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Is there cross-country convergence in government quality? A non-parametric analysis

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Abstract

This note examines the distribution of government quality across 125 countries over the period 1984-2008. To this end, a non-parametric methodology is used to study the dynamics of the entire distribution. The results show the presence of a convergence process in governance outcomes across the sample countries throughout the study period, mainly due to the evolution experienced by those countries located at both ends of the distribution in 1984. Nevertheless, our estimates also suggest that the observed convergence will not continue indefinitely. Furthermore, the analysis carried out reveals that the level of government quality of neighbouring countries helps to explain a relatively important portion of the dispersion observed in the distribution under consideration, thus confirming the relevance of spatial effects in this context.

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1 Introduction

Over the last two decades numerous studies have shown that good governance has a positive and significant effect on economic growth and the level of development (e.g. Knack and Keefer, 1995; Kaufmann and Kraay, 2002; Seldadyo et al., 2007). This suggests that cross-country variations in the quality of government can contribute to explain existing differences in per capita income around the world. In view of this, we aim to investigate the cross-country distribution of government quality in order to detect the presence of convergence or divergence in this context. This issue has hardly received any attention in the literature, which is particularly surprising taking into account its potential relevance.[1]

From a methodological perspective, our analysis is based on the non-parametric approach proposed by Quah (1996a,b; 1997) in the economic growth literature to analyse the dynamics of the entire distribution. This approach allows one to overcome some of the limitations of the traditional analysis of convergence based on the concepts of sigma and beta convergence popularized by Barro and Sala-i-Martin (1995). In particular, the chosen methodology examines the distribution of the levels of government quality as a whole, thus providing information on the degree of intra-distribution mobility and the possible presence in this setting of distinct clusters of countries with distinguishing features in terms of governance that set them apart from the rest of the sample. Furthermore, this methodology can be used to estimate the external shape of the distribution of the levels of government quality in the long-run.

2 Data

Our research requires information on the quality of government in the various countries. To that end, we resort to the International Country Risk Guide (ICRG) database developed by the Political Risk Services Group to assess the political, economic and financial risks across countries.[2] The ICRG dataset is based on the perceptions of a worldwide panel of experts on a range of country-specific variables including information about different dimensions of the quality of government. In view of this, numerous scholars have used these data over the last twenty years to measure cross-country differences in governance and the quality of institutions (e.g. Knack and Keefer, 1995; Knack and Rahman, 2007; Seldadyo et al., 2007). We opt to use the ICRG data rather than other potential alternatives because, as far as we are aware, this is the only source with information

[1] In fact, to the best of our knowledge, the only exceptions are two recent papers by Elert and Halvarsson (2012) and Savoia and Sen (2012), who examine whether there is convergence in the quality of institutions across countries.

[2] The data used in our analysis were drawn from the QoG Institute web page (http://www.qog.pol.gu.se). See Teorell et al. (2012) for further details.

for a high number of countries over a relatively long time period, which is particularly important to investigate the presence of convergence-divergence in this context.

As is usual in the literature, we use in our analysis an aggregate indicator of governance equal to the mean value of the ICRG variables 'corruption', 'law and order' and 'bureaucracy quality', rescaled between zero and one, with greater values meaning better governance outcomes. This is coherent with the approach adopted in our study, given that we are interested in the evolution of cross-country differences in overall government quality. Furthermore, using an aggregate measure is particularly appropriate taking into account the possibility that each individual indicator may be affected by measurement errors (Mauro, 1995). Our sample covers 125 countries over the period 1984-2008 (see the Appendix for further details).

3 Methodology

Let f_t be the cross-country distribution of government quality in period t, which has an associated probability measure, ϕ_t. Our aim is to describe the law of motion of the stochastic process $\{\phi_t, t \geq 0\}$. The simplest way of modelling the distribution dynamics is using a first order dependence specification:

$$\phi_t = T^* \left(\phi_{t-1}, u_t\right) = T^*_{u_t} \left(\phi_{t-1}\right) \tag{1}$$

where u_t is a sequence of disturbances, while T^* stands for an operator that maps probability measures in $t-1$ and disturbances in t to probability measures in t. For simplicity, we assume that the disturbances are included into the definition of the operator, $T^*_{u_t}$.

A first way to use equation (1) for the study of the distribution dynamics is to make discrete the space of governance outcomes, as a result of which operator $T^*_{u_t}$ becomes a transition probability matrix, M_t. Furthermore, by assuming that the underlying transition mechanism is time-invariant, the model is a time-homogeneous finite Markov chain. Accordingly, for all $s \geq 1$ we have that:

$$\phi_{t+s} = M'^s \phi_t \tag{2}$$

Additionally, this approach allows us to estimate the ergodic distribution that informs on the long-run limit of the cross-sectional distribution. Specifically, the ergodic distribution corresponds to the limit of equation (2) as $s \to \infty$:

$$\phi_\infty = M' \phi_\infty \tag{3}$$

The analysis of ϕ_{t+s} and ϕ_{∞} provides relevant information on the existence of convergence or divergence in the distribution that concerns us. Nevertheless, the employment of transition probability matrices in this context raises several potential difficulties. For example, the results may be sensitive to the criterion used to define the transition probability matrix in each case. Since there is no procedure for determining the optimum number of states and the boundaries between them, the researcher must decide arbitrarily. In fact, different methods may yield different results and even affect the Markov properties of the dynamic process (Bulli, 2001). Nevertheless, these problems can be overcome by considering that operator $T^{*}_{u_t}$ in equation (1) is a stochastic kernel, thus avoiding to impose restrictive assumptions on the data generating process. The stochastic kernel can be interpreted as a continuous version of a transition probability matrix, and is obtained by estimating the density function of the distribution in a given period $t+s$, conditioned on the values of a previous period t. Specifically, the joint density function at moments t and $t+s$ is estimated by the kernel method and then divided by the implicit marginal distribution at t in order to obtain the corresponding conditional probabilities (Johnson, 2000).

4 Results

Figure 1 presents the non-parametric estimate of the stochastic kernel for the cross-country distribution of government quality between 1984 and 2008.[3] In turn, Figure 2 shows the corresponding contour-plot, on which the lines connect points at the same height on the three dimensional kernel.[4] These graphics can be used to examine the evolution of the distribution dynamics over the study period. When interpreting Figures 1 and 2, it should be noted that in order to facilitate comparisons, the data have been normalized in each period according to the sample mean. In any case, this rescaling has no impact on countries' relative positions on the governance indicator.

Concentration of the probability mass around the main diagonal implies that most of the countries were in 2008 in a similar relative position that they occupied in 1984, which would suggest persistence in the distribution under study. However, Figures 1 and 2 reveal clearly that there was some mobility in relative terms in governance outcomes between 1984 and 2008. Specifically, our estimates show that the peak located below the sample mean is below the main diagonal, while the peak at the upper end of the distribution is above the main diagonal. This indicates that several countries with low levels of government quality at the beginning of the study period tended to improve their governance outcomes in the next years. This is the case, for example, of Bangladesh,

[3] The different graphics presented in this section were obtained using the Matlab code developed by Magrini (2007).

[4] Gaussian kernel functions were used, while the smoothing parameters were selected according to the procedure described in Magrini (2007).

Figure 1: Stochastic kernel of the cross-country distribution of the quality of government.

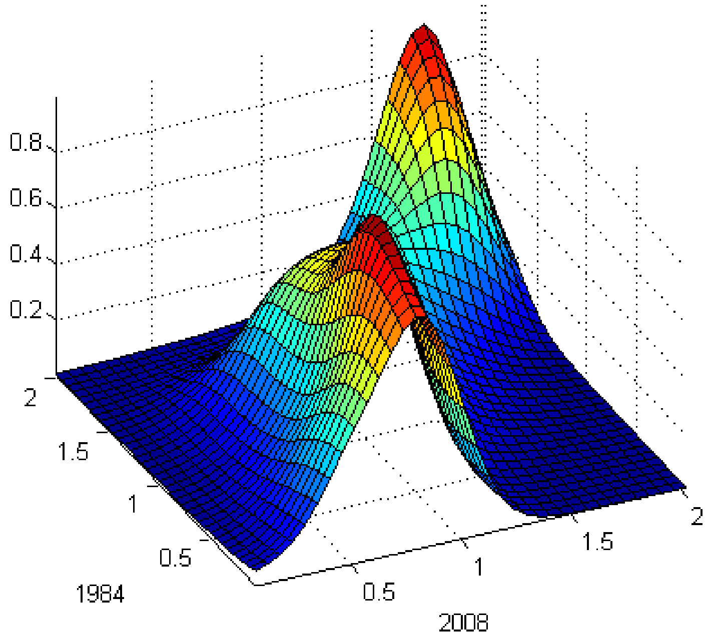
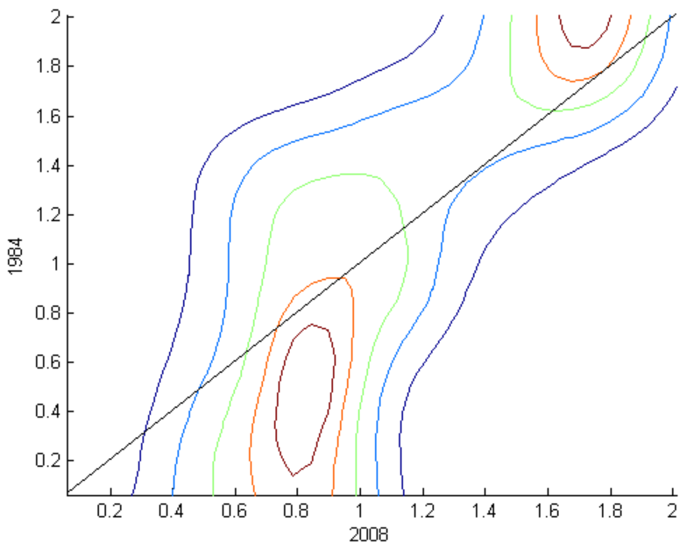


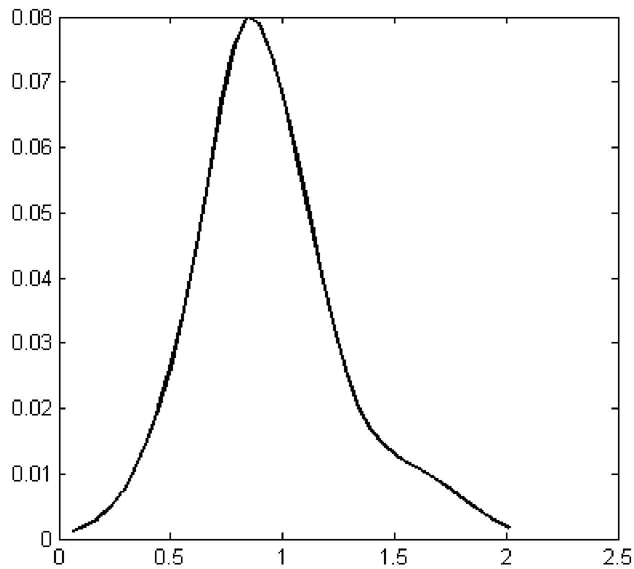
Figure 2: Contour plot of the cross-country distribution of the quality of government.



Uganda or Bolivia. In turn, some countries with high governance scores at 1984, such as Belgium, France or South Africa, got worse their relative situation throughout the study period. Overall these dynamics reveal the existence of a process of convergence in the quality of government across the sample countries between 1984 and 2008. In order to confirm this result, we calculate the coefficient of variation of the distribution, a measure of dispersion widely used in the literature to capture the concept of sigma convergence (Barro and Sala-i-Martin, 1995). The value of this statistic is found to have decreased by 25% over the study period, thus confirming the reduction registered by the cross-sectional spread of the governance scores over time.

The analysis of the stochastic kernel performed so far is insufficient to examine the long-run stationary distribution. For this reason, we now estimate the corresponding ergodic distribution. As can be observed in Figure 3, the ergodic distribution is characterized by a single mode located around 90% of the mean. Accordingly, there is no evidence to suggest that the distribution under study will fragment in the long-run into various separate groups of countries differentiated according to their level of government quality.[5] Furthermore, the information provided by Figure 3 reveals that the ergodic distribution is skewed. In particular, there appears to be more probability mass to the left than to the right of the mean. This seems to show that, according to the dynamics observed during the study period, in the future the number of countries with governance scores below the mean will continue to be relatively high.

Figure 3: Ergodic distribution of the quality of government.



[5]When comparing Figure 3 and the stochastic kernel estimated previously, it should be noted that the values that appear on the vertical axes of the various graphics are not directly comparable.

At this point, it needs to be said that, as is usual in the traditional literature on convergence, the sample countries have been considered so far as isolated units, thus ignoring the spatial characteristics of the data and the potential role of geography in shaping governance outcomes. This should raise no major problems, as long as each country evolves independently of the rest. However, this does not seem a very realistic assumption in the context of current international setting characterized by the transmission of government forms (Starr, 1991), interdependence of policy decisions (Brueckner, 2003), or policy convergence (Mukand and Rodrik, 2005).

In view of this, and in order to complete our previous results, we now investigate the role played by the spatial location of the various countries in explaining the observed disparities in the quality of government. To that end we follow an approach based on the pioneer work of Quah (1996c). Thus, we construct a conditioned distribution in which each country's governance score is expressed relative to the mean of its neighbouring countries. Specifically, the (weighted) average governance score of neighbouring countries is given by WG_t, where W is a spatial weights matrix describing the spatial interdependences among the sample countries, and G is the aggregate indicator of government quality described in Section 2. The spatial weights matrix used in our analysis is defined as:

$$W = \begin{cases} w_{ij} = 0 \quad if \quad i = j \\ w_{ij} = \frac{1/d_{ij}^2}{\sum\limits_j 1/d_{ij}^2} \quad if \quad i \neq j \end{cases}$$

where d_{ij} is the great circle distance between the centroids of countries i and j. As can be observed, W is row standardized, so that it is relative and not absolute distance which matters. The neighbour-relative governance series constructed by using W can be intuitively interpreted as the cross-country distribution of government quality that remains unexplained by spatial factors.

Having defined this conditioning scheme, it is possible to assess the role played in this context by spatial interactions across the sample countries. To do so, we estimate a stochastic kernel capturing the transitions between the original distribution and the neighbour-relative governance distribution, using the information available for the study period as a whole (Quah, 1996c; Le Gallo, 2004). The results are presented in Figures 4 and 5. If spatial effects were not relevant in this context, the probability mass should cluster around the main diagonal. Nevertheless, our estimates reveal that the probability mass tends to be located parallel to the axis corresponding to the original distribution and around one. This means that, although obviously there are some exceptions, neighbouring countries are characterized in general by registering similar levels of government quality. Accordingly, spatial effects are a relevant factor in explaining observed variations in our study variable. This conclusion is consistent with the empirical evidence provided by Seldadyo et al. (2010) using spatial econometric techniques.

Figure 4: The impact of spatial location on the distribution of the quality of government: Stochastic kernel.

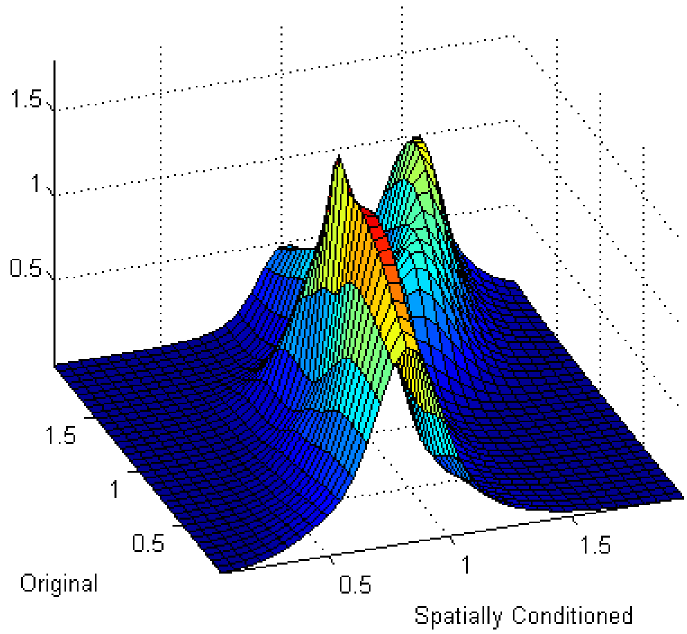
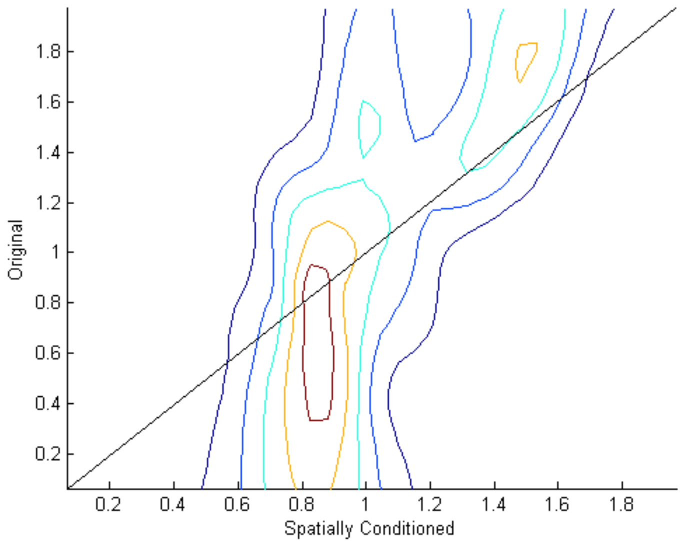


Figure 5: The impact of spatial location on the distribution of the quality of government: Contour plot.



5 Conclusions

This note has examined the distribution of the quality of government across 125 countries over the period 1984-2008. To this end, a non-parametric methodology has been used to study the dynamics of the entire distribution. The results show the presence of a convergence process in governance outcomes across the sample countries throughout the study period, mainly due to the evolution experienced by those countries located at both ends of the distribution in 1984. In any case, when assessing the implications of this finding, it should be noted that the information provided by the ergodic distribution suggests that the convergence in government quality observed between 1984 and 2008 will not continue indefinitely.

Additionally, we have investigated the impact of spatial effects on cross-country differences in government quality by means of a conditioning scheme. The estimates performed reveal that the level of government quality of neighbouring countries helps to explain a relatively important portion of the dispersion observed in the distribution under consideration. This means that government quality is not randomly distributed across the world, thus confirming the relevance of spatial effects in this context.

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Appendix

List of countries

Albania, Algeria, Angola, Argentina, Australia, Austria, Bahamas, Bahrain, Bangladesh, Belgium, Bolivia, Botswana, Brazil, Brunei, Bulgaria, Burkina Faso, Cameroon, Canada, Chile, China, Colombia, Congo, Cote d'Ivoire, Congo (Democ. Rep.), Costa Rica, Cuba, Cyprus, Czech Republic, Denmark, Dominican Republic, Ecuador, Egypt, El Salvador, Ethiopia, Finland, France, Gabon, Gambia, Germany, Ghana, Greece, Guatemala, Guinea-Bissau, Guinea, Guyana, Haiti, Honduras, Hungary, Iceland, India, Indonesia, Iran, Iraq, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kenya, North Korea, South Korea, Kuwait, Lebanon, Liberia, Libya, Luxembourg, Madagascar, Malawi, Malaysia, Mali, Malta, Mexico, Mongolia, Morocco, Mozambique, Myanmar, Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Portugal, Qatar, Romania, Russia, Saudi Arabia, Senegal, Sierra Leone, Singapore, Slovakia, Somalia, South Africa, Spain, Sri Lanka, Sudan, Suriname, Sweden, Switzerland, Syria, Taiwan, Tanzania, Thailand, Togo, Trinidad and Tobago, Tunisia, Turkey, Uganda, United Arab Emirates, United Kingdom, United States, Uruguay, Venezuela, Vietnam, Zambia, Zimbabwe