested and can use A , it will use the efficient rule whenever it meets either a firm from A or a firm from B that has the ability to use A .

It is immediate to prove that, in addition to the equilibria A., B. and E. described above, a fourth Nash Equilibrium exists, where all countries converge to the inefficient rule B but all firms use solely the efficient rule A .

3.3.1. Equilibrium D: All countries adopt B , all firms use A . In this case:

- (a) Given n_A and x , firms trade using rule A ($\pi_A > \pi_B$);
- (b) Countries choose legal rule B ($V_B > V_A$).

In this equilibrium, all firms use rule A in transactions and all countries either adopt or transplant rule B and thus $x = 1$ and $n_A = 0$. Payoffs for firms are

$$(3.11) \quad \left. \begin{aligned} \pi_A &= \pi_{BA} = 1 - \lambda; \\ \pi_B &= \pi_{BB} = \phi. \end{aligned} \right\}$$

Payoffs for the countries are

$$(3.12) \quad \left. \begin{aligned} V_A &= m\pi_{AA} = m\beta; \\ V_B &= m\pi_{BB} = m(1 - \lambda). \end{aligned} \right\}$$

Given that all countries choose B and all firms use A , no firm want to deviate unilaterally from playing A if and only if $\lambda + \phi < 1$. From (3.12), a country would choose B if and only if $\beta + \lambda < 1$. Equilibrium D in Figure 3 exists whenever these parameter restrictions are satisfied. When this is not the case, we are back to a case where where only equilibria A., B. and E. exist.

4. THE DYNAMICS OF LEGAL SYSTEM AND CHOICE-OF-LAW IN THE RESTRICTIVE REGIMES

In this Section we analyze the dynamic evolution of rule competition and of legal systems under the restrictive and semi-restrictive choice-of-law regimes described above.

When deriving the Nash equilibria in the previous Section we have worked as if countries and firms have the knowledge and the ability to choose their strategies in a rational manner. They know the fundamentals of both the legal systems and of the economy (which is equivalent to saying that they know all the payoffs), plus they know their strategies and those of all other players.¹⁶ Then players know how to coordinate on a specific equilibrium and the game is solved notwithstanding equilibrium multiplicity.

In this section we are going to add a dynamic dimension to our game. We are in fact interested in studying how each of the equilibria above may emerge as a result of firms and countries' interaction. In order to do this we are going to follow an evolutionary approach. We are therefore going to relax the assumption of common knowledge. Players learn to play by encountering similar situations repeatedly and looking at the results of their own past choices and of those of other players. When a strategy proves to be more profitable than the one they had been playing so far, then players start imitating and this leads the majority of the population to gradually follow the new strategy, changing past behavior. Therefore, players' choices evolve along an adaptive path, that looks at past results and is strongly history and path dependent. A steady state equilibrium is simply a stationary point in this evolutionary, dynamic process. In our opinion this way of modeling the evolution of legal systems and the competition between different legal rules is particularly appropriate.

In order to study the dynamics of legal evolution, we assume that countries and firms initially follow a given behavioral pattern, that they inherited from the past or that they learned from their immediate neighbors. This effectively describes the evolution of norms and their adoption as a social custom.¹⁷ This is especially true in international law, where a supranational enforcing authority is often absent, and

¹⁶This is the typical assumption of common knowledge.

¹⁷See Parisi, 2001.

might well represent the way legal rules are selected when firms trade with foreign counterparts. It may well describe also the adoption of law by single countries.

Define $n(t)$ the share of countries that have legal system A at time t . Similarly, $x(t)$ is the share of firms that can write contracts using rule A , independently of their legal system of origin. Both $n(t)$ and $x(t)$ evolve over time. In particular, they follow a replicator dynamics.¹⁸ Countries and firms compare the payoffs they would obtain with each rule with the average payoff obtained by countries and firms respectively. When a rule yields a payoff higher than the average, the share of players choosing that strategy increases, whereas the share of players selecting a strategy with payoff lower than average decreases.¹⁹ We are now going to analyze the replicator dynamics for very restrictive and restrictive choice-of-law regimes, namely, for a regime based on the *lois suppletive* test and for a less restrictive regime based on the *substantial relationship* test.

4.1. The very restrictive regime. In the very restrictive regime, firms don't have the possibility to choose rules outside their ordinary legal regime. The only choice therefore is that of countries, who decide on the basis of the payoff functions in (2.2). Applying the definition of the replicator dynamic, the rate of change of the number of countries adopting rule A , n , is

$$(4.1) \quad \frac{\dot{n}}{n} = \hat{V}_A(t) - \hat{V}(t)$$

where $\hat{V}(t)$ is the average payoff obtained by countries and is equal to

$$(4.2) \quad \hat{V}(t) = n(t)\hat{V}_A(t) + (1 - n(t))\hat{V}_B(t)$$

Substituting $\hat{V}_A(t)$ and $\hat{V}_B(t)$ into expressions (4.1) and (4.2) and using equations (2.1), we obtain the dynamics of n

$$(4.3) \quad \dot{n} = n(1 - n)m[n(1 + \varphi) - \varphi]$$

From (4.3) it is immediate to see that $\dot{n} > 0$ and the number of countries adopting A increases over time if and only if $0 < n < 1$ and $n > \frac{\varphi}{1 + \varphi}$.

We thus have the following result

Lemma 1. *In the very restrictive regime there are two steady states. In the first, all countries adopt rule A and $n = 1$. In the second, all countries adopt B and $n = 0$. The first steady state is reached if $n > \frac{\varphi}{1 + \varphi}$.*

¹⁸For a thorough analysis of evolutionary games and replicator dynamic see Weibull (1995).

¹⁹In other words, players choose the action that is the best response to the actions others followed in the past.

The very restrictive regime leads to complete harmonization (unification) of legal systems. Either rule can prevail in the final equilibrium, even the inefficient one, B . This happens when the share of countries initially adopting the efficient rule A is very low. There are therefore gains from choosing the rule which is most widespread, even if that is the inefficient one. The loss in the proceeds from trade due to inefficiency are in fact compensated by the expected gains related to the greater probability domestic firms have of being matched to a trading partner.

Notice that the equilibrium where both rules A and B coexist (equilibrium \hat{C} in Section 3.1) is not evolutionarily stable. This result should not surprise: \hat{C} is a mixed-strategy Nash equilibrium and, as such, is never evolutionarily stable.²⁰

4.2. The restrictive regime. According to the definition of the replicator dynamics, we have

$$(4.4) \quad \frac{\dot{n}}{n} = V_A(t) - \bar{V}(t)$$

$$(4.5) \quad \frac{\dot{x}}{x} = \pi_A(t) - \bar{\pi}(t)$$

where $\bar{V}(t)$ and $\bar{\pi}(t)$ are the average payoffs, respectively for countries and firms, and are defined as

$$(4.6) \quad \bar{V}(t) = n(t)V_A(t) + (1 - n(t))V_B(t)$$

$$(4.7) \quad \bar{\pi}(t) = x(t)\pi_A(t) + (1 - x(t))\pi_B(t)$$

and the payoff from choosing A for the population of firms is given by the average payoff for the firms that choose it, *i.e.* $\pi_A = n\pi_{AA} + (1 - n)\pi_{BA}$, whereas $\pi_B = n\pi_{AB} + (1 - n)\pi_{BB}$.

After several algebraic passages, the following dynamics results

$$(4.8) \quad \dot{n} = n(1 - n) [P(x) + nQ(x)]$$

$$(4.9) \quad \dot{x} = x(1 - x) [-\lambda - \beta S n^2 + nT].$$

where $P(x) = \lambda - x^2\beta\phi - x(\beta(1 - 2\phi) + 2\lambda) + \phi(1 - \beta)$, $Q(x) = 2x\beta(1 - 2\phi) + 2x^2\beta\phi - \phi(1 - 2\beta) - 1$, $S = 1 - 2\phi(1 - x)$ and $T = (2\lambda + \beta(1 - 2\phi) + 2x\beta\phi)$.

Expressions (4.8) and (4.9) identify a non-linear dynamics. We will analyze it with the help of a phase diagram, drawn in the $\{x, n\}$ space, where $x, n \in [0, 1]$.

It is possible to show that $\dot{x} > 0$ if and only if n lies above $n^x(x)$, where $n^x(x)$ has been defined in expression (3.10).²¹

²⁰See Weibull (1995).

²¹The equation $\dot{x} = 0$ has two solutions in n_A . One of the solutions however lies outside the admissible range of x and n_A for all possible values of the parameters.

Similarly, $\dot{n} > 0$ if and only if n lies above $n^n(x)$, where $n^n(x)$ has been defined in expression (3.8).

We can now prove the following result.

Lemma 2. *There are multiple steady-state equilibria for any $(x, n) \in (0, 1)^2$. The equilibria are $\{x = 1, n = 1\}$ and $\{x = 0, n = 0\}$.*

Proof. Being Nash equilibria in pure strategies, they are evolutionarily stable and are asymptotically stable steady states of the replicator dynamic. \square

The dynamic equilibria of the game are depicted in Figure 2. Notice that the situation where both rules coexist and are used, which was an equilibrium in the static version of the game, is not an equilibrium when we consider an evolutionary dynamics. Specifically, E is a saddle point, hence unstable by definition. This is because the slightest shock that moves either x or n from E renders one of the two pure strategies always preferred by either type of players, thus drawing the dynamics toward equilibria A or B.

5. LEX MERCATORIA AND ENACTED LAW: CAN THE MARKET OUTPERFORM THE STATE?

In this Section we analyze the effects of a liberal choice-of-law regime. In this case, we remove the assumption that firms contracting with other firms from the same legal area using their common legal rule. According to this assumption, for instance, a firm from legal background B that has invested to acquire the ability to write contracts with A too can use A only with foreign firms. This assumption is based on the empirical observation that firms typically tend to stick to their own legal rules when that is possible, especially small and medium enterprises. Only largest economic agents have the ability and the resources to perform lex and forum shopping and only them usually recur to lex mercatoria and to international arbitrate. In this section however we want to investigate what happens when firms are able to choose the legal rule they want to use independently of the nationality of their commercial counterpart. We thus assume that when a firm that has invested to learn both rules is matched with a compatriote with the same characteristic, they choose to contract using the most efficient rule.

In this case, under the constellation of parameters indicated in Section 3.3, the replicator dynamic admits three steady states. If $\lambda + \varphi < 1$ and $\beta + \varphi < 1$, Figure 3 shows that the steady states are A, B and D. In all these steady states, unification of legal systems occurs. Steady state D is quite interesting: In that steady state, all countries adopt the inefficient rule B , thus harmonizing their legal systems. All firms

however adopt the efficient rule.²² In this sense, we might say that the market outperforms the state, meaning that the market is able to select the efficient rule, contrary to what states do.

This equilibrium exists only under the liberal choice-of-law regime. As Figure 3 shows, it is reached when the initial conditions of the dynamic system consist of a very high share of firms already adopting A in transactions (high x) and the majority of countries adopt rule B .

It might thus look as an efficient solution, especially if the equilibrium allowed by alternative choice-of-law regimes is the one where B is universally adopted and universally used by all firms. However, in equilibrium D firms have to bear the cost λ to use A , even if unification of legal system has eliminated the cost β . The efficiency of equilibrium D becomes an even more controversial issue when alternative choice-of-law rules would have lead to equilibrium A .

The conclusion that the more liberal choice-of-law rules the better for efficiency needs at least some further inquiry.

6. THE EVOLUTION AND COEXISTENCE OF LEGAL RULES: LEGAL FAMILIES

In the previous section we have seen that a situation where rules co-exist is not an equilibrium as it is not possible to observe an equilibrium where countries converge on a rule whereas firms use the other rule. In this and in the next Section we investigate whether the predictions of Proposition 1 are robust and still hold when we consider extensions to the model.

In this Section we are going to relax the assumption of symmetric players. Specifically, we introduce heterogeneity both in the group of countries and in the population of firms. We show that heterogeneity might reverse the result obtained above, according to which coexistence of norms is never an equilibrium.

This is in line with Legrand's theory (Legrand, 1997), according to which complete legal harmonization is not possible because of the profound cultural differences among countries. Not only countries might refuse to enact or not enforce enacted norms that are too far from social customs but also when transplanting foreign principles they might "customize" their interpretation, making them differ in practice from the originary ones.

Once we introduce heterogeneity, a new steady state appears, where some countries adopt A and others B . Similarly, some firms use A in foreign contracts and others B . An interesting point is that in the same country might coexist firms using A and firms using B , given that the

²²Abusing terminology, we might say that rule A has become "lex mercatoria" or "soft law": a rule that is used in transactions although is not enacted in any country. It may even become enforced as customary law, but this is outside the scope of our work.

initial distribution of types is independent of the legal system chosen by their country. This new steady state is not unique and exists together with the two steady states identified in the previous section.

To keep the model tractable, we are going to assume that there are two types of countries and two types of firms. Countries differ for their preference for law; a share q of countries ($0 < q < 1$) has a preference for legal system A and has to bear a cost c_H when adopting system B . Similarly, a share $1 - q$ has a preference for legal system B and bear a cost c_L when adopting A .

Following La Porta et al. (1998) one might think to A as a more transparent system, with rules protecting minority shareholders and creditors, requiring mandatory disclosure of information. Conversely, B can be a system based more on interpersonal relations, where contracts are formed with a hand shake. There are societies where the introduction of more transparent rules might be strongly resisted, because it is against century -old traditions. Vice-versa, introducing B in countries used to A - like rules might be very difficult.

Firms differ in their cost of contracting using a rule different from their own ordinary one. There are firms whose costs are low, λ_L and firms whose costs are high ($\lambda_H > \lambda_L$). High-cost firms might be relatively closed firms, with few foreign commercial partners and an activity taking place mostly on the national market. Low-cost firms are relatively open firm, with large legal offices. The share of low-cost firms is f , whereas $1 - f$ are the high-cost ones.

Payoffs for firms thus become

$$\begin{aligned} \pi_{AA} &= (n_H + n_L) + (x_L + x_H) \beta(1 - n_H - n_L) \\ \pi_{AB} &= (n_H + n_L) + (1 - n_H - n_L) \beta [(x_L + x_H) + \varphi(1 - x_L - x_H)] - \lambda_j \\ \pi_{BA} &= (1 - n_H - n_L) \varphi + \beta(n_H + n_L) - \lambda_j \\ \pi_{BB} &= \varphi [(1 - n_H - n_L) + \beta(n_H + n_L)(1 - x_L - x_H)] \end{aligned}$$

where $j = H, L$ and x_H is the proportion of high - cost firms that choose A (x_L is the proportion of low-cost firms that choose A).

Payoff for countries are

$$(6.2) \quad V_{AL} = m [(x_L + x_H) \pi_{AA} + (1 - x_L - x_H) \pi_{AB}] - C_L$$

$$(6.3) \quad V_{AH} = m [(x_L + x_H) \pi_{AA} + (1 - x_L - x_H) \pi_{AB}]$$

$$(6.4) \quad V_{BL} = m [(x_L + x_H) \pi_{BA} + (1 - x_L - x_H) \pi_{BB}]$$

$$V_{BH} = m [(x_L + x_H) \pi_{BA} + (1 - x_L - x_H) \pi_{BB}] - C_H$$

Each type of firm and each type of country will be characterized by its own dynamics. We will have 4 equations describing the evolution over

time of x_H , x_L , n_H and n_L . Specifically, we have

$$\begin{aligned}\frac{\dot{n}_H}{n_H} &= V_{AH}(t) - \bar{V}_H(t) \\ \frac{\dot{n}_L}{n_L} &= V_{AL}(t) - \bar{V}_L(t) \\ \frac{\dot{x}_H}{x_H} &= \pi_{AH}(t) - \bar{\pi}_H(t) \\ \frac{\dot{x}_L}{x_L} &= \pi_{AL}(t) - \bar{\pi}_L(t)\end{aligned}$$

where $\bar{V}_j(t)$ and $\bar{\pi}_j(t)$ ($j = H, L$) are the average payoffs, respectively for countries and firms, and are defined as

$$\begin{aligned}\bar{V}_j(t) &= [n_H(t) + n_L(t)]V_{Aj}(t) + [1 - n_H(t) - n_L(t)]V_{Bj}(t) \\ \bar{\pi}_j(t) &= [x_H(t) + x_L(t)]\pi_{Aj}(t) + [1 - x_H(t) - x_L(t)]\pi_{Bj}(t)\end{aligned}$$

and where $\pi_{Aj} = [n_H + n_L]\pi_{AA}^j + [1 - n_H - n_L]\pi_{BA}^j$ and $\pi_{Bj} = [n_H + n_L]\pi_{AB}^j + [1 - n_H - n_L]\pi_{BB}^j$.

The steady states are described by the following rules:

$$(6.5) \quad \dot{x}_j \geq 0 \iff n_L + n_H > n_{Aj}^x(x_H, x_L)$$

$$(6.6) \quad \dot{n}_j \geq 0 \iff n_L + n_H > n_{Aj}^n(x_H, x_L)$$

A case where both legal systems coexists in the steady state and legal rules from both are used by firms in the steady state is presented in Figure 4.

7. CONCLUSIONS

In this paper we study the process of convergence of legal rules when there is competition between different rules. We consider two different settings; in the first one firms have to use their ordinary legal system when contracting with other domestic firms (or with firms with the same legal background). Therefore, firms can choose legal rules only when trading with foreigners, deciding whether to govern the contract according to their own or to their counterpart's rules. This situation corresponds to restrictive choice-of-law rules and leads to two possible steady states; in both steady states a unique rule is adopted by all countries and only that rule is used by all firms (universal diffusion). In such cases the final equilibrium is one of legal uniformity. Which rule prevails depends on the initial conditions. When the initial diffusion of the efficient rule is not high we might observe the universal adoption of the inefficient one. Countries minimize lack-of-harmonization costs (maximize proceeds from international trade) by adopting the legal system most common worldwide. Firms minimize transaction costs when they choose the rule that is most likely to be shared by potential commercial partners.

In the second setting we consider, firms can choose legal rules no matter the nationality of their commercial partner. They can choose a rule different from their country's one even when trading with a domestic counterpart. This corresponds to the more liberal choice-of-law rules advocated by Ogus (2002). In this case we show that there might be a third steady state, where all firms choose the efficient rule even if all countries converge to the inefficient legal system. Although being evolutionarily stable, this equilibrium is inefficient. It maximizes firms' transaction costs even if it maximizes the proceeds from trade.

In the real world we observe the presence of legal families. i.e. groups of countries sharing similar legal systems. Our model predicts that legal families would only be a transitory phenomenon (even if the transition can last centuries) in a setting where countries are sufficiently homogeneous. The presence of legal families in the steady state requires heterogeneity both among countries and among firms. In that case, we find an evolutionarily stable equilibrium where both legal systems coexist and where firms use rules from both. We find that even firms belonging to the same country might use different rules. Finally, we have pointed out that the various steady states present different degrees of efficiency, where the socially optimal is the one where the efficient rule is universally adopted. We investigate whether a supranational coordinator (federal government or the regulatory bodies of a treaty) can induce the transition to the efficient steady state, possibly by means of intergovernmental fiscal transfers.

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| Investment in flexibility and probability of investment | | | Firm operates in | | | |
|---|---|--------------------|--------------------|----------------|------------------|----------------|
| | | | A | | B | |
| | | | λ $1-x$ | 0 x | λ x | 0 $1-x$ |
| Firm operates in | A | λ $1-x$ | A | | A | B |
| | | 0 x | | | A | No transaction |
| | B | λ x | A | A | B | |
| | | 0 $1-x$ | B | No transaction | | |

TABLE 1: MATCHING PROCESS AND RULES CHOSEN FOR CONTRACT

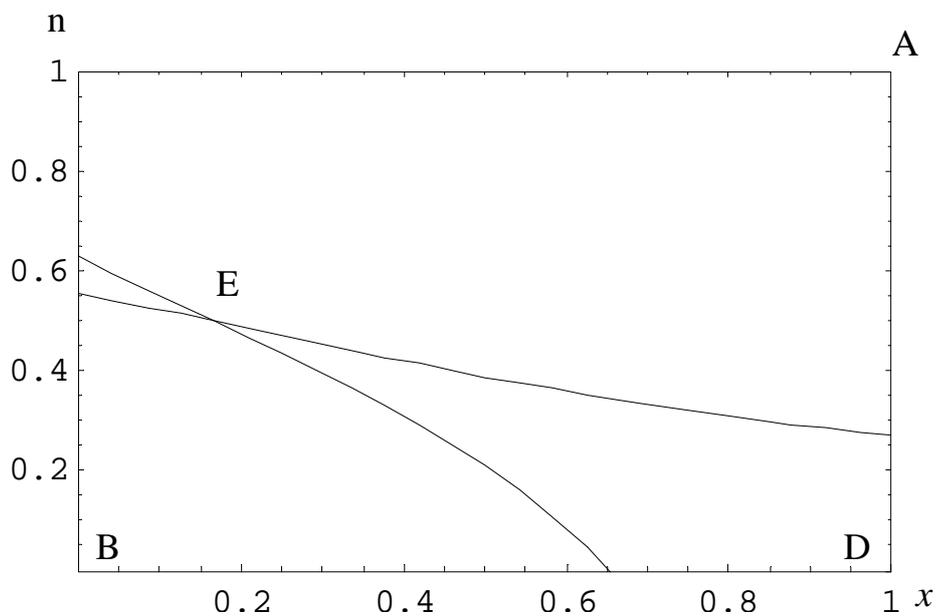


FIGURE 1: Equilibria in the static game. D exists only under a liberal choice-of-law regime.

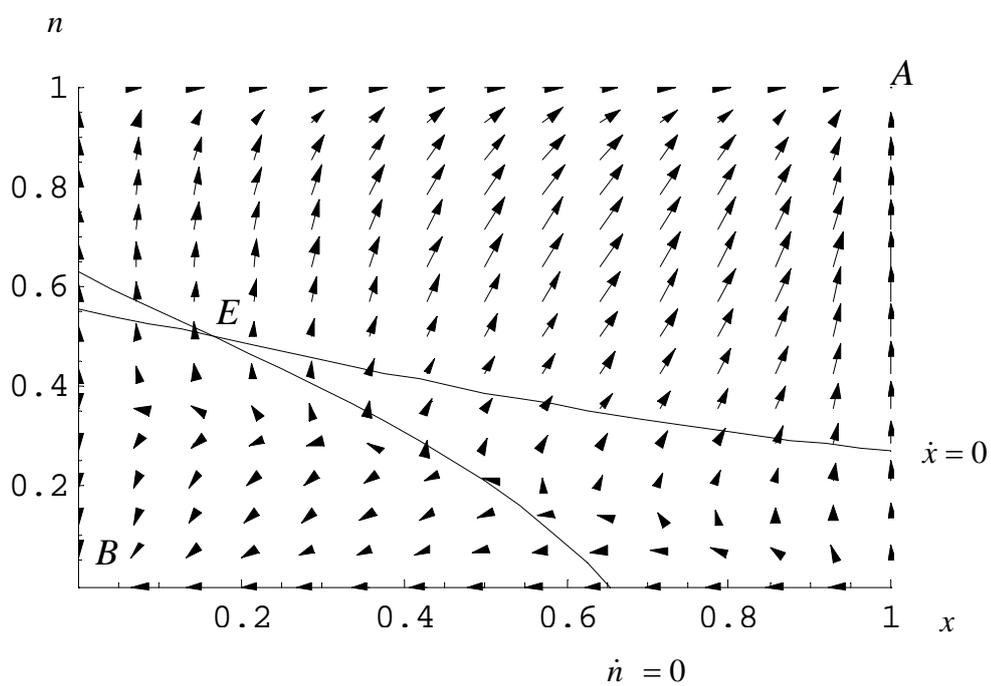


FIGURE 2: The dynamics

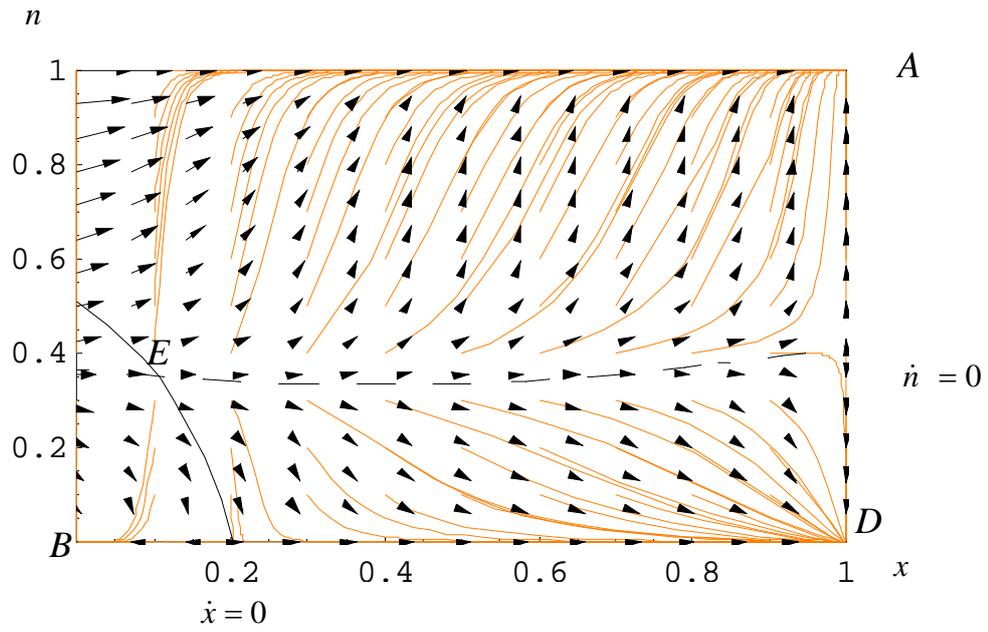


FIGURE 3: Equilibrium D exists and is evolutionarily stable (plot obtained with $\beta=0.4$; $\lambda=0.1$; $\varphi=0.51$).

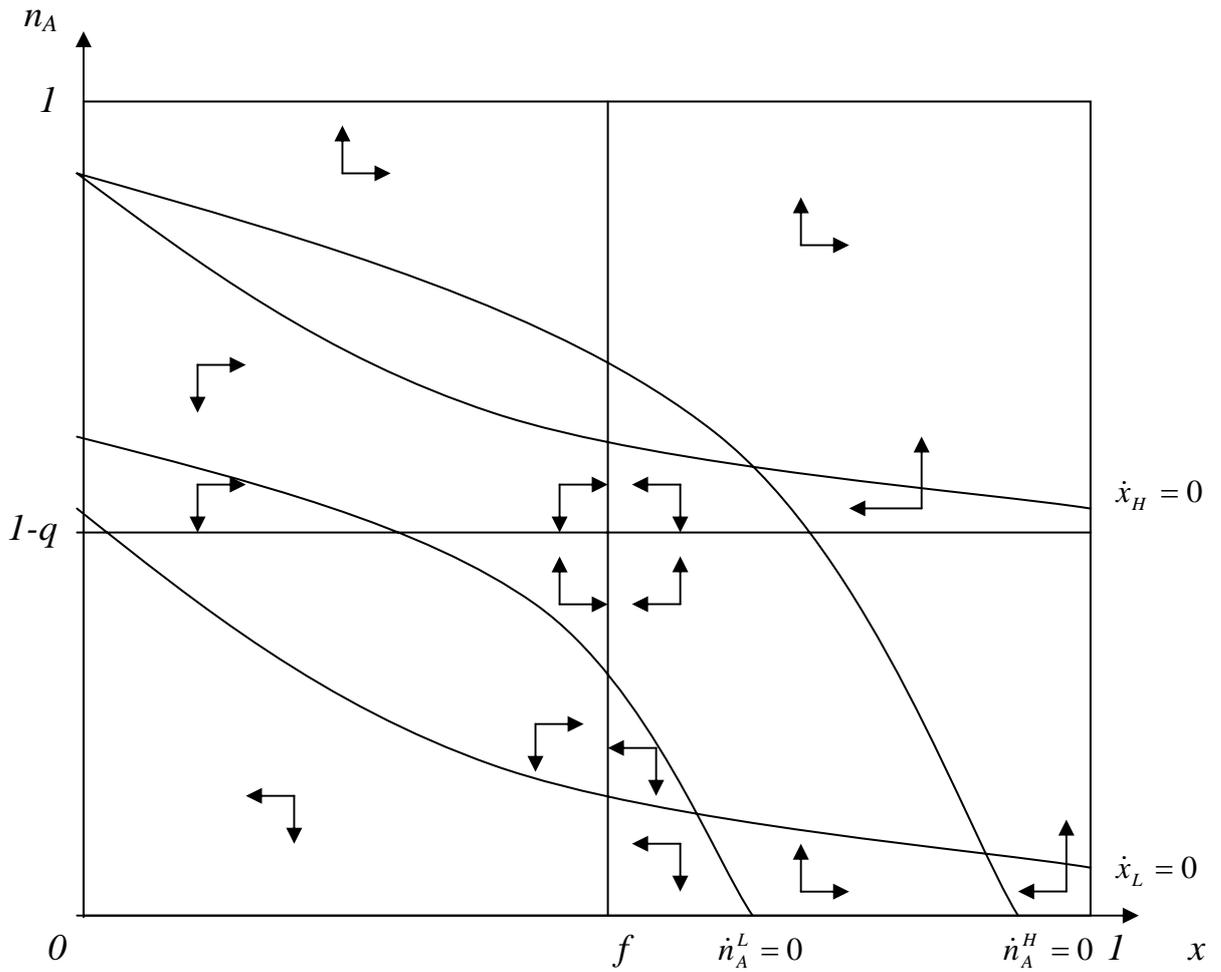


Figure 4: The equilibrium with coexistence of rules.