

## Globalisation, Growth and Convergence

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### 1. INTRODUCTION

**G**LOBALISATION – basically understood as ‘an increase in the extent to which individuals and institutions transact or exchange with others based in nation states other than their own, or otherwise influence them through their economic and social behaviour’<sup>1</sup> – is one of the most pervasive phenomena of present days. However, globalisation is by no means a new phenomenon, as its roots can be traced back, to at the very least, the late nineteenth–early twentieth-centuries (Masson, 2001). Notwithstanding this, it is important to note that the recent wave of globalisation has been spurred mainly by two factors: technological change – bringing about noticeable reductions in transport and information costs across countries; and policy decisions – pursuing tighter regional and supranational integration schemes.

The impact of globalisation has been, and still is, the subject of considerable and heated debate,<sup>2</sup> as it produces both winners and losers, not only within each country but also across countries. For some observers (Stiglitz, 2002; and Hurrell and Woods, 2000; are among the most relevant supporters of this view), globalisation is, to a certain extent, a source of concern as it poses new challenges mainly to poor countries and some groups of people and small businesses;<sup>3</sup> for others (Ben-David, 1993; Srinivasan and Bhagwati, 1999; Bhagwati, 2004), globalisation is not only just a way to foster economic growth and spread prosperity all over the world, but also a way to reduce inequality. In our view, one of the most relevant reasons behind this absence of consensus is that there is no clear and definitive definition (Scholte, 2008) and then

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<sup>1</sup> Centre For Economic Policy Research (2002, p. 1).

<sup>2</sup> Fischer has pointed out that ‘the debate over globalisation is lively, often passionate, and has sometimes been violent’ (Fischer, 2003, p. 2).

<sup>3</sup> These authors tend to highlight the fact that the benefits and costs brought about by globalisation are not evenly distributed across countries and groups of people.

measure of globalisation. Probably, this is so because globalisation has many different dimensions. At the very least, it covers three dimensions: economic, social and political (Dreher, 2006).<sup>4</sup>

Different attempts have been made to measure globalisation and by how much it has spread over the world. Although the most typical indicator of globalisation only refers to its economic dimension (the 'openness degree' or the 'openness degree plus flows of foreign capital'), there are other more sophisticated measures, such as the one proposed by Andersen and Herbertsson (2003), based on the use of factor analysis. There are, however, some other measures trying to capture more than one dimension. Among these, the World Markets Research Centre G-index (Randolph, 2001) and the Kearney 'Foreign Policy Globalisation Index'<sup>5</sup> are some of the most prominent. However, although very appealing, they suffer from some drawbacks, mainly related to the kind and number of variables considered (G-index) or to its relatively low technical quality (Kearney index).<sup>6</sup> Arguably, the most reliable measure of globalisation (actually, the one employed in this paper) is the so-called KOF index of Globalisation,<sup>7</sup> which jointly considers the economic, social and political dimensions previously mentioned.

This paper contributes to the literature by examining, in a rigorous systematic way, the extent to which globalisation is really disseminated across countries. In particular, the first aim of the paper is to analyse whether a process of globalisation convergence has taken place all over the world and how the world globalisation distribution has evolved over time. Additionally, and given the debate previously mentioned, the second aim of the paper is to investigate the relationship between globalisation and economic growth and shed some light about whether globalisation has favoured, or not, a process of convergence in per capita income.

The organisation of the paper is as follows. In Section 2, we discuss the data. A classical analysis of convergence, by applying the concepts of  $\sigma$  and  $\beta$  convergence, is provided in Section 3. This approach only pays attention to the first moments of the distribution, however, and thus presents some drawbacks. For this reason, in Section 4, we also investigate spatial disparities more deeply by considering the entire distribution. Following the recommendations of Quah (1996a, b), the external shape of the distribution and the intradistributional movements of individual countries are examined; this issue is tackled by

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<sup>4</sup> Giddens (2002, p. 10) says that 'globalisation is political, technological and cultural, as well as economic'. A detailed analysis of the concept of economic globalisation and its measurement can be found in the OECD 'Handbook of Economic Globalisation Indicators' (2005).

<sup>5</sup> This index is available at <http://www.atkearney.com>.

<sup>6</sup> Other index of globalisation with similar characteristics to the ones previously mentioned is the so-called MGI index, by Martens and Zywiets (2006).

<sup>7</sup> The method of calculation of this index is shown at URL <http://globalisation.kof.ethz.ch/>.

employing a novel approach (box plots based on highest density regions) that provides better insights into the dynamics of the world globalisation distribution. Afterwards, in Section 5, we present an empirical test of the relationship between globalisation and economic growth to comment on whether globalisation has promoted convergence in per capita income. Finally, in Section 6, the main findings are summarised.

## 2. DATA

The data used were obtained from KOF website, which offers information not only about the Index of Globalisation but also about its components – economic, social and political – and the variables used to construct all indices.<sup>8</sup> The economic index is a weighted average of two indices, one measuring actual trade flows and the other referring restrictions on trade and capital. As for the social index, this is a weighted average but of three subindices, the first refers to personal contacts, the second to information flows and the third to cultural proximity. The political index is also made up of three components: number of embassies in the country, number of international organisations to which the country is a member and number of UN peace missions in which the country participates. Finally, the total index of globalisation is a weighted averaged of these three indices.

Although the KOF website offers information for 122 countries, this information is not available for the whole period under consideration (1970–2005), in some cases simply because the basic statistics needed to construct the indicators did not exist and, in others, because many countries did not exist as such in 1970.<sup>9</sup> For these reasons, our sample covers not all countries included in the KOF data bank but just the 101 indicated in Appendix A.

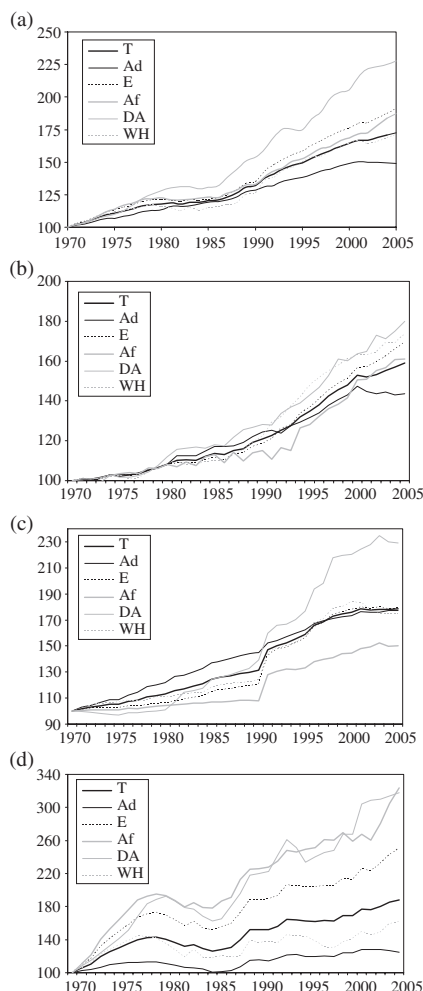
In the introductory remarks, we said that globalisation is one of the most pervasive phenomena of present days. Although, apparently, this statement needs little justification, the extent of globalisation differs, sometimes greatly, from country to country. A first glance at the issue (Figure 1) shows the evolution of the different indices for six different geographic areas: the total sample (T); advanced economies (Ad); emerging and developing economies (E); Africa (Af); developing Asia (DA); and Western Hemisphere (WH).<sup>10</sup> Four main conclusions can be reached: first, total globalisation has increased over time

<sup>8</sup> For a thorough reference to the methodology employed to construct these indices, see Dreher (2006). We have rescaled globalisation indices, so all of them range between 0 and 10.

<sup>9</sup> This is, for instance, the case of today's existing countries but which previously were part of the USSR or the former Yugoslavia.

<sup>10</sup> This grouping of countries is an adaptation of the country classification employed by the World Economic Outlook Database, IMF.

FIGURE 1  
Index of Globalisation: Evolution (1970 = 100). (a) Total Globalisation; (b) Economic Globalisation; (c) Social Globalisation; (d) Political Globalisation



Notes:

Total sample (T); advanced economies (Ad); emerging and developing economies (E); Africa (Af); developing Asia (DA); Western Hemisphere (WH).

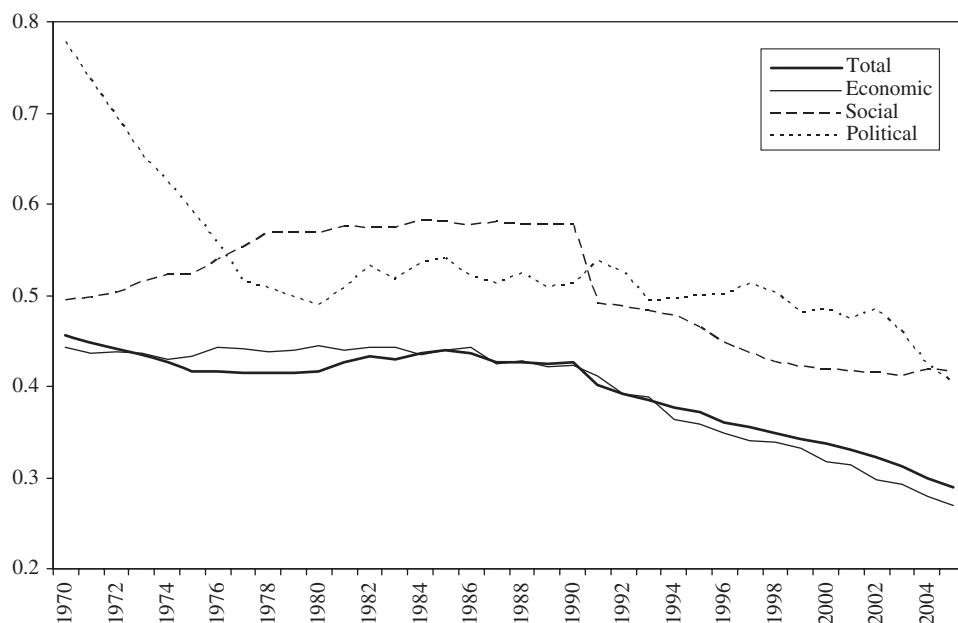
everywhere, but most rapidly in DA; economic globalisation has basically followed the same path as total globalisation in every geographical area, although at a lower pace; social globalisation and political globalisation have also experienced a huge increase over time, but following a less stable, more volatile path; finally, except for the advanced economies and the Western Hemisphere, political globalisation has progressed a lot, mainly in Africa and DA, while social globalisation is lagging behind in Africa.

## 3. THE WORLD GLOBALISATION DISTRIBUTION: ANY SIGN OF CONVERGENCE?

As is well known, convergence is an interesting but rather imprecise concept, with many (and not always equivalent) interpretations. The most generally accepted measures of real convergence, however, are the so-called  $\sigma$  and  $\beta$  convergence (see the seminal papers of Barro and Sala-i-Martin, 1991, 1992).<sup>11</sup> When these concepts are applied to globalisation, the former holds when the dispersion in the globalisation indicator diminishes over time and the second takes place when the less globalised economies increase their globalisation index more quickly than the more globalised ones.

As a starting point,  $\sigma$  convergence is computed by plotting the coefficient of variation in each year for the four indices of globalisation (Figure 2). Three main conclusions can be obtained. First, disparities in total and economic globalisation remained relatively stable until around mid-1980s, while afterwards a steady reduction took place. Second, disparities in the social globalisation index increased during the first two decades and, after a sudden fall in 1991, decreased slightly. And, third, political globalisation disparities have followed a

FIGURE 2  
Sigma ( $\sigma$ ) Convergence (Coefficient of Variation)



<sup>11</sup> For a thorough review of the concepts of convergence and its application to the European regions, see, respectively, Villaverde (2006) and Villaverde and Maza (2008).

completely different path; they dropped very quickly during the 1970s and remained stable afterwards.<sup>12</sup>

With respect to the second type of convergence, we estimate, not only for our four indicators of globalisation but only for the whole sample of countries,<sup>13</sup> a traditional absolute  $\beta$  convergence equation, for a five-year transition period to control for time-variant heterogeneity, as follows:

$$\Delta G_{i,t} = \alpha_i + \chi_t + \beta G_{i,t-k} + \varepsilon_{i,t}, \quad (1)$$

where  $\Delta G_{i,t}$  is the growth rate (approximated as logs difference) of the globalisation index of country  $i$  at five-year period  $t$ ,  $G_{i,t-k}$  is the log of globalisation index lag  $k$  years ago ( $k = 5$  years in our case),  $\alpha_i$  is the fixed effect of country  $i$ ,  $\chi_t$  is the fixed effect corresponding to period  $(t, t-k)$  and  $\varepsilon$  is the error term. As can be seen, equation (1) is estimated using panel data. It is well known that, in order for the  $\beta$  hypothesis of convergence to be satisfied, there must be an inverse relationship between the growth rate of (in our case) globalisation and its initial level. That is,  $\beta$  must be both negative and significant at standard confidence levels. The results obtained for the total indicator of globalisation for all countries demonstrate significant  $\beta$  convergence over the sample period (Table 1). Moreover, the value of the  $\beta$  coefficient enables us to say that convergence took place at a five-year rate<sup>14</sup> of 12.02 per cent, which implies that the time required covering half the gap separating the countries from a stationary state (half-life) is 8.2 five-year periods.<sup>15</sup> As for the three *partial* indicators of globalisation, the results show the existence of convergence in all the three cases, at a higher speed in relation to the political globalisation than in the other two cases.

Although previous analysis on globalisation convergence is informative, it must be admitted that it also has some important limitations (Quah, 1996a, b). Specifically, it provides no information on the external shape of the world globalisation distribution and, additionally, it ignores the fact that some countries may shift their relative positions during the study period. Therefore, to deal with these two issues, we complement the previous analysis by considering the shape and changes over time in the whole distribution.

To begin with, we scale all national values such that the average globalisation index is equal to 100. Next, we characterise the external shape of the distribution by estimating univariate density functions with a Gaussian kernel

<sup>12</sup> The same analysis has been carried out for groups of countries. By and large, disparities tend to be lower within the advanced countries than in the other groupings, whichever the indicator considered. Additionally, except for the social globalisation index, disparities across groups of countries are lower in 2005 than in 1970, the smaller differences in 2005 being computed for the political index.

<sup>13</sup> From now on, and to save space, the analysis is restricted to the consideration of all countries as a single group, thus not paying attention to the other five groups considered previously.

<sup>14</sup> The speed of convergence is calculated as  $b = -\ln(1 + T\beta)/T$ .

<sup>15</sup> The half-life  $h$  can easily be calculated using the expression  $h = -\ln(2)/\ln(1 + \beta)$ .

TABLE 1  
Beta ( $\beta$ ) Convergence

|                                  | <i>Total</i> |                    | <i>Economic</i> |                    | <i>Social</i> |                    | <i>Political</i> |                    |
|----------------------------------|--------------|--------------------|-----------------|--------------------|---------------|--------------------|------------------|--------------------|
|                                  | <i>Value</i> | <i>t-statistic</i> | <i>Value</i>    | <i>t-statistic</i> | <i>Value</i>  | <i>t-statistic</i> | <i>Value</i>     | <i>t-statistic</i> |
|                                  | -0.081*      | -11.90             | -0.068*         | -9.91              | -0.064*       | -10.71             | -0.113*          | -23.03             |
| Adjusted R <sup>2</sup>          | 0.37         |                    | 0.30            |                    | 0.42          |                    | 0.55             |                    |
| Number of countries              | 101          |                    | 101             |                    | 101           |                    | 101              |                    |
| Number of observations           | 707          |                    | 707             |                    | 707           |                    | 707              |                    |
| Speed of convergence (5-years %) | 12.02        |                    | 9.16            |                    | 8.55          |                    | 22.25            |                    |
| Half-life (5-years periods)      | 8.2          |                    | 9.9             |                    | 10.4          |                    | 5.8              |                    |

Note:

\*Significant at 1% level.

Sources: KOF index of globalisation.

and optimal bandwidth, following Silverman's rule of thumb (Silverman, 1986). This analysis is reported only for some selected years of our sample period.<sup>16</sup> Two main conclusions can be drawn from the consideration of the graphs displayed in Figure 3:

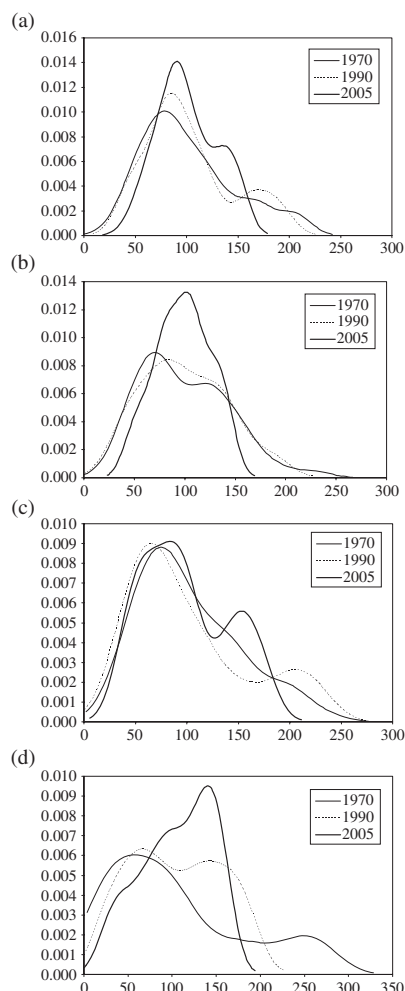
First, the existence of  $\sigma$  convergence is confirmed as the amplitude of the distribution in the four cases under consideration is much smaller in 2005 than in 1970. In fact, the probability of finding values at the lower and higher ends of the distributions has significantly decreased over time. Besides this, it is important to note that the main mode is closer to the value 100 in 2005 than in either 1970 or 1990.

Second, in the cases of total and social globalisation, a second mode (at around levels of globalisation 50 per cent higher than the average) emerges. This is not apparent in the cases of economic and political globalisation, in which the distributions present a relatively good bell-shaped form.

Having examined the external shape of the distribution over time, we turn our attention to the analysis of intradistribution dynamics. To do this, the literature has conventionally considered two approaches: the transition matrix approach and traditional stochastic kernel approach. Both suffer, however, from significant drawbacks: in the first case, because the results are crucially dependent on the number and length of the *states* considered in the analysis, and in the second case, because it commonly uses a fixed bandwidth in the *x* and *y* directions and

<sup>16</sup> We computed these density functions for every year; however, to save space, not all data are presented, although they are available upon request.

FIGURE 3  
Globalisation: Density Functions (Average = 100). (a) Total Globalisation; (b) Economic Globalisation; (c) Social Globalisation; (d) Political Globalisation



treats the conditional probability as a bivariate density function. To solve these problems, we employ the ‘stacked conditional density’ (SCD) and ‘highest conditional density region’ (HCDR) plots proposed by Hyndman et al. (1996): The SCD plot ‘displays a number of conditional densities plotted side by side in a perspective plot’ (Arbia et al., 2006, p. 10), whereas the HCDR displays the highest density regions, each one being defined as ‘the smallest region of the sample space containing a given probability’ (Hyndman et al., 1996, p. 327).

This novel method, which has been recently employed by Fischer and Stumpner (2008) and Maza et al. (2009), has two main advantages. First, it not



only solves the problems of the transition matrix and traditional kernel approaches but also presents better statistical properties. Second, it offers a more informative visual interpretation of the results than the kernel approach, highlighting the conditioning.

The SCD and HCDR plots are estimated for the whole period with optimum bandwidths in the  $x$  and  $y$  directions computed according to rules laid out by Bashtannyk and Hyndman (2001). Although the SCD plot (see the left-hand side of Figure 4) is somewhat illustrative, we focus our comments on the HCDR plot (right-hand side of Figure 4) because it is a more informative way to represent (and detect) intradistributional changes. In this graph, each vertical strip represents the highest density portion of the probability distribution for a given globalisation level in 1970. Specifically, in each strip of the HCDR plot, we have four shadings representing, from darker to lighter, total probabilities of 25 per cent, 50 per cent, 75 per cent and 90 per cent, while the bullet (•) indicates the mode of the distribution.

According to these graphs, one main conclusion can be drawn: mobility within the distribution has been relatively high, especially in the lower and upper tails of each globalisation dimension.<sup>17</sup> As can be seen, the modes (as well as the shaded areas) indicate that those countries with the greatest initial degree of globalisation have approached the average, this contributing to convergence. Similarly, the graphs also show that most of the countries in the globalisation range below the average have increased their relative position, also promoting convergence. Additionally, it is shown that mobility has been particularly low for social globalisation (Figure 4c) and high for political globalisation (Figure 4d).

To conclude this analysis, we plot the so-called ergodic or hypothetical long-run equilibrium distribution (Figure 5). It has only one mode, suggesting that it will be very unlikely to find poles or clusters among countries in any of the four globalisation indices in a hypothetical long-run equilibrium. Additionally, the shape of the distributions suggests that disparities in globalisation will remain relatively high in the foreseeable future, especially in the social and political dimensions.

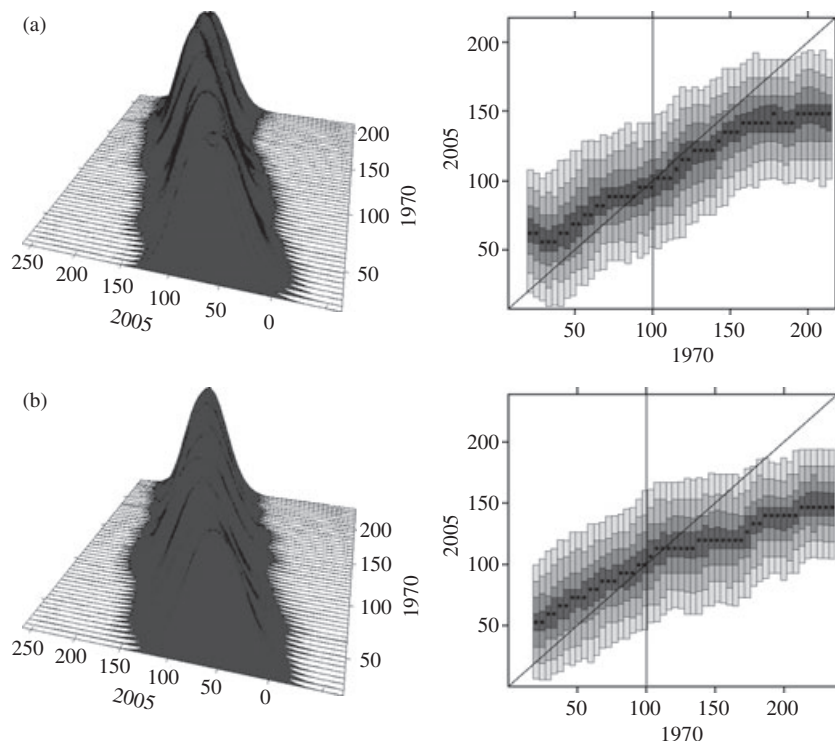
#### 4. GLOBALISATION AND GROWTH

In essence, the previous analysis demonstrates that cross-country differences in globalisation have been greatly reduced. A plausible reason for this might be that globalisation is considered a key factor promoting economic growth. Not-

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<sup>17</sup> As it should be obvious, this high mobility is partially because of the long time span used in our analysis. Naturally, the mobility degree is much smaller when five-year transition periods are considered (See Appendix B).

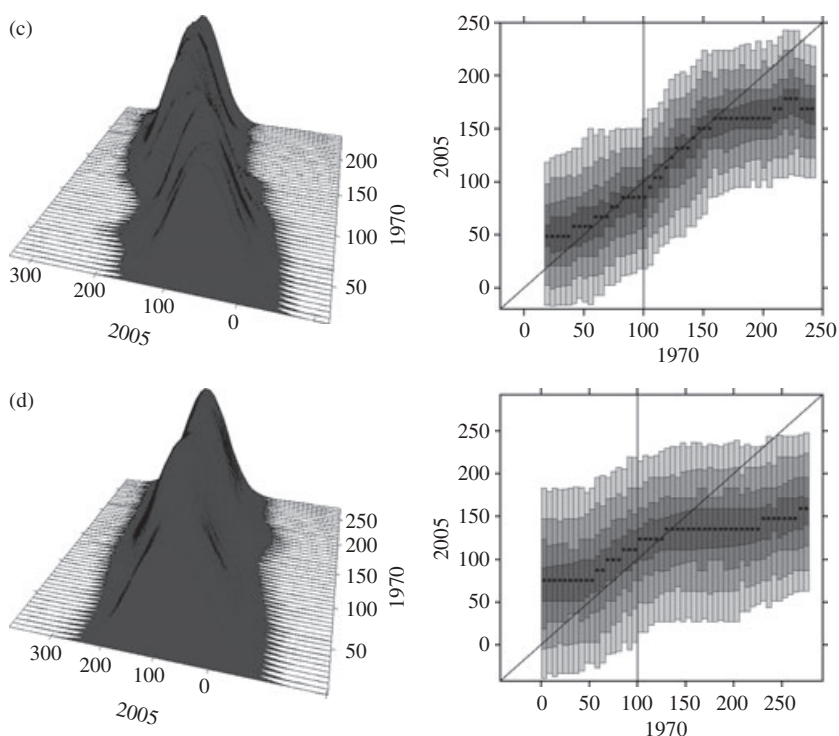
FIGURE 4  
Intradistribution Dynamics. (a) Total Globalisation; (b) Economic Globalisation; (c) Social Globalisation; (d) Political Globalisation



withstanding, it should be pointed out that ‘it is not whether you globalise that matters, it is how you globalise’ (Rodrik, 1998, p. 156).

In fact, one of the most widely held beliefs of the economics profession is that openness to international trade accelerates growth (Crafts, 2004; Dollar and Kraay, 2004). The way of reasoning varies according to the growth theory under consideration. In particular, neoclassical growth theory considers that, by allowing a more efficient allocation of resources, openness contributes to growth; endogenous growth theory suggests openness can promote growth through the diffusion of technology, learning by doing, exploitation of scale economies and so on.

From an empirical point of view, a large number of studies – most of them employing a cross-section approach – tend to support the positive association between openness and growth (see, for example, papers by Barro, 1991; Frankel and Romer, 1999; Dollar and Kraay, 2002 and the excellent survey by Singh, 2010). However, this approach has been criticised on the grounds of the robustness of its results (Srinivasan and Bhagwati, 1999; Rodriguez and

FIGURE 4 *Continued*

Notes:

Stacked conditional density (LHS) and highest conditional density region (RHS) plots (Average = 100). From dark to light, the shadings represent 25 per cent, 50 per cent, 75 per cent and 90 per cent of the total probability; bullets indicate the mode.

Rodrik, 2000), thus prompting new econometric approaches, mainly those using pooled time-series cross-section regressions.

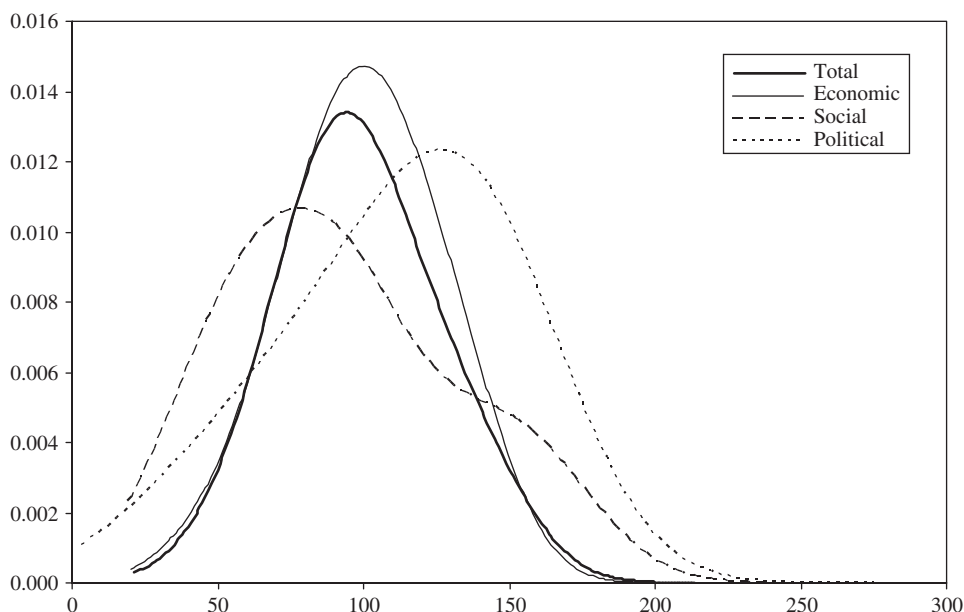
The conventional empirical literature on the issue takes the degree of openness or some other trade-related indicator as an exogenous variable. This section, in tune with Dreher's paper (2006), considers that globalisation has several dimensions and that, as such, it would not be correct to pay attention to just one of them, namely that related to the economic dimension. For this reason, we estimate the relationship between globalisation and economic growth, a relationship that may be either positive or negative.

To ascertain whether globalisation has fostered income convergence globally, we estimate a growth equation as the following:

$$\Delta Y_{i,t} = \alpha_i + \chi_t + \beta Y_{i,t-k} + \delta X_{i,t} + \varepsilon_{i,t}, \quad (2)$$

where  $\Delta Y_{i,t}$  is the per capita income growth rate of country  $i$  at five-year period  $t$ ,  $Y_{i,t-k}$  is the log of per capita income lag  $k$  years ago ( $k = 5$  years in our

FIGURE 5  
Ergodic Distribution (Average = 100)



case),  $X_{i,t}$  denotes the conditional/control variables,  $\alpha_i$  is the fixed effect of country  $i$ ,  $\chi_t$  is the fixed effect corresponding to period  $(t, t-k)$  and  $\varepsilon$  is the error term.

To estimate this equation, we have considered five-year transition periods. Thus, the data are averages over five years<sup>18</sup> and cover the time period 1970–2005. Considering that some data are not available, our panel data is unbalanced, depending on the number of observations or the type of explanatory variables employed.

First, only globalisation indices are considered conditional variables in the growth equation. The results are reported in Table 2. As can be seen, in all cases (equations 1–4 in Table 2), the coefficient  $\beta$  is negative and statistically significant, implying that convergence did take place over the study period. In addition, Table 2 also reports that the speed of convergence for total globalisation was about 4 per cent per period of five years, implying a half-life of approximately 20 periods of five years.

With respect to the globalisation coefficients, they are positive and statistically significant in all cases but the political one. In consequence, we can conclude that globalisation has promoted growth; specifically, our results indicate that a one-point increase in total globalisation would expand income growth by

<sup>18</sup> Except for the initial per capita income and rule of law.

TABLE 2  
Globalisation and Growth (OLS Estimation)

|  | 1                  | 2                  | 3                  | 4                  | 5                  | 6                  | 7                  | 8                  |
|--|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Log (INCOME <sub>pc</sub> ), beginning of the period | -0.039*<br>(-10.1) | -0.036*<br>(-9.61) | -0.039*<br>(-9.77) | -0.034*<br>(-8.87) | -0.060*<br>(-9.39) | -0.058*<br>(-9.11) | -0.060*<br>(-9.20) | -0.058*<br>(-9.03) |
| Secondary school enrolment                           |                    |                    |                    |                    | 0.000<br>(1.34)    | 0.000<br>(1.41)    | 0.000<br>(1.42)    | 0.000<br>(1.37)    |
| Log (fertility rate)                                 |                    |                    |                    |                    | -0.011<br>(-1.18)  | -0.013<br>(-1.38)  | -0.014<br>(-1.45)  | -0.013<br>(-1.38)  |
| Investment (% INCOME)                                |                    |                    |                    |                    | 0.002*<br>(6.63)   | 0.002*<br>(6.29)   | 0.002*<br>(6.73)   | 0.002*<br>(6.80)   |
| Inflation rate                                       |                    |                    |                    |                    | -0.000<br>(-1.37)  | -0.000<br>(-1.21)  | -0.000<br>(-1.42)  | -0.000<br>(-1.64)  |
| Rule of law index                                    |                    |                    |                    |                    | 0.001<br>(0.74)    | 0.001<br>(0.75)    | 0.001<br>(0.71)    | 0.001<br>(0.71)    |
| Government consumption (% INCOME)                    |                    |                    |                    |                    | -0.002<br>(1.33)   | -0.001*<br>(-3.67) | -0.002*<br>(-3.80) | -0.001*<br>(-3.57) |
| Total globalisation index                            | 0.011*<br>(4.81)   |                    |                    |                    | 0.008**<br>(2.57)  |                    |                    |                    |
| Economic globalisation index                         |                    | 0.008*<br>(4.82)   |                    |                    |                    | 0.005*<br>(2.65)   |                    |                    |
| Social globalisation index                           |                    |                    | 0.007*<br>(3.91)   |                    |                    |                    | 0.004***<br>(1.70) |                    |
| Political globalisation index                        |                    |                    |                    | 0.001<br>(0.40)    |                    |                    |                    | 0.001<br>(0.61)    |
| Number of countries                                  | 101                | 101                | 101                | 101                | 100                | 100                | 100                | 100                |
| Number of observations                               | 683                | 683                | 683                | 683                | 414                | 414                | 414                | 414                |
| Adjusted R <sup>2</sup>                              | 0.24               | 0.24               | 0.23               | 0.21               | 0.44               | 0.44               | 0.43               | 0.43               |
| Speed of convergence (five-year %)                   | 4.55               | 4.15               | 4.55               | 3.88               | 7.78               | 7.44               | 7.78               | 7.44               |
| Half-life (five-year periods)                        | 17.42              | 18.91              | 17.42              | 20.04              | 11.20              | 11.60              | 11.20              | 11.60              |

Notes:

\* Significant at 1% level; \*\* Significant at 5% level; \*\*\* Significant at 10% level.

Sources: KOF globalisation index, World Bank, Euromonitor International and Economic Freedom of the World (EFW) index.

1.1 percentage points.<sup>19</sup> Going one step further, we can state that globalisation has promoted income convergence.

The remaining four columns of Table 2 show the results obtained when, apart from globalisation indices, other control variables – selected on the basis of the Sala-i-Martin et al. (2004) study – are included in the growth equation. Specifically, we have added ‘Secondary school enrolment’, ‘Fertility rate’, ‘Investment (% GDP)’, ‘Inflation rate’, ‘Rule of law’ and ‘Government consumption (% GDP)’. An important difference between these and the previous results is an increase in the speed of convergence, which is in the range of a five-year rate of 7.5 to 8 per cent; consequently, the half-life decreases to roughly 11 five-year periods. The results regarding globalisation indices are quite similar to those obtained before, confirming the role of globalisation as a factor promoting income growth and, in an indirect way, income convergence.<sup>20</sup>

Finally, given the necessity of controlling for the potential endogeneity of some regressors and for the dynamic panel nature of the model, we estimate the same growth equations shown in Table 2 by the generalised method of moments (GMM).<sup>21</sup> This is especially suitable when considering models with predetermined or endogenous regressors based on ‘small time, large cross-section’ panels (Arellano and Bond, 1991; Arellano and Bover, 1995; Blundell and Bond, 1998). To be precise, we estimate a one-step first difference GMM with robust errors<sup>22</sup> when the lagged per capita income and globalisation variables are instrumented with suitable lags of their own first differences, which implies a noticeable loss of observations. The results are reported in Table 3. Regarding the specification tests of this kind of models, the failure to reject the null hypothesis of the validity of the instruments (Hansen–Sargan test) indicates that the specification employed is appropriate. In addition, the Arellano–Bond test of second-order autocorrelation does not reject, in any of the eight cases, the null hypothesis of absence of second-order autocorrelation in the residuals, also accepting the specification of the model.

The results obtained first corroborate that an income convergence process has, indeed, happened and, second, they indicate this has been much faster than previously mentioned; specifically, for the first four equations, the speed of convergence in total globalisation is between 23.35 (without control variables) and 23.88 (with control variables).

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<sup>19</sup> This result is quite similar to that obtained by Dreher (2006).

<sup>20</sup> In this case, a 1 per cent increase in total globalisation would expand income growth by 0.8 percentage points.

<sup>21</sup> Some papers using GMM models to estimate growth equations have also employed a transformation of the traditional growth equation estimated in Table 2, in which the current level of output is included as dependent variable (see, for example, Badinger et al., 2004). Anyway, and to facilitate the comparison of the results, we have followed the most common practice in economic growth modelling, maintaining growth income rate as dependent variable.

<sup>22</sup> We have not used a two-step GMM estimator because, as indicated by Arellano and Bond (1991), the standard errors tend to be underestimated by this estimator in small samples.

TABLE 3  
Globalisation and Growth (GMM Estimation)

|   | 1                  | 2                  | 3                  | 4                  | 5                    | 6                   | 7                   | 8                  |
|---|--------------------|--------------------|--------------------|--------------------|----------------------|---------------------|---------------------|--------------------|
| Log (GDP pc), beginning of the period             | -0.115*<br>(-6.82) | -0.093*<br>(-5.39) | -0.160*<br>(-8.01) | -0.093*<br>(-6.34) | -0.101*<br>(-3.66)   | -0.089*<br>(-3.74)  | -0.012*<br>(-4.57)  | -0.015*<br>(-6.85) |
| Secondary school enrolment                        |                    |                    |                    |                    | 0.000**<br>(1.98)    | 0.000**<br>(2.62)   | 0.000**<br>(2.25)   | 0.000***<br>(1.92) |
| Log (fertility rate)                              |                    |                    |                    |                    | 0.002<br>(0.14)      | -0.010<br>(-0.69)   | 0.006<br>(0.41)     | -0.026<br>(-1.43)  |
| Investment (% GDP)                                |                    |                    |                    |                    | 0.002*<br>(6.08)     | 0.002*<br>(5.65)    | 0.002*<br>(5.28)    | 0.002*<br>(5.05)   |
| Inflation rate                                    |                    |                    |                    |                    | -0.000<br>(-1.01)    | -0.000<br>(-0.27)   | -0.000<br>(-0.58)   | -0.000<br>(-0.92)  |
| Rule of law index                                 |                    |                    |                    |                    | 0.002***<br>(1.75)   | 0.001<br>(1.22)     | 0.002<br>(1.21)     | 0.004**<br>(2.62)  |
| Government consumption (% GDP)                    |                    |                    |                    |                    | -0.001***<br>(-1.82) | -0.002**<br>(-2.24) | -0.002**<br>(-2.09) | 0.000<br>(0.33)    |
| Total globalisation index                         | 0.021*<br>(5.93)   |                    |                    |                    | 0.027*<br>(3.17)     |                     |                     |                    |
| Economic globalisation index                      |                    | 0.015*<br>(5.03)   |                    |                    |                      | 0.011**<br>(2.42)   |                     |                    |
| Social globalisation index                        |                    |                    | 0.026*<br>(6.92)   |                    |                      |                     | 0.019*<br>(4.60)    |                    |
| Political globalisation index                     |                    |                    |                    | 0.016*<br>(5.35)   |                      |                     |                     | 0.019*<br>(4.68)   |
| Number of countries                               | 99                 | 99                 | 99                 | 99                 | 88                   | 88                  | 88                  | 88                 |
| Number of observations                            | 578                | 578                | 578                | 578                | 296                  | 296                 | 296                 | 296                |
| Sargan test ( <i>p</i> value)                     | 0.99               | 0.99               | 1.00               | 0.99               | 0.99                 | 0.99                | 0.99                | 0.99               |
| First-order Arellano-Bond test ( <i>p</i> value)  | 0.32               | 0.05               | 0.07               | 0.15               | 0.06                 | 0.03                | 0.19                | 0.08               |
| Second-order Arellano-Bond test ( <i>p</i> value) | 0.25               | 0.14               | 0.43               | 0.10               | 0.21                 | 0.26                | 0.27                | 0.10               |
| Speed of convergence (five-year %)                | 23.35              | 15.04              | n.c.               | 15.04              | 17.54                | 13.94               | 1.25                | 1.58               |
| Half-life (five-year periods)                     | 5.67               | 7.10               | 3.98               | 7.10               | 6.51                 | 7.44                | 57.41               | 45.86              |

Notes:

\* Significant at 1% level; \*\* Significant at 5% level; \*\*\* Significant at 10% level; n.c., not computable; GMM, generalised method of moments.

Sources: KOF globalisation index, World Bank, Euromonitor International and Economic Freedom of the World (EFW) index.

As for globalisation, it is confirmed that not only total, economic and social globalisation have positively affected the income rate of growth, but also political globalisation. Additionally, it is important to highlight that the influence of globalisation on economic growth and, indirectly, on income convergence, is much larger than previously mentioned. To be precise, income growth increases by 2.1 percentage points per percentage point increase of total globalisation.<sup>23</sup> This result clearly evokes Sachs and Warner's (1995, p. 3) claim that 'open economies converge, and closed ones do not'.

## 5. CONCLUSIONS

This paper has analysed total globalisation and its main dimensions (economic, social and political) from two different but closely related perspectives. First, it has examined whether a process of globalisation convergence has taken place on a worldwide basis. Second, it addresses the issue of the effects of globalisation on economic growth and convergence.

After showing that globalisation has greatly increased all over the world, the paper initially reveals, as could be expected because of the rapid changes experienced by some developing countries, that a process of both  $\sigma$  and  $\beta$  convergence has happened in all four cases under consideration and, specially, in that of political globalisation.

Second, the paper also shows that the shape of the world globalisation distribution has changed significantly over time and that more countries are positioned around the mean in 2005 than in 1970, thus confirming ( $\sigma$ ) convergence.

Next, our analysis of intradistributional dynamics indicates that mobility within the distribution has been rather high and, given its direction, has fostered convergence. This mobility has been particularly noticeable in the lower and upper ends of each globalisation dimension, specifically in the case of political globalisation.

The ergodic distribution suggests that, in a hypothetical long-run equilibrium, the probability of finding clusters of countries will be very low. Besides this, it also implies that cross-country disparities in globalisation will remain relatively high, in particular with relation to the social and political globalisation dimensions.

Finally, the analysis of the relationship between globalisation and growth clearly demonstrates that, as a general rule, globalisation has promoted growth. Considering the aforementioned convergence in globalisation, this result implies that globalisation has also fostered income convergence across countries.

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<sup>23</sup> When control variables are included in the analysis – equation (5) of Table 3 – the increase goes to 2.7 percentage points per one-point increase in globalisation.



APPENDIX A  
List of Countries Considered in the Analysis

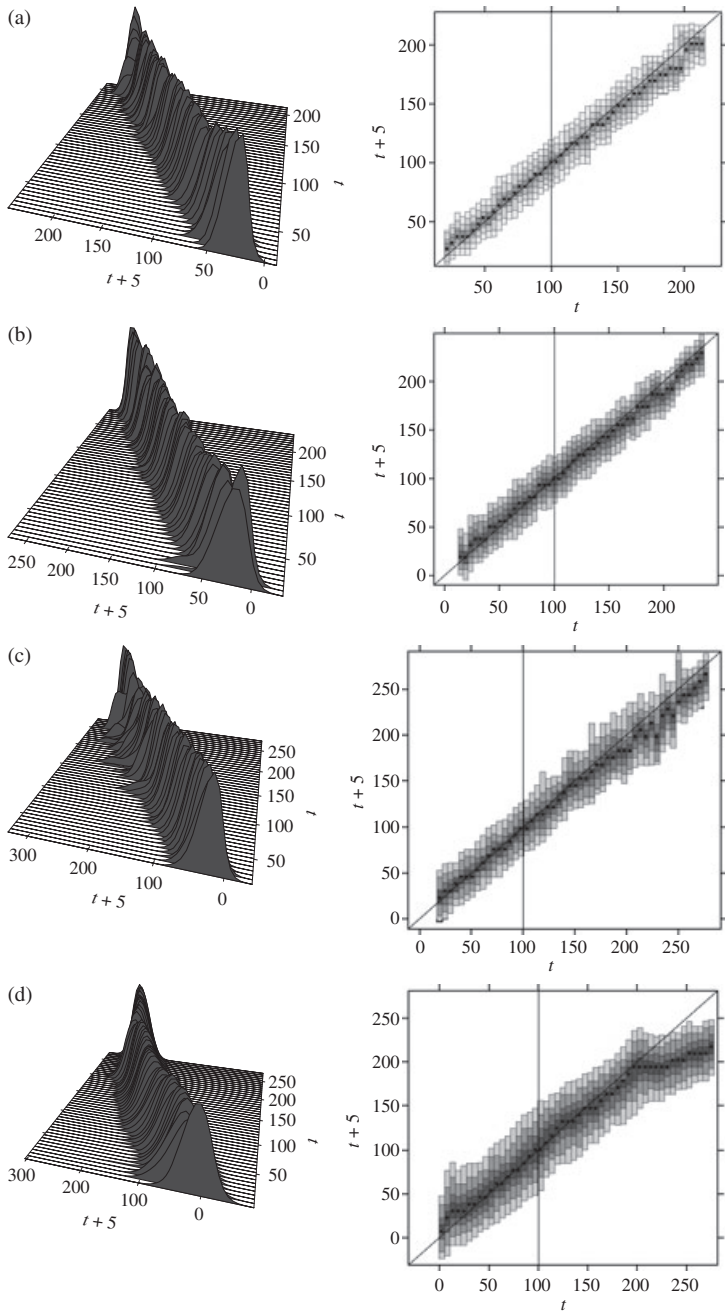
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|                      |                    |                     |
|----------------------|--------------------|---------------------|
| Albania              | Greece             | Norway              |
| Algeria              | Guatemala          | Oman                |
| Argentina            | Guyana             | Pakistan            |
| Australia            | Haiti              | Panama              |
| Austria              | Hungary            | Papua New Guinea    |
| Bangladesh           | Iceland            | Paraguay            |
| Barbados             | India              | Peru                |
| Belgium              | Indonesia          | Philippines         |
| Benin                | Iran, Islamic Rep. | Poland              |
| Bolivia              | Ireland            | Portugal            |
| Botswana             | Israel             | Romania             |
| Brazil               | Italy              | Rwanda              |
| Bulgaria             | Jamaica            | Senegal             |
| Burundi              | Japan              | Sierra Leone        |
| Cameroon             | Jordan             | Singapore           |
| Canada               | Kenya              | South Africa        |
| Central African Rep. | Korea, Rep.        | Spain               |
| Chad                 | Kuwait             | Sri Lanka           |
| Chile                | Luxembourg         | Sweden              |
| China                | Madagascar         | Switzerland         |
| Colombia             | Malawi             | Tanzania            |
| Costa Rica           | Malaysia           | Thailand            |
| Cote d'Ivoire        | Mali               | Togo                |
| Cyprus               | Malta              | Trinidad and Tobago |
| Denmark              | Mauritius          | Tunisia             |
| Dominican Republic   | Mexico             | Turkey              |
| Ecuador              | Morocco            | Uganda              |
| Egypt, Arab Rep.     | Namibia            | United Kingdom      |
| El Salvador          | Nepal              | United States       |
| Fiji                 | Netherlands        | Uruguay             |
| Finland              | New Zealand        | Venezuela, RB       |
| France               | Nicaragua          | Zambia              |
| Germany              | Niger              | Zimbabwe            |
| Ghana                | Nigeria            |                     |

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APPENDIX B

Intradistribution Dynamics. Five-year Transition Periods. (a) Total globalisation; (b) Economic globalisation; (c) Social globalisation; (d) Political globalisation



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