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The Paradox of Legal Unification

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Abstract

In the games used to study legal standardization, legal unification is never the outcome of the usual cooperative solution. Given the importance of legal unification in practice, this property appears as a paradox. To solve this paradox, we resort to alternative notions of cooperation. We show that introducing other-regarding preferences or Kantian rules of behavior do not resolve the paradox. By contrast, we show that legal uniformity prevails at any Berge equilibrium of our legal standardization game (a Berge equilibrium is a strategy profile such that a unilateral change of strategy by any one player cannot increase another player's payoff). This, we argue, is a first step towards a solution to the paradox of legal unification.

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1 Introduction

To account for legal convergence, law & economics relies on a fundamental trade-off. On the one hand, legal convergence decreases the cost of legal diversity and therefore enhances international trade. On the other hand, legal convergence increases the cost of the discrepancy between national laws and national legal preferences.[1] Legal changes across countries are then interpreted as issues of legal standardization games where national law-makers face this tradeoff. Legal cooperation, in particular, is construed as the set of national legal changes which maximizes the sum of the countries payoff functions.

This attempt at interpretation, however, gives rise to the following paradox: while observed in reality, legal unification, namely the substitution of a new and unique legislation for multiple national rules, *never* maximizes the sum of the countries payoff functions.[2] We call this inability to theoretically predict legal unification the *paradox of legal unification*. This paper aims at studying this paradox and at providing a theoretical solution. To do this we follow two approaches.

In the first approach, legal cooperation is viewed as the Nash equilibrium of a game where law-makers have *other-regarding* preferences. By other-regarding preferences we mean that each country takes into account other countries welfare in its own payoff function (see Cooper and Kagel, 2016). This approach is a common way to explain the unexpected prevalence of cooperative behavior observed in experimental studies of social dilemmas. Since transboundary topics are often seen as needing international cooperation, other-regarding preferences are also used to analyze international agreements. For example, Kolstad (2014) use the assumption of social preferences among heterogenous countries to understand the foundations of international environmental agreements (see also Van Long, 2016 and Lin, 2018). Introducing such preferences in a legal standardization game, we show that there is no Nash equilibrium in which legal unification prevails. Thus, taking into account other-regarding preferences in the analysis does not solve the legal unification paradox.

A second approach is to keep standard preferences and to introduce alternative notions of

[1]Legal preferences refer to the way cultural values are embodied in the law. As stated by Legrand (1997), legal systems are the product of the history, culture and political compromises of each country over the years, and in this way differ from one country to another.

[2] The same problem arises with non cooperative interactions. Specific assumptions are needed to obtain the possibility of legal uniformity in Nash equilibria of legal standardization games. A first specific assumption is law-makers have finite strategy sets (see, *e.g.*, the seminal paper by Garoupa and Ogus, 2006). A second specific assumption is that law-makers preferences are not continuously differentiable (see, *e.g.*, Crettez et al., 2013; Crettez et al., 2016).

cooperative solutions. Firstly, we pay attention to the case where agents follow Kantian rules of behavior.[3] Agents make a decision according to a Kantian rule when they think that this rule should be a universal law (*i.e.*, all the agents should behave in the same way). To study Kantian rules of behavior in our legal standardization game, we rely on the formulations proposed by Laffont (1975), Roemer (2010) and Roemer (2015)

Secondly, we focus on the idea that cooperative behavior often builds on team reasoning and mutual support (see, *e.g.*, Colman, Pulford, et al., 2008, Guala et al., 2013, Sugden, 2015). In this connection, we single out the notion of Berge equilibrium (Berge, 1957, Zhukovskii and Chikrii, 1994, Colman, Körner, et al., 2011). A Berge equilibrium is a strategy profile such that a unilateral change of strategy by any one player cannot increase another player's payoff.

Thirdly, we study a concept of cooperative solution which appears in all the major ethical traditions and which is commonly referred to as the "Golden Rule". We concentrate on Van Damme (2014)'s game-theoretic formalization of the following version of the Golden Rule: "Do unto others as you like others to do unto you".

Our analysis of these three alternative solution concepts shows that Kantian rules of behavior do not lead to legal unification. By contrast, legal unification is achieved in *any* Berge equilibrium of our legal standardization game. Further, we show that in this game Van Dame's Golden rule coincides with the notion of Berge equilibrium. As our legal standardization game always has a Berge equilibrium, we conclude that this notion of cooperative solution provides a possible solution to the paradox of legal unification.

The remaining part of the paper unfolds as follows. In section 2, we define legal unification and we propose some examples. In section 3 we lay out a general legal standardization game. We then present the paradox of legal unification in section 4. We study the alternative cooperative solution concepts in section 5. Section 6 presents a discussion of the empirical relevance of team reasoning (on which the concept of Berge equilibrium relies). Section 7 contains some concluding remarks. All the proofs are relegated to the appendix. Section 2, which comes next, first addresses some terminology issues.

[3] Discussing the provision of public goods, Samuelson (1954) already quoted Kant's categorical imperative as a possible means to achieve preferred social outcomes.

2 Legal Unification: Terminology and Examples

Legal convergence is the process according to which national legal rules become closer between each other overt time. This convergence can be the result of spontaneously ordered institutional arrangements. An example of spontaneous legal convergence is legal transplantation, which is the "introduction in national legal systems of status and principles belonging to other systems, be they legal rule of other countries, or customs whose acceptance is widespread" (see Carbonara and Parisi, 2007). Spontaneous legal convergence and in particular its more extreme form, legal uniformity, however, is a rare phenomenon (Gomez and Ganuza, 2012). It is quite always the result of international legal coordination. We call *legal unification* the process by which international cooperation achieves legal uniformity.

The objective of legal unification is to render uniform the legal responses of different countries facing the same facts or situations, irrespective of the national level involved. Legal instruments, as the UNIDROIT foundation puts it: "must be understood in the same way in all countries, and they must be applied in the same way."[4]. According to UNIDROIT, the benefices of uniform laws include "a greater certainty in dealings across borders, an increased volume and value of international trade and cross-border relations, the promotion of improved standards of conduct, the establishment of performance benchmarks and the facilitation of more effective international dispute resolution and enforcement of rights."

Boele-Woekin (2010) argues that "the unification of substantive private law is predominantly achieved by international convention." An international convention does not create a uniform law per se. That is because legal unification is only achieved after the ratification of the convention by all the countries parties to the agreement. Legal unification is thus a top-down process, which may imply a certain part of collective decision-making.

An early example of an international convention leading to legal unification is the Warsaw Convention on air transport (Stephan, 1999). Another example is the United Nations Convention on Contracts for the International Sale of Goods (CISG), whose aim is the promotion of international trade through the adoption of uniform rules. The drafters of the convention explicitly stated that uniformity was needed in its application (Ferrari, 1996).[5]

[4] See, Unidroit.

[5] See, *e.g.*, Article 7(1) of the Convention: "*In the interpretation of this Convention, regard is to be had to its international character and to the need to promote uniformity in its application and the observance of good faith in international trade.*"

In regional unions such as the European Union, there exist additional tools of unification. Uniform law making in the European Union is achieved by means of *Regulations*, which are European legal acts immediately enforceable as law in all member states simultaneously.[6] Regulations differ from Directives, the other European tool to achieve legal convergence. A Directive is a legal act of the European Union which requires member states to achieve a particular result, without dictating the legal means to achieve that result.[7] In Comparative Law literature the use of directives refer to *legal harmonization*. Legal harmonization of law seeks to promote coordination of different legal provisions or systems by eliminating major differences and creating minimum requirements or standards.[8] Legal harmonization and legal unification are then two distinct way to promote convergence. Both require some kind of cooperative behavior from the countries concerned. For example, in the European Union, as indicated in article 5 of the Treaty establishing the European Economic Community, *Member states shall take all appropriate measures, whether general or particular, to ensure fulfillment of the obligations arising out of this Treaty or resulting from action taken by the institutions of the Community. They shall facilitate the achievement of the Community's tasks.* Kono (2014) (p. 133) argues that the specific institutionalized long-term relationships between Members of the E.U. incentive them to consider their interest from broader perspectives [9].

Such cooperative behavior is unlikely outside regional unions. This can explain why at a more global level, Kozuka (2007) concludes that legal unification is far from being prevalent.[10] Kono (2014) makes a review of international conventions and shows that only four conventions have more than fifty members States. An important question is then to understand under which conditions legal unification can be the result of a cooperative or collective decision process. To analyze this process, we next introduce a legal standardization game.

[6] Article 288 of the Treaty on the Functioning of the European Union: *A regulation shall have general application. It shall be binding in its entirety and directly applicable in all Member States.*

[7] Article 288 of the Treaty on the Functioning of the European Union: *Directives shall be binding, as to the result to be achieved, upon each Member State to which it is addressed, but shall leave to the national authorities the choice of form and methods.*

[8] In some papers (see *e.g.* Gomez and Ganuza, 2012), legal unification is synonymous with *full* harmonization, while harmonization is labeled as minimal harmonization.

[9] This does not mean, however, that the interests of a member state are always aligned with those of the other states - the recent decision by the United Kingdom to leave the European Union is a case in point.

[10] This is in contrast with the expectations made by the legal comparatist David (1968) who argued that "the problem is not whether international unification of law will be achieved; it is how it can be achieved." The optimistic view is still shared today. For instance Zeller (2002) asserts that "History has shown that unification of laws is inevitable and unstoppable."

3 A Legal Standardization Game

Consider a game with N players, each player representing a country. The legal preferences and the legal system of country i are respectively represented by the real numbers θ_i and ℓ_i (these numbers are different across countries). We interpret these points as being aggregate indexes of legal rules concerning a specific issue of the legal system.[11] Country i chooses (or adapts) its own legal system ℓ_i in order to maximize its payoff function $\mathcal{U}^i$. Denoting by $\boldsymbol{\ell}$ the strategy profile $(\ell_1, \ldots, \ell_i, \ldots, \ell_N)$, by $\boldsymbol{\ell}_{-i}$ the incomplete strategy profile $(\ell_1, \ldots, \ell_{i-1}, \ell_{i+1} \ldots, \ell_N)$, we assume that

$$\mathcal{U}^i(\boldsymbol{\ell}) = U^i(\ell_i, \theta_i) + V^i(\ell_i, \boldsymbol{\ell}_{-i}). \tag{1}$$

We make three additional assumptions about $\mathcal{U}^i(\boldsymbol{\ell})$.

• First, the function U^i is single-peaked with respect to θ_i. Namely, $\frac{\partial U^i}{\partial \ell_i}$ is positive when $\ell_i < \theta_i$, negative when $\ell_i > \theta_i$, and nill when $\ell_i = \theta_i$.This assumption captures the idea that country i bears cultural adaptation costs when its actual law ℓ_i nears foreign law ℓ_j by departing from its legal preferences θ_i (the foundations of such legal preferences are described for example by Legrand, 1996).

• Second, the function $V^i(\ell_i, \boldsymbol{\ell}_{-i})$ is single-peaked with respect to ℓ_i when viewed as a function of the foreign legal systems ℓ_k, $k \neq i$. To wit, country i payoff increases when the foreign legal systems get closer to its own legal system. This payoff increase reflects the fact that legal diversity generates specific transaction costs.[12] For instance, Rodrik (2004) argues that the diversity of national institutional arrangements is the most important source of transaction costs in international exchanges, broadly representing nearly 35% in ad-valorem terms.

• Third we finally assume that both the functions U^i and V^i are smooth and that

$$\left.\frac{\partial V^i(\ell_i, \boldsymbol{\ell}_{-i})}{\partial \ell_i}\right|_{\ell_j = \ell,\, j=1,\ldots,n} = 0, \quad \forall i. \tag{2}$$

The above equation means that changing ℓ_i brings no benefits to country i if legal uniformity

[11] The construction of aggregate indexes of legal rules is a current practice in the empirical law & economics literature. For instance, the Leximetrics database included several quantitative indexes of legal rules on corporate governance, creditor law or labor law (see Siems, 2011). Datasets can be found in Deakin et al. (2017).

[12] On these transaction costs, see, *e.g.*, Katz (2000), Linarelli (2003), and Wagner (2005).

is actually achieved (even if the uniform law differs from country i legal preferences θ_i). To put it differently, from an economic or administrative viewpoints the benefit of legal uniformity does not depend on the very nature of the uniform law. For sure, the cost of legal convergence *does* depend on direction along which it occurs. But this cost, which is mainly a cultural one, is already taken into account in the function $U^i(\ell_i, \theta_i)$.

Examples

The following specification of the payoff function $\mathcal{U}^i$, originally proposed by Loeper (2011), satisfies our assumptions:

$$\mathcal{U}^i(\boldsymbol{\ell}) = -\frac{1}{2}(\ell_i - \theta_i)^2 - \frac{\gamma}{2N}\sum_{j\neq i}^{N}(\ell_i - \ell_j)^2. \tag{3}$$

It is indeed easy to see that the function $U^i(\ell_i, \theta_i) = -\frac{1}{2}(\ell_i - \theta_i)^2$ peaks when $\ell_i = \theta_i$ and that the function $V^i(\ell_i, \boldsymbol{\ell}_{-i})$ peaks when $\ell_j = \ell_i$ for all j. It is also easy to check that the above specification of $\mathcal{U}^i(\boldsymbol{\ell})$ satisfies equation (2).

Another example of a utility function that satisfies all of our assumption is

$$\mathcal{U}^i(\boldsymbol{\ell}) = -\sqrt{a + (\ell_i - \theta_i)^2} - \gamma\left(\sum_{j\neq i}\sqrt{a + (\ell_i - \ell_j)^2}\right), \tag{4}$$

where a is a positive parameter.[13]

4 The Paradox of Legal Unification

In this section we first study the standard cooperative solution of our legal standardization game. We show that this solution never satisfies legal uniformity.[14] We call this result the Paradox of legal unification. We then consider the usual resolution of this paradox proposed in the literature, namely introducing the assumption that the coordination costs linked to legal harmonization are higher than those associated to legal unification.

[13]This utility function relies on the function $\sqrt{a + x^2}$, which boils down to the absolute value function when $a = 0$.

[14]This notion of cooperative solution does not refer to the various concepts of Cooperative game theory.

4.1 The Standard Cooperative Solution

In the literature, legal cooperation is often construed as the maximization of a weighted sum of the countries payoff functions (see, *e.g.*, Carbonara and Parisi, 2007, Monheim-Helstroffer and Obidzinski, 2010).[15]

Countries are thus assumed to solve the following problem

$$\max_{\boldsymbol{\ell}} \sum_{i=1}^{N} \beta_i \big(U^i(\ell_i, \theta_i) + V^i(\ell_i, \boldsymbol{\ell}_{-i}) \big), \tag{5}$$

where we interpret the parameter β_i as the weight given to country i in the maximization problem. We call this maximization problem the *standard cooperative solution.*

Assuming that all country weights β_i are positive, we obtain the following result

Proposition 1. *Legal unification is never the outcome of the standard cooperative solution.*

When the national laws are chosen to solve problem (5), each of these laws satisfies the following first-order optimality condition

$$\beta_i \frac{\partial U^i}{\partial \ell_i}(\ell_i, \theta_i) + \sum_{j=1}^{N} \beta_j \frac{\partial V^j}{\partial \ell_i}(\ell_j, \boldsymbol{\ell}_{-j}) = 0. \tag{6}$$

This condition means that when ℓ_i gets marginally closer to θ_i, the increase in the payoff of country i is compensated by the sum of the marginal changes in the payoffs of the other countries (some of these changes may be positive, as ℓ_i also gets closer to ℓ_j, but this may not be the case for all countries). Where legal unification is realized in the standard cooperative solution, all the terms $\frac{\partial V^j}{\partial \ell_i}(\ell_j, \boldsymbol{\ell}_{-j})$ in the above equation are nil.[16] But this would imply that $\ell_i = \ell = \theta_i$ (since $U^i(\ell_i, \theta_i)$ is single-peaked in θ_i). Yet by assumption the ideal laws θ_i are all different. This is a contradiction. We illustrate the Proposition with the next example.

Example

[15] In Carbonara and Parisi (2007), countries actually receive a fixed share of the maximization of the sum of their objective functions.

[16] This stems from the assumption that $\ell_k = \ell$ for all k (legal unification is realized), that the functions $V^j(\ell_j, \boldsymbol{\ell}_{-j})$ are all single-peaked with respect to ℓ_j when viewed as functions of ℓ_k, $k \neq j$, and from equation 2.

When the countries payoff functions are given by equation (3) and all the β_i are the same, the solution to the problem (5), namely

$$\max_{(\ell_i)_i} \sum_{i=1}^{N} \mathcal{U}_i = \max_{(\ell_i)_i} \left\{ -\frac{1}{2} \sum_{i=1}^{N} (\ell_i - \theta_i)^2 - \frac{\gamma}{2N} \sum_{i=1}^{N} \sum_{j \neq i} (\ell_i - \ell_j)^2 \right\},$$

is given by the following expressions

$$\ell_i = \frac{\theta_i + 2\gamma\hat{\theta}}{1 + 2\gamma}, \; i = 1, \cdots, N,$$

where $\hat{\theta} = (\sum_{i=1}^{N} \theta_i)/N$. Observe that legal unification occurs if and only if $\theta_i = \theta$, for each country i. Otherwise the law of country i is in between its own legal preferences θ and the mean of the national legal preferences $\hat{\theta}$.

4.2 Legal Unification in the Law & Economics Literature

An implication of Proposition 1 is that additional assumptions must be made if we want to account for legal unification while considering that legal cooperation is best modeled as the maximization of the sum of the countries payoffs. The resolution of the paradox of legal unification in the law & economics literature rests on a two-step approach (see Carbonara and Parisi, 2007, Monheim-Helstroffer and Obidzinski, 2010 Loeper, 2011).

The first step consists of solving problem (5) under the assumption that $\ell_i = \ell$, for all country i. We therefore look for the *best uniform law*. Searching for the best uniform law is equivalent to solve the following problem

$$\max_{\bar{\ell} \in \mathbb{R}} \sum_{i=1}^{N} U^i(\bar{\ell}, \theta_i). \tag{7}$$

That is because, from our assumptions on the function V^i (and notably assumption (2)), all the functions V^i are constant when legal uniformity prevails. Therefore, solving problem (5) under the assumption that $\ell_i = \ell$ for any country i is equivalent to solving problem (7).

Notice, however, that from Proposition 1 the sum of the countries payoff functions with legal uniformity *cannot* be higher than the value of this sum when countries choose the solution of problem 5. This is why a second step is needed. In this second step, we assume that the solution to problem 5 (*i.e.*, without *imposing* legal uniformity) involves significant coordination and transaction costs which, when subtracted to the sum of the countries payoffs, makes the solution to problem (7) a comparatively better choice.[17]

Yet the two-step standard solution to the paradox of legal unification is short of being compelling, since it is by no means obvious that the coordination costs linked to legal harmonization are always higher than those implied by legal unification. Negotiating to tailor a unique rule that satisfies all countries can be comparatively more difficult and lengthy than agreeing on a common set of general principles, while enabling countries to keep national specificities (*i.e.*, legal harmonization). Kono (2014) gives several arguments showing that choosing a uniform law is not always the less costly option if we take into account the costs of creation, maintenance and amendment of the law.

To sum up, it seems worthwhile to explore alternative ways to resolve the paradox of legal unification. To do this we need to modify the terms of the problem used to study legal cooperation. One way to do this is to introduce different solution concepts. We address this issue in the next section.

5 Alternative Socially Oriented Solution Concepts

A growing body of empirical and theoretical literature argues that economic agents make individual choices while having social concerns. Consequently, rather than relying on the standard cooperative approach seen in section 4, we consider four alternative solution concepts that embody social concerns and we study whether these concepts can solve the paradox of legal unification. The first concept builds on the idea that agents behave non-cooperatively but have other-regarding preferences. The second concept builds on Kantian rules of behavior (Roemer, 2015). The third one, the notion of Berge equilibrium, captures the idea of mutual support (Berge, 1957). The fourth and last one refers to traditional ethics and is named Golden rule (Van Damme, 2014). In the last three solution concepts we assume standard preferences, but non-standard protocols of decision. This is in contrast with the first concept, which builds on non-standard preferences (namely other-regarding preferences), albeit a standard protocol of decision (that is, a Nash equilibrium).[18]

[17]See, *e.g.*, Crettez et al. (2016) for a study where *both* legal harmonization and legal unification bring about transaction costs.

[18]Van Long (2016) reviews the impact of other-regarding preferences and ethical choice on environmental outcomes. While Long takes up the issue of international cooperation when countries have non-standard preferences, his setup and ours are formally different. Moreover, he does not consider Berge equilibria.

5.1 A Non-cooperative Approach with Other-Regarding Preferences

In this approach, we explain the collective decision-making that underlies legal cooperation by assuming that countries behave in a non-cooperative way, *but* at the same time take into account the impact of their choices on the welfare of other countries. Introducing other-regarding preferences in the payoff functions of otherwise non-cooperative agents seems to be often used to explain the unexpected prevalence of cooperation observed in experimental studies of social dilemmas. As Roemer (2015) puts it :

> Economic theory, for the main, attempts to explain cooperative behavior as the *non-cooperative* equilibrium of a complex game with many stages. The innovation of behavioral economics is to include exotic arguments in preferences (for example, a sense of fairness) but the analytical structure is still Nash (non-cooperative) equilibrium.

Following this idea, we consider the next question: is it possible to endow countries with meta preferences (incorporating other-regarding traits) such that legal uniformity can be realized in a Nash equilibrium of the legal standardization game?

To further the formal study of this question assume that each country i has meta preferences represented by a meta payoff function $\mathcal{T}^i$

$$\mathcal{T}^i\left(\mathcal{U}^1(\ell_1, \boldsymbol{\ell}_{-1}), ..., \mathcal{U}^i(\ell_i, \boldsymbol{\ell}_{-i}), ..., \mathcal{U}^N(\ell_N, \boldsymbol{\ell}_{-N})\right), \tag{8}$$

which is differentiable and such that the partial derivatives $\frac{\partial \mathcal{T}^i}{\partial U^j}$ are all positive for each i and j.

The following Proposition answers to the above question as follows

Proposition 2. *There are no differentiable-increasing functions $\mathcal{T}^i$ defined on $\mathbb{R}^N$ such that legal uniformity is realized in a Nash equilibrium of the legal standardization game where the countries meta-payoff functions are given by the function $\mathcal{T}^i$, $i = 1, ..., N$.*

To better understand this result assume by way of contradiction that legal uniformity could be realized in a Nash equilibrium of the legal standardization game when countries have other-regarding preferences. When country i changes its law by a marginal amount, the direct effect on country j payoff is equal to $\frac{\partial \mathcal{U}^j}{\partial \ell_i} = \frac{\partial V^j}{\partial \ell_i}(\ell_i, \boldsymbol{\ell}_{-i})$, where $\ell_i = \ell$ for all i. This direct effect on country j marginally affects country i by an amount equal to $\frac{\partial \mathcal{T}^i}{\partial \mathcal{U}^j}\frac{\partial V^j}{\partial \ell_i}$. When there is legal uniformity in a Nash equilibrium, the last term is nil (because so is $\frac{\partial V^j}{\partial \ell_i}$) and the first-order condition for country i choice reduces to: $\frac{\partial \mathcal{T}^i}{\partial \mathcal{U}^i}\frac{\partial U^i}{\partial \ell_i}(\ell_i, \theta_i) = 0$. The only case where this is possible is when $\ell_i = \ell = \theta_i$. But such a condition cannot be simultaneously true for all counties, since we have supposed that the ideal legal systems are all different.

Therefore, when countries have other-regarding preferences, it remains always beneficial for at least one country to deviate from a unique candidate legal rule, in order to choose a national legal system ℓ_i closer to its own legal preference θ_i.[19]

5.2 Kantian Equilibria

A second alternative socially-oriented solution concept, which is actually an alternative cooperative solution concept, is the notion of Kant equilibrium. This equilibrium, first introduced in Economics by Laffont (1975) rests on Kant's idea that an autonomous agent should impose his own laws. But if each agent arrives at these laws by the sole use of reason, all agents will arrive at the *same* laws. As a consequence, a choice can be considered as rational if each agent agrees that it should become a universal law (a categorical imperative) for all the other agents.[20]

From a formal viewpoint, a legal system ℓ is a Kant-Laffont equilibrium if it maximizes the payoff function $\mathcal{U}^i$ of each country i, when *all* the other countries also make this choice. We define a *Kant-Laffont equilibrium* as the uniform law $\tilde{\ell}$ which maximizes the objective function of each country i when all the remaining countries j also choose $\tilde{\ell}$. Formally $\tilde{\ell}$ solves the following problem

$$\max_{\ell} \mathcal{U}^i(\boldsymbol{\ell}) = U^i(\ell, \theta_i) + V^i(\ell, \boldsymbol{\ell}_{-i}); \text{for all } i, \tag{9}$$

where all the components of $\tilde{\ell}$ are equal to ℓ. A difficulty with this solution concept, however, is that when countries legal preferences are different, Kant-Laffont equilibrium does not exist.

Nonetheless, Roemer (2015) has recently proposed another interpretation of the Kantian imperative in which the diversity of players' preferences does not a priori precludes the

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[19] We notice that one can use the same kind of reasoning to show why legal uniformity would not hold in a Nash equilibrium when countries have *selfish* preferences. It suffices to assume that $\frac{\partial \mathcal{T}^i}{\partial \mathcal{U}^j} = 0$, for all $i \neq j$, and $\frac{\partial \mathcal{T}^i}{\partial \mathcal{U}^i} > 0$.

[20] On this notion of rationality see Sugden (1991).

existence of an equilibrium. Specifically, the characteristic of the Kantian approach, Roemer argues, is "not to ask individuals to put themselves in other people's shoes, but rather to evaluate how they would fare if all other behaved as they do." In this connection, what the others do can be interpreted in several ways. Roemer focuses on the case where each player contemplates whether it is worthwhile to *deviate* in a pre-defined way from a candidate equilibrium, assuming that all the other players will also deviate following a pre-defined protocol. Thus, people are not necessarily assumed to make the same decisions as in the Kant-Laffont equilibrium. We rather assume that people deviate in the same way, if so they choose.

Roemer proposes several definitions of what he calls Kantian equilibria (see, *e.g.*, Roemer, 2015). We concentrate on one definition, the notion of *additive Kantian equilibrium.*[21] We shall say that a vector of strategies $\boldsymbol{\ell}^K$ is *an additive Kantian equilibrium*, if, given a vector $A = (a_1, \ldots, a_i, \ldots, a_n) \in \mathbb{R}^n_{++}$, we have[22]

$$0 = \arg\max_{\alpha \in \mathbb{R}} U^i(\ell_i^K + \alpha a_i, \theta_i) + V^i(\boldsymbol{\ell}^K + \alpha A), \; \forall i. \tag{10}$$

At a Kantian equilibrium, no player would prefer to deviate from his strategy, given that all other agents would deviate in a similar way. This is how the idea of a universalized action is captured. We obtain the following result

Proposition 3. *Let $\boldsymbol{\ell}^K$ be an additive Kantian equilibrium. Then legal unification is not achieved.*

To understand the Proposition suppose by way of contradiction that legal uniformity is achieved in a Kantian equilibrium. Then there is no way for country i to increase the value of $V^i(\boldsymbol{\ell}^K)$ since this function has reached a maximum value. Thus, a marginal change in country i law ℓ_i will bring about no change in the marginal value of $V^i(\boldsymbol{\ell}^K)$. That is, at the

[21] While this notion is suited for non-symmetric model, Roemer restricts his definition to the case where agents have the same strategy space, namely a subset of non-negative real numbers. Moreover, Roemer mainly considers the case where each agent's objective is either monotonically increasing or monotonically decreasing with respect to the other agents' strategies. In our model, this would only be the case if all the countries decisions were either lower than $\min_i \theta_i$ or greater than $\max_i \theta_i$. Roemer also considers a notion of a multiplicative Kantian equilibrium. In such an equilibrium, an agent would receive a lower payoff upon scaling up (or down) his activity level by a positive factor, were other players to follow suit by scaling up (or down) their activity level by the same factor. This notion of equilibrium does not seem to be well defined in our setting if the countries choices ℓ_i have different signs. It is, however, well-defined, if all the countries choices are positive real numbers.

[22] See Roemer (2010), p. 6., or Roemer (2015), definition 4, with $A = \mathbb{1}$, where $\mathbb{1}$ is the vector whose components are all equal to 1.

margin one can neglect the consequences of the fact that others will act like us. But as long as the uniform law is different from country i ideal legal law θ_i, there is always an interest for this country to change its own legal system at the margin and to make it closer to this ideal law.[23] Hence, when there is legal unification Kantian rationality reduced to standard selfish rationality.[24]

5.3 Berge equilibrium

We now consider yet another socially oriented solution concept, namely the notion of *Berge equilibrium*.[25] A Berge equilibrium for our legal standardization game is a strategy profile $\boldsymbol{\ell}^b$ which satisfies the following inequations[26]

$$\mathcal{U}^i(\ell_i^b, \boldsymbol{\ell}_{-i}) \leq \mathcal{U}^i(\boldsymbol{\ell}^b), \quad \text{for all } \ \boldsymbol{\ell}_{-i}, \quad \text{for all } i \in N. \tag{11}$$

A Berge equilibrium is a strategy profile such that a unilateral change of strategy by any one player cannot increase another player's payoff. This makes a Berge equilibrium a *mutual support equilibrium*. The Berge equilibrium formalizes the motto "One for all, and all for one" (also inverted to "All for one, and one for all") traditionally associated with the King's Musketeers in Alexandre Dumas's novel *The Three Musketeers*.

The notion of Berge equilibrium is related to Team reasoning theory. Like the notion of other-regarding preferences, this theory has been developed to account for cooperative behavior in social dilemmas that standard game theory fails to predict. Here, we contend that countries can conceive themselves as members of a team, and make their choices so as to satisfy the team's objective. Team reasoning implies a transfer of agency from the countries to the collective level (on team reasoning and team preferences see, *e.g.*, Sugden, 2000).

The Berge equilibria of the legal standardization game enjoy a remarkable property, which, in our view, goes a long way towards solving the legal unification paradox. We indeed have the next result

[23] That is because $\frac{\partial U^i(\ell_i^K + \alpha a_i, \theta_i)}{\partial \ell_i}$ is non-nil whenever ℓ_i^K is different from θ_i and α is nil.

[24] We can show that the same conclusion applies to the case of a multiplicative Kantian equilibrium, should this equilibrium be well-defined.

[25] See, *e.g.* Colman, Körner, et al. (2011) and Courtois et al. (2015) for a presentation of the history of this notion.

[26] We follow the definition used in Courtois *et al.* (2015). A Berge equilibrium is sometimes called a Berge-Zhukovskii equilibrium.

Proposition 4. *Legal unification is realized in any Berge equilibrium of the legal standardization game.*

For any Berge equilibrium $\boldsymbol{\ell}^b$, therefore, there is a real number ℓ such that $\ell_i^b = \ell$ for all i. This property hinges on the assumption that all the functions V^i are single-peaked in ℓ_i. In a Berge equilibrium, all countries j choose $\ell_j = \ell_i$ so as to maximize the payoff of country i. Since this property is satisfied for each country i, it follows at once that legal unification must be realized.

We saw in the last subsection that the Kantian approach doesn't require an individual to be empathetic, in the sense that his preferences may not necessarily be other-regarding: individuals should only seek universally compelling behavioral rules. On the contrary, the Berge approach requires each individual to take into account the preferences of others. This does not mean, however, that individual should *a priori* take "similar actions". Nevertheless, legal unification is obtained in a Berge equilibrium but not in Kantian equilibrium.

The next Proposition also shows that *any* real number ℓ is a Berge equilibrium of the legal standardization game.

Proposition 5. *Let $\ell \in \mathbb{R}$ be given. Then ℓ is a Berge equilibrium for the legal standardization game.*

Indeed, as we have already noticed, if $\ell_i = \ell$, then to maximize $\mathcal{U}^i$ all countries j must choose $\ell_j = \ell$. As this is true for all i, we have just checked that ℓ is Berge equilibrium.

There are, admittedly, too many Berge equilibria for our legal standardization game. It is easy to see, however, that all Berge equilibria associated with a legal system ℓ lying outside the interval $[\min_i \theta_i, \max_i \theta_i]$ are not Pareto-optimal. To wit, all countries would benefit from a shift from ℓ to $\min_i \theta_i$, if ℓ is lower that $\min_i \theta_i$, or from ℓ to $\max_i \theta_i$, if ℓ is higher than $\max_i \theta_i$.[27]

When ℓ belongs to the interval $[\min_i \theta_i, \max_i \theta_i]$ the associated Berge equilibrium may not necessarily be Pareto-optimal either. The next Proposition characterizes the Pareto-optimal Berge equilibria of our legal standardization game when the countries payoff functions are all concave.[28]

[27] This remark illustrates the property that a Berge equilibrium is *not* always Pareto-optimal.
[28] This would be the case of the specification of the payoff function given in equation (3).

Proposition 6. *Assume that the utility functions $\mathcal{U}_i$ are concave. Then a Berge equilibrium ℓ^b for the legal standardization game is Pareto-optimal if and only if there is a country i such that $\ell = \theta_i$.*

The *if* part of this property is immediate. Indeed, if the Berge equilibrium ℓ^b is equal to θ_i, then any other legal arrangement will lower the payoff of country i. The intuition of the *only if* part is less immediate. Indeed, this only if part crucially relies on the assumption that the utility functions are all concave. Under this assumption, a strategy profile is Pareto-optimal if there is a set of weights for which this profile maximizes the objective function (5). Building on this remark one can show that there is one and only one country for which the weight is positive.

The multiplicity of Berge equilibria can be related to the uncertainty regarding the direction of legal convergence in practice. As stated by Gomez and Ganuza (2012), in setting new rules for the protection of one class of contracting parties, the legal literature does not provide insights as to whether the new standard should reproduce the minimum or the maximum existing levels of protection, or any other combination of these levels.

5.4 Golden Rule

As stated by Singer (1993), "the major ethical traditions all accept, in some form or other, a version of the Golden Rule that encourages equal consideration of interests. “Love your neighbor as yourself”, said Jesus. “What is hateful to you do not do to your neighbor”, said Rabbi Hillel. Confucius summed up his teaching in very similar terms: “What you do not want done to yourself, do not do to others”. The Mababharata, the great Indian epic, says: “Let no man do to another that which would be repugnant to himself.”

Our focus will be on Van Damme (2014)'s formal analysis of the golden rule “Do unto others as you like others to do unto you.” This rule is very similar to the mutual support property embodied in Berge equilibria. That is because, as what you would like others do unto you is to maximize your payoff, then in return, what you have to do to them is to maximize their payoffs.

We specifically consider what Van Damme (2014) calls a *weak golden rule.* A weak golden rule is a real number r such that for each country i

$$\mathcal{U}^i(r.\mathbb{1}) = \max_{\boldsymbol{\ell}_{-i}} \left\{ U^i(r, \theta_i) + V^i(r, \boldsymbol{\ell}_{-i}) \right\}, \tag{12}$$

where we recall that $\mathbb{1}$ is the vector of $\mathbb{R}^n$ whose components are all equal to 1.[29]

In plain English, this definition means that when country i chooses legal system r, then all the other countries maximize country i payoff by choosing r as well. Comparing the definitions of the Berge equilibrium and the weak golden rule, we see that any weak golden rule *is* a Berge equilibrium and conversely, any Berge equilibrium *is* a weak golden rule.[30] This equivalence strongly depends on the structure of our legal standardization game. There are other games for which a Berge equilibrium is not necessarily a golden rule (see Van Damme, 2014).[31]

We next summarize the above discussion of the golden rule in the following Proposition

Proposition 7. *Let ℓ be a real number. Then ℓ is a Berge equilibrium of the legal harmonization game if and only if it is a weak golden rule.*

In our setting the notion Golden rule does not give additional insights in comparison with the Berge equilibrium, except that it refers to different foundations (while the Berge equilibrium is one way to formalize cooperative behavior, the notion of weak-golden rule is closely linked to moral precepts).

6 Conclusion

While legal unification is observed in practice, accounting for it from a theoretical law-&-economic viewpoint is challenging. To solve the paradox, we have proposed to interpreting legal unification as the Berge equilibrium of a legal standardization game. Some objections can be made concerning the empirical relevance of this solution. In this connection, we should first notice an asymmetry regarding the burden of the proof. Indeed, when we rely on the standard idea that cooperation can be construed as the maximization of the sum of countries payoff functions we do not refer to especially compelling evidence. We infer from the fact that cooperation is *often* modeled by the maximization of the sum of players' payoff functions that this modeling device is also relevant to study international legal cooperation. To the best of our knowledge, the evidence to support this presumption is scant.

[29] See Van Damme (2014), equation (7) page 10.

[30] The first assertion relates to the result that any real number generates a Berge equilibrium.

[31] Van Damme (2014) also considers what he calls a *strong golden rule* (equation 4, page 9). A strong golden rule, however, is formally identical to a Kant-Laffont equilibrium (Laffont, 1975). It then follows from the preceding subsection that there is no strong golden rule equilibrium for our legal standardization game.

Against the use of Berge equilibrium, it can be said that this notion is too demanding in terms of altruistic behavior. This is true, albeit, nothing less seems to be involved when we rely on the social objective function displayed in equation (5). Yet, in experimental common interest games, for instance, we generally observe that players manage to coordinate their actions on mutually beneficial outcomes. But to account for this observation, standard theory provides little help. Alternative theories are needed.

Among those that have been proposed, we can single out team reasoning theories. In effect, from everyday experience of life it may seem obvious that people frequently put the interests of the groups to which they belong ahead of their personal interests. Team reasoning is likely to play a role through international socialization and/or acculturation, especially in the European Union. International socialization refers to the change in the perception of the world that policy makers experience by frequently interacting at an international level (e.g. Pollack, 2006). According to Goodman and Jinks (2008) and Goodman and Jinks (2013): "acculturation... [is] the general process by which actors adopt the beliefs and behavioral patterns of the surrounding culture. This complex social process is driven,..., by identification with a reference group which generates varying degrees of cognitive and social pressures to conform with the behavioral expectations of the wider culture." Both international socialization and acculturation shape identities, preferences and actions of individuals and member states and favor "we"-thinking. The heavy reliance of international lawmaking bodies on technical experts is also likely to enhance "we"-thinking." Referring to the design of international trade rules, Stephan (1999) notices that "these experts have a relatively free hand to discover the common ground that can transcend differences in culture, history, levels of economic development, and social structure."

A last argument in favor of our approach is the relatively small number of legal unification agreements (see section 2). The rarity of these agreements may relate to the sparsity of the cases where there is strong mutual support among countries. In this perspective, viewing legal unification as a Berge equilibrium of a legal standardization game makes sense.

There are two arguments in favor of this non standard solution concept. First of all, if we agree that legal unification should be viewed as the outcome of a collective process, we know of no alternative socially-oriented solution concept which can solve the legal unification paradox. In particular, we have shown that we cannot rely on the introduction of explicit other-regarding preferences, or Kantian rules of behavior. We have also seen that the notion of weak golden rule of behavior coincides with the Berge equilibrium. Our second argument is that while there is no direct empirical support of the notion of Berge equilibrium, there is evidence of pervasive "we"-thinking. Thus there are hints that the Berge equilibrium, which is a possible formalization of "we"-thinking, can be useful for understanding the outcome of *collective* decisions processes, like those at work in negotiations on international legal arrangements.

Yet, our approach to solve the unification paradox yields another paradox: legal harmonization (interpreted as a coordinated choice of legal diversity) is also *never* a Berge equilibrium of our legal standardization game.

To tackle this new paradox it might be fruitful to recall that agents, but also countries, often follow situation-specific behavior rules. In this connection, we may assume, as proposed by Gauthier (1986) and Courtois et al. (2015), that agents choose a *disposition* in order to play a game. The investigation of the disposition approach to analyze legal standardization games is a natural topic for future research.

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A Proof of the Propositions

Proof of Proposition 1

Proof. Let $\boldsymbol{\ell}^*$ be a solution of problem 5. Then the following necessary condition is satisfied:

$$\beta_i\big(\frac{\partial U^i}{\partial \ell_i}(\ell_i^*, \theta_i) + \frac{\partial V^i}{\partial \ell_i}(\boldsymbol{\ell}^*)\big) + \sum_{j \neq i}^{N} \beta_j \frac{\partial V^j}{\partial \ell_i}(\boldsymbol{\ell}^*) = 0, \text{ for all } i. \tag{13}$$

Assume by way of contradiction that $\ell_j^* = \ell^*$ for all j. By the single-peak property of the functions V^j we have

$$\sum_{j \neq i}^{N} \beta_j \frac{\partial V^j}{\partial \ell_i}(\boldsymbol{\ell}^*) = 0, \text{ for all } i. \tag{14}$$

Therefore we obtain that:

$$\beta_i\big(\frac{\partial U^i}{\partial \ell_i}(\ell^*, \theta_i) + \frac{\partial V^i}{\partial \ell_i}(\boldsymbol{\ell}^*)\big) = 0, \text{ for all } i. \tag{15}$$

From equation (2), we have $\frac{\partial V^i}{\partial \ell_i}(\boldsymbol{\ell}^*) = 0$. Equation (15) thus reduces to $\beta_i \frac{\partial U^i}{\partial \ell_i}(\ell^*, \theta_i) = 0$. However, since all the β_i are non-nil and all the θ_i are different, the conditions $\frac{\partial U^i}{\partial \ell_i}(\ell^*, \theta_i) = 0$ imply that $\ell^* = \theta_i$ for all i. This is a contradiction. □

Proof of Proposition 2

Proof. Assume by way of contradiction that there is a Nash equilibrium with legal uniformity when the countries' payoff functions are given by equation (8). In such a Nash equilibrium the following condition holds for each country i:

$$\sum_{j=1}^{N} \frac{\partial \mathcal{T}^i}{\partial \mathcal{U}^j} \frac{\partial \mathcal{U}^j}{\partial \ell_i} = 0. \tag{16}$$

In the above expression $\frac{\partial \mathcal{U}^j(\boldsymbol{\ell}^*)}{\partial \ell_i} = \frac{\partial V^j(\boldsymbol{\ell}^*)}{\partial \ell_i}$ (for $j \neq i$) and $\frac{\partial \mathcal{U}^i(\boldsymbol{\ell}^*)}{\partial \ell_i} = \frac{\partial U^i(\ell_i^*, \theta_i)}{\partial \ell_i} + \frac{\partial V^i(\boldsymbol{\ell}^*)}{\partial \ell_i}$. When legal uniformity is realized $\ell_i^* = \ell_j^* = \ell$ and then as in the proof of Proposition 1

$$\frac{\partial V^j(\boldsymbol{\ell}^*)}{\partial \ell_i} = \frac{\partial V^i(\boldsymbol{\ell}^*)}{\partial \ell_i} = 0. \tag{17}$$

Therefore equation (16) reduces to

$$\frac{\partial \mathcal{T}^i}{\partial U^i} \frac{\partial U^i(\ell, \theta_i)}{\partial \ell_i} = 0, \tag{18}$$

Since by assumption $\frac{\partial \mathcal{T}^i}{\partial U^i}$ is positive, the above equation implies that $\frac{\partial U^i(\ell, \theta_i)}{\partial \ell_i} = 0$ for all i. But these conditions imply in turn that $\ell = \theta_i$ for all i. Since all the countries ideal laws θ_i are different this is a contradiction. □

Proof of Proposition 3

Proof. Assume by way of contradiction that there exists an additive Kantian equilibrium where legal unification is realized. Then there is a real number ℓ such that for all i, the following condition is satisfied for all i when $\alpha = 0$:

$$a_i \frac{\partial U^i}{\partial \ell_i}(\ell, \theta_i) + a_i \frac{\partial V^i}{\partial \ell_i}(\ell.\mathbb{1}) + \sum_{i \neq j} a_j \frac{\partial V^i}{\partial \ell_j}(\ell.\mathbb{1}) = 0. \tag{19}$$

By the single-peak property of the functions V^i and equation (2) we necessarily have:

$$a_i \frac{\partial V^i}{\partial \ell_i}(\ell.\mathbb{1}) + \sum_{i \neq j} a_j \frac{\partial V^i}{\partial \ell_j}(\ell.\mathbb{1}) = 0. \tag{20}$$

Since $a_i \neq 0$, then $\frac{\partial U^i}{\partial \ell_i}(\ell, \theta_i) = 0$. But this implies that $\ell = \theta_i$. Since the countries legal preferences are all different we obtain a contradiction. □

Proof of Proposition 4

Proof. Let $\boldsymbol{\ell}^b$ be a Berge equilibrium. Let ℓ_i^b be the decision assigned to country i. By using the single peak property of function V^i, we find that in this Berge equilibrium $\ell_j^b = \ell_i^b$ for all $j \neq i$. This property holds for all i. Thus all the countries make the same decision. Therefore legal unifications prevails in any Berge equilibrium. $\square$

Proof of Proposition 5

Proof. Let ℓ be a real number. Assume that $\ell_i = \ell$. From the single-peak property of function V^i , $\mathcal{U}^i$ is maximized with respect to $\boldsymbol{\ell}_{-i}$ when $\ell_k = \ell$ for all $k \neq i$. Since this is true for all i $\boldsymbol{\ell} = (\ell, \ldots, \ell)$ is a Berge equilibrium. $\square$

Proof of Proposition 6

Proof. Let us prove the only if part. Let ℓ^b be a Berge equilibrium. Assume that $\boldsymbol{\ell}^b = (\ell^b, \ldots, \ell^b)$ is Pareto-optimal. As all the payoff functions are concave, by Proposition 8.10 of Kreps (2012) there exist N non-negative real numbers, not all nil, such that $\boldsymbol{\ell}^b$ maximizes $\sum_{i=1}^N \lambda_i \mathcal{U}_i$ in $\mathbb{R}^N$. Therefore $\boldsymbol{\ell}^b = (\ell^b, \ldots, \ell^b)$ must also satisfy the N following necessary condition

$$\lambda_i \left(\frac{\partial U^i}{\partial \ell_i}(\ell^b, \theta_i) + \frac{\partial V^i}{\partial \ell_i}(\ell^b, \boldsymbol{\ell}^b_{-i}) \right) + \sum_{j \neq i}^{N} \lambda_j \frac{\partial V^j}{\partial \ell_i}(\ell^b, \boldsymbol{\ell}^b_{-j}) = 0, \ . \tag{21}$$

for all i. By the single-peak property of the V^j functions and equation (2) we know that in a Berge equilibrium, $\frac{\partial V^j}{\partial \ell_i}(\ell^b, \boldsymbol{\ell}^b_{-j}) = 0$ for all j and all i. Then the above equation boils down to

$$\lambda_i \frac{\partial U^i}{\partial \ell_i}(\ell^b, \theta_i) = 0 \text{ for all } i. \tag{22}$$

We know that there exists a country i for which λ_i is non-nil. For such a country we have

$$\frac{\partial U^i}{\partial \ell_i}(\ell^b, \theta_i) = 0. \tag{23}$$

This implies that $\ell^b = \theta_i$. Since equation (22) holds for all j, this also implies that there exists at most one country for which $\lambda_i \neq 0$. This yields the only if part of the Proposition. The if part is immediate since when $\ell^b = \theta_i$, country i is always worse off when a different value of $\boldsymbol{\ell}$ is chosen. $\square$