Regionalization and Globalization in Regulatory Capitalism: the Regional Dimension in the Diffusion of Regulatory Agencies

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Abstract

The decision to create independent regulatory agencies as a tool to cope with the development of capitalism has been widely followed by decisionmakers from all over the globe. The paper aims to answer whether the diffusion of this kind of institutions is a process explained mainly by a regional dynamics or by a global dynamics. By regional dynamics it us understood that countries have followed the patterns of regional leaders and by global dynamics, that countries have followed other countries outside their region.

The covariates include complexity of the economy (economic dimension), size of the country, size of the government (governmental dimension) and democratic institutions (institutional dimension). More specifically, the paper compares models assuming that those covariates have an effect on a global level and models assuming that the covariates have an effect at regional level. The performance and implications of the models are then compared to understand under what circumstances diffusion follows a regional or a global logic.

The data used to test the hypothesis comes from a database that includes OECD, ASEAN and Latin American countries (59), and 16 sectors of regulatory governance from financial, social, utilities and competition areas.

Bayesian data analysis is used to estimate the parameters of interest. It allows the researcher to design more flexible models (hierarchical models), present the results in a more natural way, improve the clarity of the interpretation and avoid artificial assumptions in comparative politics.

1 Introduction

During late 1980s and most of the 1990s a wave of regulatory policies expanded over the world, in a context of large economic restructuring, state reforms, and related privatization processes, that coincided with and contributed to the expansion of the regulatory capitalism worldwide. As a consequence, now we find in most countries in the world an extended range of new regulatory institutions operating in many different policy areas, aiming to govern markets or prevent social risks of very different nature and dimension, and in many cases showing a significant degree of political and technical sophistication (Levi-Faur & Jordana 2005, Gilardi 2008, Jordana, Levi-Faur & Fernández-i-Marín 2009).

Before the 1990s, the expansion of regulatory agencies in the world was mainly limited to the financial area, existing only few cases in the social and competition domains, which emerged basically since the 1950s. Almost no agencies existed for the utilities area, as this area was operating in most countries under public monopolies for most cases until the 1980s. Such situation was radically distinct than the United States, where the regulatory state had been developed in many fronts already before the Second World War, creating a particular mode of governance with a singular character. In fact, Latin American and European contexts until 1980s were quite similar: utilities remained under public control, and no social regulation existed or it was very weakly developed. Only in the financial area probably Latin America had a larger institutional development than in Europe, although the quality of its regulatory institutions deteriorated strongly in the 1960s and 1970s.
Later on, since the 1980s, and particularly during the 1990s, the number of regulatory agencies in the world exploded, and many were created in all areas of regulation. A similar pattern of rapid agency creation occurred in Europe, Latin America and other parts of the world, including developing countries in Asia and Africa. In Southern Asia, regulatory agencies also expanded in the financial area strongly during the nineties. In fact, the option to create an institution such as a regulatory agency was considered at that time as “the appropriate model of governance in capitalist economies” (Jordana et al. 2009, 4). However, intensity of agency creation was not the same in each part of the world: for example, in Europe agencies in social regulation area grew faster and extended widely than in Latin America. This growth was particularly important in the utilities area, where privatizations in many sector boosted new market regulation for different utilities sector (electricity, water, gas, telecommunications, etc.), stimulating an intense diffusion process that went beyond privatization diffusion itself. Also in the social regulation area many agencies were created, but not so intensively as in the utilities. With some regional differences, environment was a sector with a pattern of strong creation, as well as pensions and other sectors such as pharmaceutical and food safety (Gilardi, Jordana & Levi-Faur 2007).

This paper develops some ideas already presented in Jordana et al. (2009), which discusses the role of different channels of institutional transfer in the creation of regulatory agencies since the 1960s. The paper, titled “The Global Diffusion of Regulatory Agencies: Channels of Transfer and Stages of Diffusion”, shows how the creation of regulatory agencies has been driven by four channels of institutional transfer. Diffusion occurs through the sector channel (ST), in the sense that the decision to establish a regulatory agency is influenced by the number of agencies created in the same sector in other countries up to that year; through the national channel (NT), where the decision is influenced by the number of agencies yet existent in the country; through the supranational channel (SNT), where the decision is influenced by the number of agencies created in other similar sectors; and through the Intergovernmental channel (IGT), where the decision is influenced by the number of agencies in (similar) other countries.

Here we present a parallel research to complete the picture of factors that explain how institutions are diffused through different countries in the world. While the previous paper emphasized the equilibrium between two comparative approaches, namely, the policy sector approach (PSA) and the national patterns approach (NPA), in this case, we focus on the NPA. So only the differences between countries are addressed here. Secondly, the previous paper was centered on the idea that channels -and different factors within each channel- may explain diffusion, whereas here we aim to explain differences in the likelihood of countries to create regulatory agencies. Hence, this paper focuses directly on country diffusion, examining the role of variables such language or cultural affinities to adopt new institutions, but also focuses whether domestic factors that made countries sensible to the establishment of a regulatory agency have some territorial affinities.

Finally, other aim of the paper is to show that that Bayesian data analysis allows the researcher to design more flexible models (specially using hierarchical models), to present the results in a more natural way and to improve the clarity of the interpretation. While some of those ideas may seem only relevant to the technical details, the paper shows
that the greater flexibility of the models empowers the results and emerges some features of the process that may not be observed by using classical approaches. The paper is structured as follows: the following section presents the theoretical framework, section 3 the research hypothesis, section 4 introduces the research design, section 5 presents and discusses the results, and section 6 is devoted to the conclusions.

2 Theoretical Approaches on Regionalism and Globalization

Definitions of globalization are varied, but we can observe two different trends in approaching this phenomenon. One the one side, there is the functional economic reasoning, based on the view that world economic exchanges have been increasing in recent decades, creating new trade and information interdependences, or strengthening existing ones. What has produced such increase in economic exchange is supposed to be related to technological changes in transports and communications, as well as changes of economic and political structures world-wide.

“I define globalization as the cluster of technological, economic, and political processes that drastically reduce the barriers to economic exchange across borders” (Drezner 2007, 10).

On the other side, we have the actor-based reasoning, based on the intentional perspective to explain political and economic change. To observe globalization, this approach concentrates its analysis on the role of networks of actors promoting interactions and exchange beyond country boundaries, and expanding co-ordination in their activities. Actors considered here are mainly bureaucrats and professionals, but also businessmen and intellectuals that are active in increasing their personal and organizational links over the different dimensions in which they are present.

The world polity approach (or “world society”) represents a manifest view from this second perspective. This approach, with a strong ideational orientation, suggests that abstract concepts about policy paradigms, state organization, technical procedures, etc. expands around the world by means of diffusion and institutional isomorphism, confirming progressively a similar logic of the modern state in any place of the world. Here globalization refers to this convergence on similar ideal notions of the polity and policy, which become authoritative norms to be followed (Finnemore 1996, Meyer, Boli, Thomas & Ramírez 1997, Meyer 2000). These processes are not always rational neither automatic, as Krücken & Meier (2006, 254) suggest:

“In practice, adoption of a global model is more complex than a simple choice between the new, global model and the former national one. Complete universalization typically fails, as elements of global and national models merge and give way to creative deviation from a given path. In this, we see major, yet rather unexplored source of institutional innovation […]. The spread of global models of modern actor hood will certainly generate a great deal of loose coupling, ritual adaptation, and symbolic politics at the level of the individual institution,”
This approach considers that the fluxes of institutional harmonization expand over the world, in a process of diffusion conceived in a way that moves from direct links among countries to be structured by international organizations in a more advanced stage (Schofer 2003, 752). In this sense, a variety of this approach discards the more structural aspects of the diffusion process, and claims more intensely about the role of global or transnational civil society, while in correspondence it is also possible to observe a move in the focus of their interest from polity issues to policy ones. The role of epistemic communities, non-governmental organizations, professional networks, etc. is seen increasingly as conducting global spaces of collaboration and exchange on policy frameworks and directions of policy change beyond the states and their formal relations in governmental international organizations (Braithwaite & Drahos 2000, Keck & Sikkik 1998). Global views on public policies are framed in constant dialogues over these spaces, and then translated to nation-states over specialized networks of public officials and professionals directly or by means of international organizations. Empirical analysis from this perspective focus on the dimensions of these global civil society networks and their connections to state structures, but it is unclear their capability to assert how effective these network influence on global and national public policies.

As to the globalization of regulatory governance, many approaches assert that powerful forces either intentional or structural- at the transnational level stimulated the diffusion of new institutions for the regulatory state beyond country boundaries, provoking its booming during the 1990s as a response to new challenges in the governance of capitalist economies (with significant differences however for each sector). In fact, as we have argued elsewhere, diffusion of regulatory institutions boomed in the 1990s as a consequence of simultaneous processes of interaction between countries (which observed what other countries did) and between sectors (which were exposed to influences from other sectors) (Jordana et al. 2009).

Regulatory agencies represent institutional solutions to the problems related to the management of the regulatory capitalism. They articulate interactions between global and local actors, as well as between public and private ones. Having strong institutional identity, they are easily identifiable by global actors in the respective regulatory sector, configuring contact points for global networks of specialized regulators in national domains, contributing to transmit values, information and policy innovations. Also, they are considered by local actors as contact points to access to global networks beyond the national dimension. Thus, interests, preferences and perceptions circulate fluently in both directions thanks to the role of the regulatory agency -in particular when they operate efficiently both politically and organizationally-, configuring a more integrated and active global regulatory regime.

Regionalism has been usually related to foreign and international trade strategies, and more generally, to international economic relations (being the analysis of regional integration another stage in the regionalization process). Other studies focus on political interactions among countries, analyzing the creation of regional institutions, particularly the conditions that lead to successful processes of economic integration (Mansfield & Milner 1999). In this paper, we take regionalism as a collection of political and economic developments related to a common area (territorial, cultural, . . .) in which take part the
countries that are involved in such area. Here we are interested in considering how structural factors underlying such processes have a differential impact on the diffusion of regulatory agencies, distinguishable from the general developments related to the globalization process.

The regionalization argument is not an argument against globalization, but it represents a different view about how globalization works, diminishing the role of global interactions, or also global structures, and focusing on special effects of cohesive spatial structures of countries developing specific patterns toward a stronger interaction. How regionalization and globalization dynamics interact, and how regionalization contributes to globalization (or also how regionalization filters globalization effects), is something that still requires further scrutiny, and only some initial work has been done until now. In any case, regionalization emerges as a more institutionalism-based approach, centred on the perception that the world is moving towards a system of regional clusters, and then integration processes of different nature contribute strongly to this new realm. Not necessarily political integration processes as seen with the European Union should be adopted abroad, as far as many other mechanisms of regionalization may appear. Here phenomena such as new regionalisms emerge as integration processes based on bilateral and multi-lateral agreements, without well-defined formal structures.

From a regional point-of-view, we should interpret the diffusion of the regulatory state as process mainly guided by regional patterns, either by the collective action of neighbours’ states or under a clear regional leadership, that fosters to adopt some common institutions. However, regionalism should not be limited to the role of state actors; in fact, regionalism can be also driven intensively by non-state actors, which converge in a regional space for territorial, cultural, language or other particular reasons, promoting the adoption of similar institutions or other roles to construct a more coherent policy space. These actors, when referring to regulatory governance, are represented very often by regional specialized networks of professionals and bureaucrats, which tend create regional homogenization initiatives in their regulatory spaces, on the basis of sharing intensively policy information and managerial practices.

3 Research Question and Hypothesis

To ground our research question, in this paper we inquiry about the establishment of regulatory agencies since 1950 considering different theoretical perspectives. On the one side, we contemplate the introduction and diffusion of these agencies, a new institutional model, as a part of the globalization processes, where some particular institutional models and policies are extended over the world in a relatively homogeneous way (as sustained by the world policy approach, for example). On the other side, we have the regionalization argument, which refers to the role of region’s internal processes to make sense of the diffusion within the region of regulatory agencies. Regionalism may explain significant differences among regions, and also refer to different patterns of diffusion within each region, based on particular problems they may address, particular institutional paths of development, and many other aspects that a globalization view may not
control. We might expect to find internal regional similarities and significant differences among regions -as to their regulatory institutions- if the regionalization argument is confirmed.

Thus, we discuss in this paper whether globalization or regionalization arguments are more convincing in explaining the emergence of the regulatory state in Asia, Latin America and Europe. In fact, both arguments can be also compatible to certain extent, but then we should examine if both are relevant, and also, how they combine to provide a plausible explanation about such diffusion process in the regions under study. The regionalization argument can offer a strong complement to the globalization thesis in our case, in particular making sense of variations within sectors that world policy interpretation could not be able to appreciate, but also can help to better understand the engines of diffusion behind some general patterns. In fact, more than opposing regionalization versus globalization as explanatory causes of the diffusion of regulatory agencies, we would like to discuss a view of globalization in which regionalization constitutes a relevant causal part of globalization and its intensification, in a way that still needs to be better elucidated.

The paper aims first to find which diffusion and country domestic variables favor the creation of regulatory agencies. And second, to test if these variables have a regional pattern or follow more global direction. In order to do that, regionalization and globalization assumptions are compared then to test whether they give substantively different results on the effects of diffusion variables (the role of distances, and sharing languages to facilitate diffusion); and also on the effect of domestic variables: the wealth, size and democracy of the country (and also size of the government) on the creation of regulatory agencies.

Geographical distances among countries are considered a possible factor facilitating diffusion. Thus we may expect that when new agency creations emerge elsewhere, its impact will be stronger on countries being geographically closer, which will be more receptive to create regulatory agencies.

**Hypothesis 1** Countries are more likely to have more regulatory agencies when geographically close neighbours have created more regulatory agencies.

Cultural similarities, which we identify here considering those countries sharing a common language, can be another factor facilitating the diffusion of institutional innovations.

**Hypothesis 2** Countries are more likely to have more regulatory agencies when countries with the same language have created more regulatory agencies.

The economic dimension draws on the productive characteristics of the countries. The complexity of the economies may have an effect on the necessity to establish independent governing bodies that act as regulators. Hence, the hypothesis states that:

**Hypothesis 3** Wealthier countries are more likely to create regulatory agencies.
The demographic dimension takes into account the population of the country in the sense that biggest countries may find the need to create more specialized institutions. Hence, the hypothesis states that:

**Hypothesis 4** Biggest countries are more likely to create regulatory agencies.

The policy dimension pretend to identify whether the existence of a large government share in the GDP may have an impact on the propensity of a country in creating regulatory agencies

**Hypothesis 5** Biggest governments are more likely to create regulatory agencies.

The institutional dimension aims to capture the effects of having democratic institutions. It is expected that non-democracies are less likely to divide the power, and try to retain the control of the decisions, being less inclined to create independent bodies. Hence, hypothesis states that:

**Hypothesis 6** Democratic countries are more likely to create regulatory agencies.

The last two hypotheses aims to test whether there are regional differences in the way that diffusion processes and domestic risk factors operate. The hypotheses, then, states that:

**Hypothesis 7** The effects of geographical distances among countries and shared languages in fostering diffusion are not equal in every region. There are different regional patterns in regulatory agency adoption.

**Hypothesis 8** The effects of the economic, demographic, government size and institutional dimensions are not equal in every region. There are different regional patterns in regulatory agency adoption.

### 4 Model Design, Data and Methods

#### 4.1 Outcome: regulatory agencies diffusion within countries

Countries diverge in the amount of regulatory agencies they have and in the process of creation of them. Hence, not only countries show different percentages of regulatory agencies nowadays, but the process of creation has been earlier, later, more sudden or sustained on time. Figure 1 shows the diffusion curves 59 countries, comprising Latin America, Europe, South East Asia plus China, Japan and South Korea, and the rest of the OECD. The curves of diffusion are the outcome to explain: the percentage of regulatory agencies \( y \) in every country \( c \) for each time point \( t \), or \( y_{tc} \).

The model aims to explain the percentage of regulatory agencies of every country at every time point based on different dimensions simultaneously:
Figure 1: Diffusion of regulatory agencies by country.

a) The global trend of creation of agencies  How many regulatory agencies do countries have in global at every moment of time.

b) What Other countries have done  How many regulatory agencies are in close countries and what is their effect on oneself creation. By close countries it can be understood either pure geographical distances, and/or cultural ties. Those variables aim to capture the pure patterns of diffusion between countries.

c) What you are  Specific structural characteristics may make countries more or less likely to have create regulatory agencies.

Parts a) and c) are specified in basic models and using traditional and established approaches. Part b) includes spatial econometrics in the sense that the weighting matrices are links between countries (nodes in the network) and the data towards which they are weighted are the already created regulatory agencies in the destination country.
4.2 Explanatory Diffusion Variables

The model includes two variables that account for the fact that countries take into account what other close countries are done. This is a typical approach from spatial econometrics (Franzese & Hays 2007, Franzese & Hays 2008). A spatial lagged dependent variable is used to capture this effect. As in many other spatial models, “closeness” is a concept that can be operationalized not only by pure spatial distances, but also by sharing borders, by historical and religious background, etc. In this paper “closeness” has been operationalized by geographical distances between the capitals of the countries and by sharing a common language.

The model that captures the spatial interdependence dynamics between countries can be expressed as \( y_{tc} = \rho W y + \epsilon \). The outcome variable \( y_{tc} \) is a \( CT \times 1 \) vector of cross sections by time (\( C \) units are observed for a period of \( T \) years). \( \rho \) is the spatial autoregressive parameter to estimate. \( \rho \) accounts for the effect of other countries in the amount of regulatory agencies of the observed country. \( W \) is an \( CT \times CT \) block–diagonal spatial-weighting matrix, that multiplied by \( y \) turns to the spatial lag variable. It can be read as the weighted sum of the other countries outcomes, with weights \( w_{ij} \) reflecting the relationship between the country of origin and the other countries. The weights for each country are normalized to 1 so that \( \sum_j w_{ij} = 1 \).

There are two specifications of \( W \) used in the paper. One is based on the geographical distances between the capitals of the countries, and the other is based on the binary relationship of having or not a common language. The two specifications try to capture the effect of the diffusion of institutions based on the hypothesis that institutional designs are diffused from country to country more probably when a) countries are closer, in pure geographical terms and/or b) countries have a common language, which reflects a common historical background and facilitates the exchange of ideas. Hence, \( \rho \) is a vector of 2 parameters, being the first one the geographical distances and the second one the sharing of language.

To sum up, the network variables aimed at capturing the dynamics of spatial interdependence are the following:

**Distances**, expressed by the matrix of the percent of regulatory agencies in other countries weighted by the geographical distances between the capitals of the countries.

**Shared Language** expressed by the matrix of the percent of regulatory agencies in other countries weighted by the fact that the countries share the same language.

4.3 Explanatory Country Controls

The model includes four variables to account for country characteristics that may alter the likelihood of a country to have more or less regulatory agencies. The basic model that captures the country predisposition to have more or less agencies can be expressed as: \( y_{tc} = X\beta + \epsilon \). In this case the outcome variable is explained by a vector of 4 \( \beta \) parameters that capture the effect of the wealth of the country, the country size in inhabitants, the size of the government and the level of democracy on the propensity to have more or less regulatory agencies.
The values for the variables are country and time specific. The first three indicators come from the PENN World Table 6.3 (Heston, Summers & Aten 2009) and are the real GDP per capita relative to the United States, population and government share of real GDP per capita. The variable for democracy is the Polity2 indicator from the Polity IV database (Polity IV Project, Political Regime Characteristics and Transitions, 1800-2008 2008). The PENN World Table is only available from 1950, and so the models start there. Starting in 1950 is also convenient to avoid the Second World War nuisances, and is not a problem from the point of view of the outcome, since few countries have relevant percentage of regulatory agencies prior to that year. In order to normalize the GDP per capita and population to meet the requirements of linear regression, the variables have been rescaled using the natural logarithm. The country variables have been centered in their means in order to make the results more easily interpretable, specially the intercepts corresponding to the time dimension.

To sum up, the country variables are the following:

**Wealth** expressed by the real GDP per capita relative to the United States (US=1) from the PENN World Table, centered at its mean.

**Size of the country** expressed by the natural logarithm of the population from the PENN World Table, centered at its mean.

**Size of the government** expressed by the government share of the real GDP per capita from the PENN World Table in a 0 to 1 scale, centered at its mean.

**Democratic features** expressed by the Polity2 revised combined polity score of the 2007 Polity IV database in a -1 to 1 scale, centered at its mean.

There are few cases of missing values. The GDP per capita is not available for some countries during the first years of the 50s. In this case the imputed values have been the predicted values from a linear regression of the time trend of the GDP per capita (logged) for each specific country. In the case of missing values on the government share of the GDP per capita it has been assigned the mean of the country. For the Polity2 indicator, missing values have been assigned to 0 in a -10 to 10 scale ranging from full autocracies to full democracies. For Luxembourg and Iceland it has been assigned their value on older PolityIV editions, which in both cases corresponds to full democracies (10). Table 1 shows the descriptive statistics of the network and country variables.

In addition to the effect of the diffusion variables and the country controls, the temporal dynamics is modelled in order to capture the general trend of adoption of regulatory agencies in the countries of the database, and can be expressed as $y_{tc} = \delta_t + \epsilon$. The error element in the equations is clustered by countries ($\epsilon_c$) to account for the fact that the data is not independent, but has a structure based on countries.

The basic model combines the three elements (spatial dynamic, country characteristics and temporal dynamic) with the errors clustered by countries to form the following equation:

$$y_{tc} = \delta_t + \rho Wy + \beta X + \epsilon_c$$

(1)
Table 1: Descriptive statistics of the variables of interest. Notice that the country variables have been rescaled to be centered around the mean.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Min</th>
<th>Mean</th>
<th>Median</th>
<th>Max</th>
<th>sd</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distances</td>
<td>0.042</td>
<td>0.26</td>
<td>0.182</td>
<td>0.83</td>
<td>0.192</td>
<td>3379</td>
</tr>
<tr>
<td>Shared Language</td>
<td>0.000</td>
<td>0.19</td>
<td>0.146</td>
<td>1.00</td>
<td>0.210</td>
<td>3379</td>
</tr>
<tr>
<td>GDP per capita (US=1)</td>
<td>-0.411</td>
<td>-0.00</td>
<td>-0.109</td>
<td>2.59</td>
<td>0.339</td>
<td>3379</td>
</tr>
<tr>
<td>Population (log)</td>
<td>-5.529</td>
<td>0.00</td>
<td>-0.138</td>
<td>4.76</td>
<td>1.620</td>
<td>3379</td>
</tr>
<tr>
<td>Government Share of GDP</td>
<td>-0.136</td>
<td>-0.00</td>
<td>-0.011</td>
<td>0.37</td>
<td>0.058</td>
<td>3379</td>
</tr>
<tr>
<td>Polity</td>
<td>-1.332</td>
<td>0.00</td>
<td>0.368</td>
<td>0.57</td>
<td>0.700</td>
<td>3379</td>
</tr>
</tbody>
</table>

The basic model states that the level of regulatory agencies in a given country in a specific year can be defined lineally by the general trend of regulatory agencies in the specific year, two $\rho$ parameters that account for the effect of the relationship of the country with the levels of regulatory agencies in close others, four $\beta$ parameters to account for the country covariates and some error specific to that country.

The following step is the addition of the regional dynamics into the model. This way, the spatial and the country variables are allowed to vary by region. The use of hierarchical modelling and Bayesian inference allows to easily integrate the regional dynamics by letting the $\rho$ and $\beta$ parameters to vary by region around some variable-specific means $\mu$ and precisions $\tau$ ($\rho_r \sim N(\mu_\rho, \tau_\rho)$ and $\beta_r \sim N(\mu_\beta, \tau_\beta)$). The model, then, is expressed by:

$$y_{tc} = \delta_t + \rho_r W y + \beta_r X + \epsilon_c$$  \hspace{1cm} (2)

Finally, the last step is to allow the variables to vary by time in addition to vary by region. This is accomplished by making linking the effects of the variables in one specific time point to the value of the same variable in the previous time point. Formally, this makes $\rho_r$ and $\beta_r$ to be linked not to a general trend of the variable, but to a general trend in the time process ($\rho_{rt} \sim N(\mu_{\rho_t}, \tau_{\rho_t})$).

$$y_{tc} = \delta_t + \rho_{t-r} W y + \beta_{t-r} X + \epsilon_c$$  \hspace{1cm} (3)

4.4 Inference and Estimation

Bayesian methods for data analysis show clear advantages over more traditional frequentist methods. Among the most important characteristics are the “ability to model a wide class of data types and complex models”, a systematic way to make overt assumptions, the clear and intuitive way (probability statements) in which results are presented, the possibility of updating those statements as new information is obtained, the systematic way in which previous knowledge about the subject is incorporated in the analysis and a clear way of assessing model quality and sensitivity to assumptions (Gill 2002, ch. 1). Those advantages arise specially in the context of comparative research (Western 1998, Western & Jackman 1994). One of the basic assumptions of the
frequentist approach is that data is created by a repeatable mechanism (stochastic). Then hypothesis are tested and results based on the Null Hypothesis Significance Test assume that the sample in one of the possible samples, which is not the case. This leads to various misconceptions: the p-value is seen as a quantity that tells the probability that the null hypothesis is false and the infinite number of alternatives to the null hypothesis are not considered, amongst others (Wagner & Gill 2005, 7–9)(Gelman, Carlin, Stern & Rubin 2003, 250). In addition to that, the way in which uncertainty is presented under Bayesian statistics is more intuitive and less arbitrary. Statements about the quantities of interest are made in probabilistic terms and avoid the misconceptions about p-values: choosing an arbitrary threshold, and then saying that there is more than, for example, 95 percent of probability that the null hypothesis is false. As Gelman & Stern (2006) explain, “the difference between ‘significant’ and ‘not significant’ is not itself statistically significant”.

In every model, the chains of the posterior are obtained with JAGS (Plummer 2007), which uses the Gibbs sampler. Different initial values have been used to assess convergence. All chains have run long enough to be stable and according to the Geweke test (Geweke 1992) there is no evidence that the chains have not converged. The chains have been analyzed under R (R Development Core Team 2009) with the coda (Plummer, Best, Cowles & Vines 2009) and boa (Smith 2007) libraries. Models have been run under different initial values and different specifications of priors to check their sensitivity to different conditions; they show great stability. Weakly informative priors have been used in the models presented, which implies that the parameters would be identical or very close to those obtained by maximum likelihood. In fact, Bayesian can be seen as a “justification for classical maximum likelihood inference […] in the limit of large sample size [using] asymptotic theory” (Gelman et al. 2003, 247). Results and substantial interpretations of some of the parameters are presented using graphical figures, in accordance with statisticians’ advice of “turning tables into graphs” (Gelman, Pasarica & Dodhia 2002).

5 Findings

Recall from the methods section that there are three models in which results are based. The first model assumes that the diffusion variables and the characteristics of the countries have homogeneous effects through region and time on the level of regulatory agencies created (Equation 1). The second model relaxes the assumption that the effects are the same for all regions (Equation 2), and the third model adds the estimation of a temporal dimension in addition to the regional (Equation 3). Table 2 presents the results for the first model. The table shows the mean of the posterior and the 90 percent of the credible interval of each parameter. They can be understood similarly to the value of the parameter and the 90 percent confidence interval in classical frequentist statistics.

The effects of the spatial interdependence dynamics are positive and different from zero, meaning that there is diffusion between countries in a global scale, and this diffusion happens more intensely through countries that are geographically closer and countries
that share the same language. While the size of the government is neither different from zero, there are positive effects of wealth, size of the country and democratic features in the likelihood of having more regulatory agencies.

Table 3 and Figure 2 show the results for the second model, where the effects are allowed to vary by region. The relaxation of the assumption of equal values for the variables in every region draws a somewhat different picture in the results. This effect is positive in Latin America and Europe and negative in the East Asian countries. It means that the decisions to make more regulatory agencies in Latin American and European countries are driven by the amount of regulatory agencies that closer countries have done previously. And the effect is just the contrary in South East Asian countries, where having closer countries with more regulatory agencies makes the countries less likely to create more institutions.

As far as the country variables are concerned, the variables that accounts for the wealth of the country and the size of the government now show negative effects in Latin America. This indicates that being richest and having a biggest government is linked with having less regulatory agencies in Latin America. The effect of having a biggest government is also negative in South East Asia. It is also worth noting that institutional features do not seem to play a role in Asian countries or in the “other” group, because the variable is not different from zero. Notice that all those negative effects have not been captured in the model that restricts the variables to be equal for all the sample. By restricting the variable to be equal in every region, the previous model had not been able to captured this feature of the process.
Figure 2: Posterior means and 90 percent credible intervals of the parameters estimated by model by region (Equation 2).

Figure 3 shows the sign and the relevance of all the countries through time, for each of the regions. If the addition of the regional difference of the parameters shows a different story, the addition of the temporal difference adds another layer of richness to the analysis. In this case, it shows that not only the effects are different by regions, but shows that the difference in the relevance of each variable evolves over time. This evolution turns some variables to be significant only on some periods. There are several aspects to remark concerning the addition of the variation over time. First, the effect of geographically close countries is generally only positive in the most recent years. In Latin America the closeness is more clearly related to a diffusion mechanism, but not in Europe or in South East Asian countries. Second, having a shared language is positively associated with diffusion un Latin America and Europe in recent years, but it was not that way until very recently. This trend is inverse in Asian countries. Hence, hypothesis 2 does not hold in any circumstance. Third, the effect of the GDP per capita on having more regulatory agencies is positive and generally increasing over time, except in Latin America where it is constant. Hypothesis 3 holds in general and has increased in strength, except for Latin America, where controlling for the rest of the variables the relationship is inversed. Fourth, biggest countries do have more regulatory agencies in general, supporting hypothesis 4 except in the 90s in Asian countries. This effect is becoming stronger in Latin America and Asia and less important in the “other” countries. Fifth, only under very specific circumstances it holds hypothesis 5 that states that biggest countries do have more regulatory agencies. Biggest governments have a somewhat different effect depending on the region and the time. The time trends show that in Latin America the effect has turned from negative to positive, in Europe from irrelevant to positive, en Asia from irrelevant to negative and quite sustained in the other countries. This suggest that the creation of regulatory agencies has not always been considered as a monopoly of more or less interventionist countries. Finally, except in the “other” group, the existence of democratic institutions have consistently favoured the establishment of new regulatory agencies. This means that hypothesis 6 holds in general. The variable shows a clear upward tendency in all the regions except the “other” countries. This suggest that it recent years the institution of regulatory agencies has
been adopted more intensily by democratic regimes. In any case, it is clear that regions show clearly different stories, specially when the time dimension is added.

5.1 General Time Evolution and Country Differences

All the models include both a temporal dynamic (expressed by $\delta$) in the equations and the errors clustered by country (expressed by $\sigma_t$ as the standard deviation of $\epsilon_c$). Those parameters, while being part of the estimation processes, are not really relevant for the analysis. They are shown for model represented by Equation 3 in Figures 4 and 5, respectively.

5.2 The Regional–Global Logic

The possibility of having the posterior of the parameters that link the each of the network and country covariates with their “grand mean” represented by $\mu_\rho$ and $\mu_\beta$ allows to draw conclusions on the different levels of integration of every dimension. Hence, it is possible to compare the strength of the regional or global logics for each dimension by using the deviations of the $\beta$ parameters around the grand mean $\mu_\beta$. The deviations allow
to measure the relative strength of each extreme of the continuum. Lower deviations between the regional value and the global trend mean that a global logic has driven the phenomena, whereas higher deviations from the grand mean will mean that the logic is based more on regional logics.

While the raw deviations can be an indicator, they do not allow to compare the relative strength of every dimension because of the differences in scales. Hence, a correction for the scale must be used. In this case, correcting for the mean of the parameters is enough. The paper proposes a ratio of Regional–Global logic that accounts for the level of similarity between the unrestricted parameters for every region and the fully restricted version of a single parameter for the effect. The ratio can be expressed by $RG = \frac{\sigma_\theta}{|\mu_\theta|}$. It is based on the coefficient of variation parameter. Mean values of $RG$ and the 90 percent credible intervals are shown in Table 4.

<table>
<thead>
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<th></th>
<th>Mean</th>
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<th>95%</th>
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<tr>
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<td>30.8</td>
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<tr>
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<td>0.82</td>
<td>26.6</td>
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<tr>
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<td>0.53</td>
<td>12.2</td>
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<tr>
<td>Democracy</td>
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<td>11.3</td>
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<tr>
<td>Government size</td>
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<td>0.37</td>
<td>10.4</td>
</tr>
<tr>
<td>Shared Language</td>
<td>0.4</td>
<td>0.17</td>
<td>1.4</td>
</tr>
</tbody>
</table>

Table 4: Estimated mean and 90 percent HPD of the Regionalization–Globalization ratio. Higher values indicate dimensions with stronger regional logic.

The comparison of the $RG$ values of the variables shows that the network variable that accounts for the geographical distances is the indicator with higher difference by region.
In other words, that the values of the parameter in each region are more disperse in this variable that in the others. On the other side, the variable that accounts for the shared language shows a strong similarity compared by regions. The indicator suggest that the effect of countries creating more regulatory agencies on the basis of geographically close neighbours having more agencies is clearly different by region, not homogeneous. It can not be sustained that in this case globalization has lead to a homogenization in the way in which countries look at each other by regions. This is also the case of the variable that links the government size with the creation of more regulatory agencies.

In any case, it is important to remark that it is not only the concrete value of the index what matters, but also the fact that the index shows values in a range from 0.6 to 2.6. This may suggest that for some dimensions the global logic is appropriate (in this case, the shared language and the population), whereas for other dimensions, restricting the variables to have a single value for all the countries in the globe can lead to wrong results (as in the case of distances, government size and democracy). Results, hence, emphasize the need for taking regional logics into account when studying processes of diffusion of institutions.
6 Conclusions

The paper has explained the diffusion variables and risk factors associated to countries that make them more or less likely to have more or less regulatory agencies, and whether those dimensions are based on a regional or global logic.

The effects of diffusion variables and country covariates are mainly driven by differences in regions and in time. The article has shown that in general diffusion variables are helpful to understand the process of regulatory agencies adoption. Variables associated to countries are also important. In this case, GDP per capita is generally associated with more regulatory agencies, and its effect is increasing over time; population is also positively associated with regulatory agencies, specially in Latin America and in recent years; the size of the government has shown a complex pattern with the effect in Europe and Latin America becoming positively associated with agencies and negatively in Asia; democracies are generally linked to highest numbers of regulatory agencies as well. The conclusions would be substantially different if methodologies based on pooling all the data or adding dummy variables per region would have been employed. The use of Bayesian hierarchical inference has helped to model regional and time trends between the effects of the variables. Moreover, it has allowed to quantify the size and magnitude of the regional–global logics under which every risk factor operates.

References


