ISSN: 1576-0162

To What Extent Do Regional Disparities Depend on the Measure and Indicator Employed?: A Reference to the EU

¿En qué medida las disparidades regionales dependen de las medidas e indicadores empleados? Un estudio para la UE

José Villaverde
University of Cantabria, University of Limerick
villavej@unican.es

Adolfo Maza
University of Cantabria
adolfo.maza@unican.es

Recibido: octubre de 2011; aceptado: noviembre de 2012

Abstract

The reduction of EU regional disparities in development levels is a key goal in the European Commission's policy agenda, but there are at least two debatable points that have captured the attention of academics and policy-makers: how to measure disparities between regions and the practical meaning of the word *development*. This paper attempts to contribute to this debate by shedding some light on these two points. First, as different measures have been proposed to evaluate the evolution of (regional) disparities, the report attempts to verify whether all of them roughly convey similar information. Second, given that different (single and composite) indicators, other than the traditional per capita GDP, have been proposed to represent the term development, the paper wants to see whether the conclusions drawn from the use of these single and composite indicators are generally similar to those from the per capita GDP. Regarding inequality measures, the results tended to show that all of them convey more or less the same information, namely, a common time pattern leading to a significant reduction of regional disparities in EU27 during the period 1995-2007. With respect to the development indicators, the results tend to support the conclusion that regional variations in development, whatever indicator is employed, are closely related to variations in per capita GDP.

Keywords: Regional Disparities; Measures; Development; Single and Composite Indicators.

Resumen

La reducción de disparidades regionales en la UE constituye uno de los objetivos principales de la agenda política de la Comisión Europea. Al respecto, sin embargo, hay cuando menos dos cuestiones básicas que suscitan un amplio debate entre académicos y dirigentes políticos: cómo medir las disparidades entre regiones y cuál es el significado del término *desarrollo*. Este trabajo trata de arrojar algo de luz sobre estas cuestiones. Primero, y dado que se han propuesto diferentes medidas para calibrar la magnitud de las disparidades, el estudio trata de averiguar si todas ellas conducen, o no, a similares resultados. Segundo, considerando que diferentes indicadores (tanto simples como compuestos), distintos al tradicional PIB per capita, han sido sugeridos para determinar el grado de desarrollo de una región, este trabajo estudia si las conclusiones obtenidas a partir de todos ellos son, en esencia similares a las obtenidas con el PIB per capita. Las conclusiones del estudio muestran que, con respecto a las medidas de desigualdad, no importa cual se utilice ya que todas ellas conducen a similares resultados: una reducción de las disparidades regionales en la UE27 durante el periodo 1995-2007. En lo que se refiere a los indicadores de desarrollo, los resultados apoyan la idea de que las variaciones en el grado de desarrollo, sea cual sea el indicador utilizado para representar el mismo, se encuentran estrechamente correlacionadas con las variaciones en el PIB per cápita.

Palabras clave: Disparidades regionales; Desarrollo; Indicadores simples y compuestos.

JEL classification: R11, 011, E2.

1. Introduction[1]

The reduction of regional disparities in the European Union (EU) has been a prominent issue in the policy agenda since at least the mid-1970s, which saw the launch and implementation of the European Regional Development Fund (ERDF). This policy and, consequently, academic interest in the extent and scope of regional disparities in the EU[2] has been prompted mainly by two factors. From an analytical perspective, there exists a desire to test the validity of different and somewhat competing theories of economic growth, specifically the neoclassical and endogenous growth theories. And, from an empirical perspective, interest has been generated by successive EU enlargements and the economic changes related to the ongoing process of globalisation, which have greatly increased regional disparities within the area.

In order to address these regional disparities, the EU has implemented a so-called regional policy (now essentially renamed "cohesion policy") which, under the pressure of mounting evidence, has experienced several reforms over time, some of them quite drastic. The official reasoning behind this policy is that "economic and social cohesion is one of the main operational priorities of the EU" (Monfort, 2008, p. 3). Several articles in the treaty establishing the EU deal directly with this issue. Of these, Article 158 is among the most specific as it states that "in particular, the Community aims to reduce the disparities between the levels of development of the different regions and the backwardness of the least favoured regions or islands, including rural areas."

Although the stated goal of this article is apparently self-evident, there are at least two points that have captured the attention of academics and policy-makers: how to measure disparities between regions and the practical meaning of the word *development*. With respect to the first point, most empirical papers

[1] This is a reduced version of a longer research funded by SIEPS about *Regional disparities in the EU*.
[2] A wide variety of papers has been written on this issue, this naturally meaning that it is nearly impossible to acknowledge all the researchers that have been dealing with it. As a short reference to some interesting papers, it is worth mentioning the old but excellent survey edited by Armstrong and Vickerman (1995). More recently, the books edited by Cuadrado-Roura and Parellada (2002) and Fingleton (2003), reviews as Magrini (2004), and papers like Badinger *et al.,* (2004), Maza (2004), Fingleton and López-Bazo (2006), Meliciani (2006), Le Gallo and Dall'erba (2008), Monfort (2008), Mora (2008) and Maza and Villaverde (2011) are good references.

employ different summary measures. To deal with the second issue, many employ per capita GDP as the variable that, in theory, better describes the degree of development a region enjoys.

Bearing this in mind, the current paper attempts to contribute to the empirical literature by shedding some light on these two points. Therefore, the purpose of this work is two-fold, with both aspects being comparative in nature. First, as different measures have been proposed to evaluate the evolution of (regional) disparities, we want to verify whether all of them roughly convey similar information. Second, and in the same vein, given that different (single and composite) indicators, other than per capita GDP, have also been proposed to represent the term "*development*", we want to see if the conclusions drawn from the former are generally similar to those from the latter.

The remainder of this paper is organised as follows. Section 2 briefly reviews some of the most widely used measures of regional disparity, while Section 3 addresses the issue of which indicators are more suitable to represent what is encompassed within the term *development*. With reference to the NUTS2 regions of the EU27,[3] Section 4 applies the measures mentioned in Section 2 to the indicators considered in Section 3 in order to test whether the use of one or other indicator and one or other disparity measure makes any noticeable difference either on the evolution of disparities or in the ranking of the regions. Finally, some concluding remarks are presented in Section 5.

2. Measures of regional disparities

As indicated in Villaverde and Maza (2011a: 148) the term "disparity is a multifaceted concept encompassing dimensions such as convergence, inequality, polarisation and concentration". Of these four dimensions, the dimension of inequality probably offers the broadest perspective. Yet, inequality is not an easy concept to capture; on the contrary, it can be said that "Inequality is like an elephant: You can't define it but you know it when you see it" (Fields, 2001: 14). However interesting the debate regarding the meaning of inequality, we are not going to delve into it deeply here; for short, we consider it in its simplest sense that two or more quantities are the same (Villaverde and Maza, 2011a).

Although initially devised to address inequality issues between individuals, most of the conventional measures can easily be, and have been, adapted to address inequality between territories. The problem with these measures is that –because they employ different weighting schemes and some of them are based on social welfare judgements while others are not- they may offer different views of the extent and evolution of this inequality and none of them is universally accepted as being superior to the others. As this is an empirical

[3] For statistical reasons all our indices have been calculated for 264 regions, the official number being 271 regions.

paper, we believe that a practical way of solving this issue is to jointly consider a representative set of inequality measures. If all of them point to the same direction, we can be relatively sure about the robustness of the conclusions obtained. Following this rather convenient approach, we propose to use five of the most commonly used summary measures of inequality (for a reference to all these indexes see, for example, Villaverde and Maza, 2011b): σ-convergence (computed as the coefficient of variation), the Gini index (G), two versions of the Theil index (T(0) and T(1)), and the Atkinson index (A(1)). The first four are positive measures of inequality, while the fifth is a normative measure based on value judgments regarding welfare lost due to the existence of inequality.

3. Which variables are most accurate as indicators of development? Single or composite indicators?

The term *development* is widely used in the literature (as well as in ordinary conversation), and is somewhat similar to the word *inequality* in that people generally understand what one is talking about. However, since it is a very broad concept, it is difficult to define and even more difficult to capture in an indicator. For instance, from the European Commission point of view, the term *development* employed in Article 158 of the EU Treaty sometimes refers to the well-being or living conditions of European citizens, but other times alludes to the actual economic performance of EU countries and regions and, yet other times, pertains to the competitiveness of EU countries and regions.[4]

In an effort to create a working definition, researchers, policy-makers, and international institutions have offered various proposals addressing how to measure country/regional development. One of the most interesting proposals is that of the United Nations Development Programme with its yearly publication of the Human Development Report, in which the Human Development Index (HDI), inspired by Sen's development theory, is included (UNDP, 1990). More recently, the Commission on the Measurement of Economic Performance and Social Progress (CMEPSP) created by the President of the French Republic (Stiglitz *et al.,* 2009) has offered interesting insights into the issue.

Typically, national or, as is the focus of this paper, regional development, is measured by gross domestic product (GDP) per capita, mainly for the handy usability of this indicator. In fact, per capita GDP is the most frequently used indicator as, directly or indirectly, it is considered to reflect a region's production capacity, income, and/or economic development level.[5] However, the premise

[4] Recent examples of this flexible, interchangeable interpretation can be found in European Commission (2010).

[5] See, for instance, Khan (1991) and Mankiw *et al.* (1992) and, more recently, the "Communication from the Commission to the Council and the European Parliament" on the issue of "GDP and beyond. Measuring progress in a changing world" (European Commission, 2009) in which specifically states that "GDP has also come to be regarded as a proxy indicator for overall societal development and progress in general" (p. 2).

of the HDI and the CMEPSP report, as well as that of many other critics of the *de facto* position of this variable as the primary (or sole) indicator of development (see e.g. Davidson, 2000), is that, although per capita income is a key component in measuring economic development, there are other dimensions that are closely linked to quality of life and the opportunities available to individuals that should also be taken into consideration. Among these, it is thought that non-income dimensions such as health, education, personal activities, political voice and governance, social connections, environmental conditions, and personal and economic (in)security should also play a role.

Acknowledging the soundness of these, and other, proposals, but also considering the difficulty of its implementation (as indicated in the CMEPSP report), or its lack of practical relevance to the EU case, here we adopt a very simple yet rigorous approach. That is, in order to measure disparities in the degree of regional development in the EU27, we use two different sets of indicators. The first is made up of some highly significant individual socio-economic variables, and the second set consists of various groups of composite indicators. Both approaches have pros and cons, and there is no generally accepted rule for determining which is best.

Similar to what was said in Section 2 regarding inequality measures, our idea is very simple but logical: if all these (single and composite) indicators point to conclusions somewhat similar to those obtained using per capita GDP, then we would get a reasonable picture of the evolution of disparities in the EU27 regions' development, and of the changes in the ranking of the regions. As a result, policy-makers would be in a better position to address the problems they seek to ameliorate.

Which are, therefore, the original, key variables we have singled out for our analysis? Although we are well aware of the criticism directed at per capita GDP we have opted to use it as our benchmark in accordance with a long standing tradition in economics. In its favour is the fact that per capita GDP is an unambiguous indicator of the strength of a region relative to others. However, as mentioned previously, it has been argued that, with the word *development*, one is referring to a concept with multiple dimensions which, to be properly measured, would need other indicators besides per capita GDP. Following this line of reasoning there are, in our opinion, two possible courses of action: the first and simplest consists of taking a group of single variables and analysing, separately, their evolution over time; and the second possibility involves the construction of composite indicators based on these single variables. We propose to use both options so, in addition to per capita GDP, we elected to employ the following as our single indicators: productivity (PR), compensation per employee (wages, W), household expenditure (HE), disposable income (DI), and the unemployment (UR) and employment (ER) rates. Some of these indicators are, on an *a priori* basis, better suited for measuring what could be termed *economic development, economic performance*, or *competitiveness* (e.g. per capita GDP, productivity), while others are better suited for measuring social aspects of development (e.g. disposable income, household expenditure and unemployment rate) and, finally, others (wages, activity and employment rates) could easily play both roles.

According to some opinions, namely those of the United Nations Development Programme and the CMEPSP, the first option—using separately single indicators other than per capita GDP—does not add much to the use of this variable alone as a proxy for development. Therefore, the construction of composite indices has been proposed. Although this type of indicator has its own drawbacks, such as difficulty of interpretation, its construction has become very popular in the last few years, to the point that the OECD has produced a handbook giving directions as to how to proceed (Nardo *et al.*, 2005).

In our case, we have opted initially for computing a very simple yet consistent composite index echoing the HDI, but, in order to be more representative of the EU case, using different single indicators. Therefore, we proceed in four steps: First, we choose the variables, X_{ij}, to be used as our single indicators. In practice, these are the seven variables previously mentioned, making $i = 1, 2, \ldots 7$.[6] Second, we rescale them using the expression:[7]

$$I_{ij} = \frac{Actual\ value\ X_{ij} - Minimum\ value\ X_{ij}}{Maximum\ value\ X_{ij} - Minimum\ value\ X_{ij}}$$

Third, an intermediate indicator I_j is defined for each region j as the average of the single indicators X_{ij}, and fourth, we rescale the composite indicator by making the average of I_j equal to 100. The average for different *ad hoc* weightings is computed both in arithmetic and geometric terms, the first under the assumption of perfect substitutability across all single indicators considered, and the second under the assumption of imperfect substitutability among them.

In total, we have computed five rounds of four indicators with three variables. Thus, we have 20 versions of the index, as shown in Table 1. For the first round of four indicators, we have given the same weight to each variable, and for the other four rounds, we began by assuming that the first two variables (those not related to the labour market) have the same weight and, in total, this equals 50%, 60%, 70%, 80%, respectively.

A composite indicator like the previous one can be criticised on at least two counts: the *ad hoc* weights chosen for its computation, and the small number of variables used.[8] To address the first of these issues, the *ad hoc* weighting employed in the construction of the index, we have opted to compute a new

[6] Actually, instead of UR we have used the variable "1/UR", meaning that larger values represent better situations for the region considered.
[7] This procedure implies that the rescaled observations take on values between 0 and 1. Although its main drawback is that the distribution of normalized values is heavily influenced by outlier observations, it is commonly employed (for a recent reference see Olivié and García, 2010).
[8] However, it must be recognised that, as it is done in this paper, the index is widely used in research and policy work (McGillivray and Shorrocks, 2005).

composite indicator. Specifically, we used all of our seven single indicators and applied a principal components analysis (PCA). In this way, the weightings are, to a great extent, endogenously determined. Following standard practice, we proceed in four steps:

- First, we analyse the correlation structure of the variables. For this, we rely on the KMO measure of sampling adequacy and Bartlett's test of sphericity. The results reveal that KMO statistic is greater than 0.5, and Bartlett's measure on the correlation matrix passes at the 0.05 significance level, indicating that our sample is adequate to conduct a PCA.
- Second, we proceed to the factor extraction step and observe that, as expected, PCA extracts two factors (Table 2). These two factors, with eigenvalues greater than 1, explain more than 84% of the total variance of the original indicators.
- Then, we calculate factor loadings, for which we first have the component matrix, indicating the loading (correlation) of each variable with each factor and, subsequently, the communalities or proportion of the variance explained by the two factors. Afterwards, although not essential in our case, we compute the rotated component matrix, with the results shown in Table 3. The rotated component matrix results lead us to conclude that the variables that correlate highly with factor 1 are all related to economic activity. Therefore we label this factor *income*, while factor 2 is highly correlated with the employment and unemployment rates, so an appropriate label is *labour market*.

  This two-factor solution has three primary advantages: first, all of the original variables are highly correlated with one factor and weakly with the other. Second, all variables have at least one factor loading with a magnitude greater than 0.5, which experts consider to be very significant. Third, the reliability of the extracted factor structure is clear since it explains between 72 and 90% of the variance of each original variable.
- The fourth and final step involves a weighting and aggregation procedure to obtain the summary indicators. To construct the weights from the rotated component matrix, we follow the approach described by Nicoletti *et al*. (2000: 22), in which the weights for each factor "are obtained by squaring and normalising the estimated factor loadings". Weights thus obtained are then applied to the original variables and the products are summed to give two intermediate composite indicators. Finally, we aggregate the intermediate indicators "by weighting each composite using the proportion of the explained variance in the dataset" (Nardo *et al.*, 2005: 65). The weights obtained for both the intermediate and summary indicators are shown in Table 4.

Lastly, to address the relatively small number of variables used in our analysis, we also took a cursory look at the EU Regional Competitiveness Index (RCI), a regional composite index developed by Annoni and Kozovka (2010: 28) for the European Commission. The main goal of the RCI is "to map economic performance and competitiveness at the NUTS2 regional level for all EU Member

States", for which the authors use a framework that includes what they refer to as eleven major pillars (institutions, macroeconomic stability, infrastructure, health, quality of primary and secondary education, higher education/training and lifelong learning, labour market efficiency, market size, technological readiness, business sophistication and innovation), each one of which is the result of employing various single indicators (in total some 79 single indicators are used). Although very interesting, this index suffers from the drawback mentioned in the first Human Development Report (UNDP, 1990: 13), that is, "having too many indicators in the index would blur its focus and make it difficult to interpret and use". Khan (1991) also argues that using a composite index for comparing the level of development across countries (regions) has some major disadvantages; for a summary of the pros and cons of using composite indicators, see Nardo *et al.* (2005).

4. Regional disparities in the EU

4.1. Data collection, missing data and imputation methods

In this section, we present the results obtained on the evolution of regional disparities in the EU27 over sample period 1995-2007 for all our (single and composite) indicators. However, a word of caution is warranted regarding the data used for computing these indicators. Given the limitations of regional data availability, working with regional data at EU27 level, other than for the most common variables, is difficult due to two factors. First, because there are so many omitted data points in so many indicators in the official (EUROSTAT) and some private but widely used (Cambridge Econometrics) statistical databases, it is absolutely necessary to make assumptions, including some which are very crude, on how to deal with missing information. Second, because in some cases original and/or imputed data are totally inconsistent and thus not reliable.

In any event, following the suggestion made by Annoni and Kozovska (2010), we have considered a limit of 10–15% missing data to be the threshold for including a single indicator in our computations. As a result, some variables that, in our opinion, should have been included in the analysis[9] have been completely discarded, as it makes no sense to use a different set of original variables for (nearly) every year of the sample. Depending on the number of missing observations for each indicator, we have proceeded as follows:

1. If NUTS1 values are available, we assign these values to NUT2 regions.
2. If data are available at country and NUTS2 levels, but only for some years, and only country data for others, we impute values to NUT2 regions by taking the average of the "region/country" ratios.
3. If data are available at country and NUTS2 levels for some years but there is no information at all (neither for the country nor for the regions) for others, we extract a quadratic trend.

[9] These variables are mainly related to public capital, human capital, and technological capital endowments.

4. If, for a specific indicator and specific country, data are unavailable for all years, we proceed in three steps: First, we identify countries with a similar per capita GDP; second, for these countries, we calculate the "indicator/GDP" ratio and then their average; and third, we impute to this country a value equal to the product of its GDP times the aforementioned ratio.

As a result of these data issues, one should be aware that, except for per capita GDP and possibly productivity, when using the data sets mentioned above, the validity of the conclusions drawn from the analysis may, in some cases, be affected by these interpolation methods.

4.2. The evolution of regional disparities in the EU27: The results

With the aforementioned precautions in mind, we apply the inequality measures mentioned in Section 2 to the (single and composite) indicators mentioned in Section 3. After normalising our results relative to those of the first year (1995 = 100), Figure 1 offers a clear idea of how regional development disparities have evolved over time for each of the single and composite indicators we computed.[10] Three main conclusions can be drawn.

- The foremost conclusion is that it does not matter much which indicator (single or composite) and inequality measure is being considered, since the evolution of regional disparities nearly always follows the same time pattern. There are, however, two main differences between single and composite indicators: a) the time patterns of single indices tend to be more linear (less variable) than those of composite indicators, and b) the period between 2000 and 2004 tends to systematically show higher values with composite (excluding these computed using factor analysis) than single indicators.
- The second conclusion is that, depending on the indicator considered, the decline in regional disparities varies substantially. This decline is much larger when wages and/or disposable income are involved in the computation.
- The third conclusion is that the observed decrease in the level of inequality shows large discrepancies depending on the measure considered; the degree of variability is the lowest with the Gini coefficient and the coefficient of variation.

These conclusions are strengthened when we compute the Pearson correlation coefficient between all our (single and composite) indicators. The results shown in Table 5 (which run through to 2007 and use arithmetic mean indices; the results of the rest of the years and geometric average indices are available

[10] As the results obtained for composite indicators based on HDI methodology are very similar, both with arithmetic and geometric averages, only the first ones are presented here, while the second are available upon request.

upon request) indicate that per capita GDP and productivity are the indicators that best correlate with the others. In particular, per capita GDP correlations are quite strong (always >70% and in most cases >80%) with all composite indicators. In contrast, household expenditure and unemployment and employment rates tend to correlate much more poorly with the other indicators.

Although the two previous conclusions offer interesting insights into the evolution of regional disparities in the EU, it would be enlightening to see whether regions tend to be situated in roughly the same position whatever indicator is used, as this can be considered a key element in the design of regional policy. This evaluation can be accomplished by computing the Spearman rank correlation coefficient (Table 6), although we believe that we can get more information by using the approach proposed herein. Our approach is based on a reinterpretation of the so-called transition matrix approach (Maza *et al.* 2010) in that instead of measuring the mobility degree in a distribution between two years, it measures, for a specific year, the "mobility" degree between any two of our distributions, one of which is always the per capita GDP distribution. To compute our transition matrix, we defined, for each distribution, a set of five non-overlapping states, each containing 20% of the regions. In other words, we have made regional groups according to quintiles (the lowest 20%, the second 20%, and so forth).[11] The information contained in the transition matrix has also been summarized by applying Shorrocks Mobility Index (SMI).[12] The results obtained for 2007 for all our single and composite indicators (Table 7; results with geometric averages once again available upon request) indicate that:

- The values of the elements along the main diagonal are, in general, the highest of each row, meaning that in most cases the region's positions are roughly the same regardless of the indicator considered.
- This consistency is most pronounced among the very well-positioned (top quintile) and very poorly-positioned (bottom quintile) regions, as the diagonal values are much greater in those cases than for the other quintiles.
- As expected, "mobility" from one quintile to adjacent quintiles is greater than to more distant quintiles. This implies that, when discrepancies between per capita GDP and the other indicator emerge, they are not overly large.
- According to Shorrock's mobility index, the "mobility" degree is, in most cases, around 0.5, although it varies from a minimum of 0.29 to a maximum of 0.66. While this finding could imply that, in most cases, the mo-

[11] The criterion on which this division is based is arbitrary, as there is no theoretical method to achieve an appropriate partition of the distribution (see Magrini, 1999 and Bulli, 2001).

[12] This index, *SMI* for a transition matrix T is given by:

$$SMI(T) = \frac{n - tr(T)}{n - 1}$$

where *tr* denotes the trace of the matrix and *n* is the number of states (5 in this case). The index is normalised to take values between 0 and 1 by dividing it by : $\frac{n}{n-1}$

bility degree between any two indicators is "medium", the truth is that, considering the small range of the second, third, and fourth quintiles, this mobility should be termed as "low".[13]

5. Concluding remarks

This paper has tried to shed some new light on the evolution of disparities in the degree of development of European regions at the NUTS2 level. As there is an ongoing and heated debate regarding which measure(s) and indicator(s) are best suited to evaluate this evolution, we have examined both issues. We started by considering that the analysis of development disparities can be best looked at from the point of view of inequality, for which we proposed using five of the most conventional inequality measures (σ, Atkinson, Gini, and Theil 0 and 1). We then discussed which indicator should be used to describe the degree and evolution of regional development disparities. We used a battery of both single and composite indicators and compared their results with those obtained with per capita GDP.

Regarding inequality measures, the results tended to show that all of them convey more or less the same information, namely, a common time pattern leading to a significant reduction of regional disparities in EU27, though the Gini index and the coefficient of variation consistently displayed a lower degree of variability and change than the others.

With respect to the development indicator, our results tend to support the conclusion that regional variations in development, whatever indicator is employed, are closely related to variations in per capita GDP. According to this, should we pay attention to only this variable and ignore other single and/or composite indicators? The plain answer to this question is: "IT DEPENDS".

To be more explicit, the answer would be NO if ideally we were able to fulfil these three conditions:

- Agreement regarding the real content of the term *development*[14]
- Agreement on the attributes or dimensions that best fit with this agreed concept
- And, finally, establishment of a basic databank with reliable, consistent and far-reaching time series observations for all of the underlying variables (single indicators) behind the previously agreed dimensions.

However, acknowledging the difficulty of achieving three conditions, we propose a very simple "rule of thumb": keep it simple. In other words, it appears to us that:

1. Per capita GDP is the best single indicator of the degree of development in the EU27 regions, as it is the most widely available and reliable of all indicators. Therefore, increasing efforts should be made by the Euro-

[13] The results obtained for the Spearman correlation coefficient (Table 6) support this statement.
[14] As noted by Nardo *et al.* (2005) "what is badly defined is likely to be badly measured".

pean statistical offices and, in particular, by EUROSTAT, to improve, as much as possible, the way this variable is estimated.

2. If, as mentioned in Section 3, it is considered that development is a multifaceted concept that, to be properly measured, requires a composite indicator, then we believe that this should be constructed using as few single indicators as possible. In fact, the greater the number of single indicators used in the construction of a composite indicator, the more assumptions regarding the data imputation will be required, and the resulting composite indicator will be more difficult to interpret and less reliable. Finally, the decision to use simple or more complex composite indicators does not seem to be a substantial matter.

Bibliographic References

Annoni, P. and Kozovska, K. (2010): *EU Regional Competitiveness Index 2010*. European Commission, JRS-IPSC. Publications Office. http://easu.jrc.ec.europa.eu/eas/downloads/pdf/JRC58169.pdf

Armstrong, H.W. and Vickerman, R.W. (Eds.) (1995): *Convergence and Divergence among European Regions*, Pion Ltd.

Badinger, H., Müller, W.G. and Tonld, G. (2004): “Regional Convergence in the European Union, 1985-1999: A Spatial Dynamic Panel Analysis”, *Regional Studies,* 38(3), 241-253.

Bulli, S. (2001): “Distribution Dynamics and Cross-country Convergence: A New Approach”, *Scottish Journal of Political Economy*, 48(2), 226-243.

Cuadrado-Roura, J.R. and Parellada, M. (Eds) (2002): *Regional Convergence in the European Union: Facts, Prospects and Policies*, Springer, Berlin and New York.

Davidson, E.A. (2000): *You Can’t Eat GNP. Economics as if Ecology Mattered*, Perseus, MA.

European Commission (2009): *GDP and Beyond. Measuring Progress in a Changing World*, COM(2009) 433 final.

European Commission (2010): *Investing in Europe’s Future. Fifth Report on Economic, Social and Territorial Cohesion*.

Fields, G.S. (2001): *Distribution and Development: A New Look at the Developing World*, MIT Press, Massachusetts and London.

Fingleton, B. (Ed.) (2003): *European Regional Growth*, Springer, Berlin.

Fingleton, B. and Lõpez-Bazo, E. (2006): “Empirical Growth Models with Spatial Effects”, *Papers in Regional Science*, 85, 177-198.

Khan, H. (1991): “Measurement and Determinants of Socioeconomic Development: A Critical Conspectus”, *Social Indicators Research*. 24, 153-175.

Le Gallo, J. and Dall’erba, S. (2008): “Spatial and Sectoral Productivity Convergence Between European Regions, 1975-2000”, *Papers in Regional Science*, 87(4), 505-525.

Magrini, S. (1999): "The Evolution of Income Disparities across the Regions of the European Union", *Regional Science and Urban Economics, 29, 257-281*.

Magrini, S. (2004): Regional di(convergence). In: Henderson, J. and Thisse, J. (Eds), *Handbook of Regional and Urban Economics*, Elsevier, Armsterdam, pp. 2741-2796.

Mankiw, G., Romer, D. and Weil, D. (1992): "A Contribution to the Empirics of Economic Growth", *Quarterly Journal of Economics*, 107, 407-437.

Maza, A. (2004): "La distribución regional de la renta y su polarización en la Unión Europea", *Revista de Economía Mundial*, 10-11, 151-169.

Maza, A., Hierro, M. and Villaverde, J. (2010): "Measuring Intra-distribution Dynamics: An Application to the European Regions", *Annals of Regional Science*, 45, 313-329.

Maza, A. and Villaverde, J. (2011): "EU Regional Convergence and Policy: Does the Concept of Region Matter?", *Journal of Policy Modeling*, 33(6), 889-900.

McGillivray, M. and Shorrocks, A. (2005): "Inequality and Multidimensional Well-being", *Review of Income and Wealth*, 51(2), 193-199.

Meliciani, V. (2006): "Income and Employment Disparities Across European regions: The Role of National and Spatial Factors", *Regional Studies*, 40(1), 75-91.

Monfort, P. (2008): Convergence of EU Regions. Measures and Evolution. EU Regional Policy Working Papers, 01/2008.

Mora. T. (2008): "Factors Conditioning the Formation of European Regional Convergence clubs", *Annals of Regional Science*, 42(4), 911-927.

Nardo, M., Saisana, M, Saltelli, A. and Tarantola, S. (2005): "Handbook on Constructing Composite Indicators: Methodology and User Guide". OECD, STD/DOC(2005)3.

Nicoletti, G., Scarpertta, S. and Boylaud, O. (2000): "Summary Indicators of Product Market Regulation with an extension to Employment Protection Legislation", *OECDE Economics Department Working Papers* 226, ECO/WKP(99)18. http://www.oecd.org/dataoecd/21/13/1880867.pdf

Olivié, I. and Garcĩa, C. (2010): "¿Dónde debe ir la ayuda? Propuesta de un índice de desarrollo para la asignación internacional de la ayuda", *Revista de Economía Mundial*, 24, 131-162.

Stiglitz, J., Sen, A., and Fitoussi, J.P. (2009): *Report by the Commission on the Measurement of Economic Performance and Social Progress*. http://www.stiglitz-sen-fitoussi.fr./en/index.htm

UNDP (1990): *Human development report*, New York, OUP.

Villaverde, J. (2006): Indicators of Regional Economic Convergence; In: De Lombaerde P. (Ed.), *Assessment and Measurement of Regional Integration*, Routledge, London, 146-161.

Villaverde, J. and Maza, A. (2011a): Measurement of Regional Economic Convergence; In: De Lombaerde P., Flôres, R., Lelio Iapadre, P. and Schultz, M. (eds.), *The Regional Integration Manual*, Routledge, London, pp. 147-178.

Villaverde, J. and Maza, A. (2011b): Regional Disparities in the EU: Are They Robust to the Use of Different Measures and Indicators?. SIEPS, nº 4.

Table1. Weights for HDI

	GDP	PR	W	HE	DI	1/UR
I11	33.3	33.3				33.3
I12	25.0	25.0				50.0
I13	30.0	30.0				40.0
I14	35.0	35.0				30.0
I15	40.0	40.0				20.0
I21		33.3	33.3			33.3
I22		25.0	25.0			50.0
I23		30.0	30.0			40.0
I24		35.0	35.0			30.0
I25		40.0	40.0			20.0
I31		33.3		33.3		33.3
I32		25.0		25.0		50.0
I33		30.0		30.0		40.0
I34		35.0		35.0		30.0
I35		40.0		40.0		20.0
I41		33.3			33.3	33.3
I42		25.0			25.0	50.0
I43		30.0			30.0	40.0
I44		35.0			35.0	30.0
I45		40.0			40.0	20.0

Table 2. Total variance explained

Component	Initial eigenvalues			Extraction sums of square loadings			Rotation sums of square loadings		
	Total	% variance	Cumulative %	Total	% variance	Cumulative %	Total	% variance	Cumulative %
1	4.571	65.293	65.293	4.571	65.293	65.293	4.041	57.727	57.727
2	1.315	18.787	84.080	1.315	18.787	84.080	1.845	26.353	84.080
3	0.423	6.036	90.116						
4	0.395	5.638	95.754						
5	0.165	2.354	98.108						
6	0.121	1.727	99.835						
7	0.012	0.165	100.000						

TABLE 3. ROTATED COMPONENT MATRIX AND COMMUNALITIES

Variables	Factors		Communalities
	F1 (Income)	F2 (Labour market)	
GDP	0.873	0.369	0.899
PR	0.942	0.013	0.888
W	0.925	0.136	0.875
HE	0.812	0.241	0.717
DI	0.902	0.267	0.884
1/UR	0.205	0.862	0.786
ER	0.142	0.904	0.837

TABLE 4. PCA WEIGHTS

Variables	Factor loadings		Weights of variables in factor	
	F1	F2	F1	F2
GDP	0.76	0.14	0.19	0.07
PR	0.89	0.00	0.22	0.00
W	0.86	0.02	0.21	0.01
HE	0.66	0.06	0.16	0.03
DI	0.81	0.07	0.20	0.04
1/UR	0.04	0.74	0.01	0.40
ER	0.02	0.82	0.00	0.44
Total	4.04	1.84	1.00	1.00
Weight of factors in summary indicator			0.69	0.31

Figure 1. Evolution of disparities

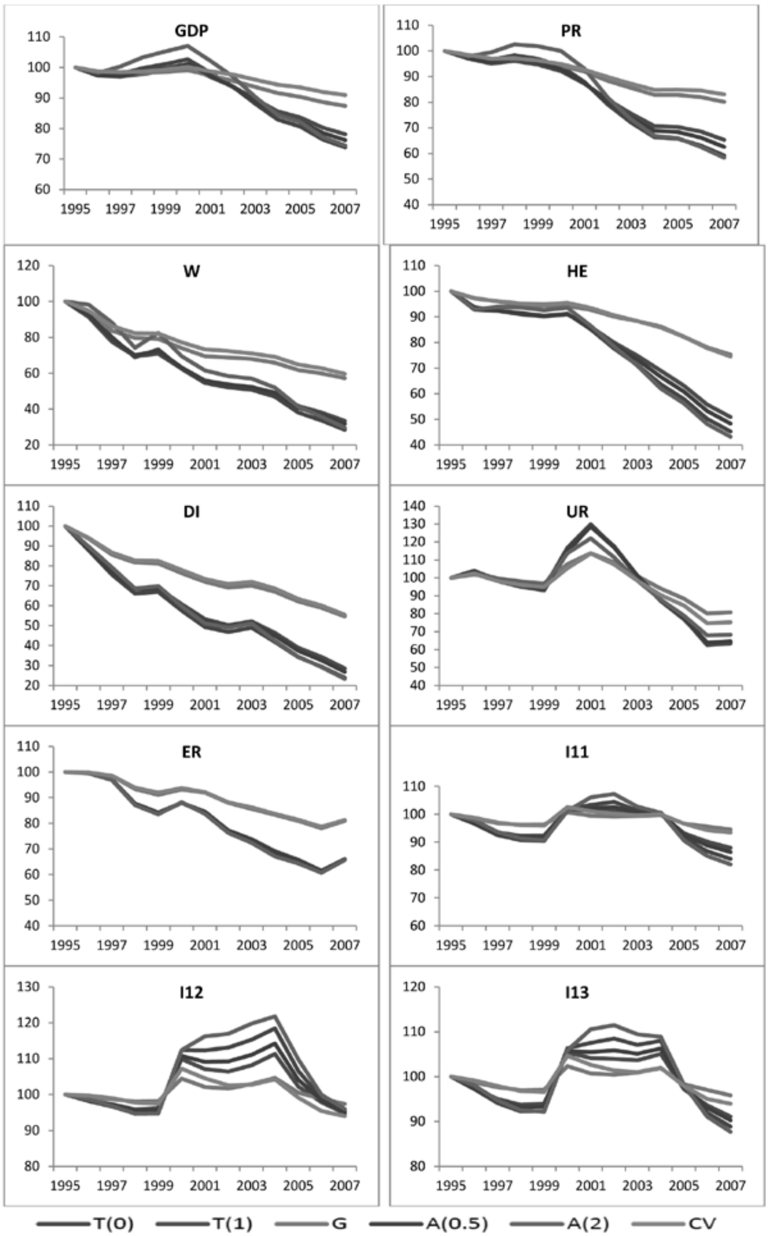

FIGURE 1. EVOLUTION OF DISPARITIES (CONT.)

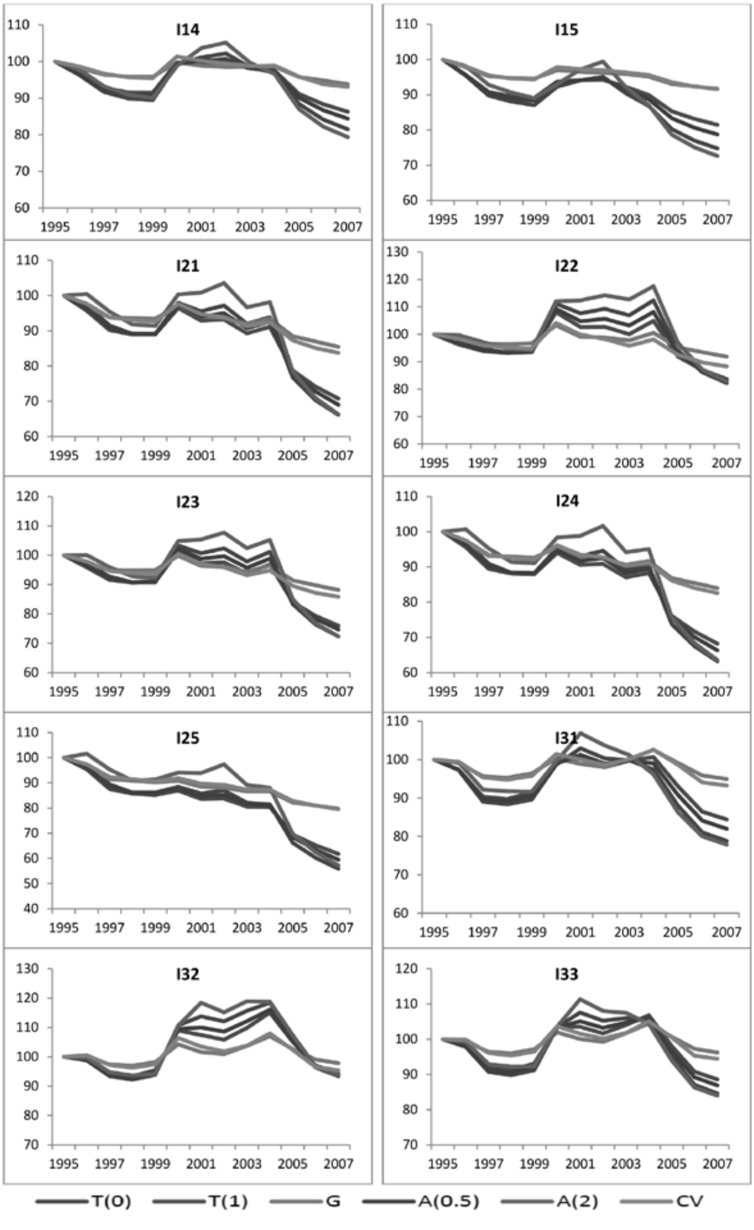

Figure 1. Evolution of disparities (cont.)

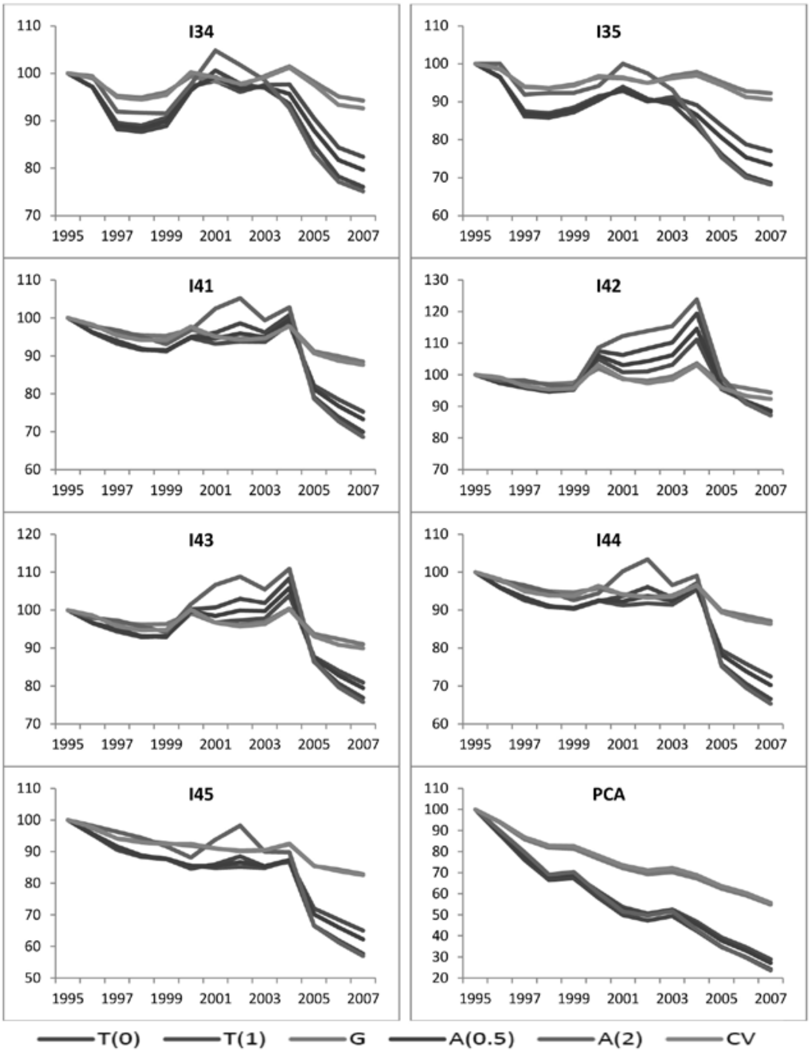

Table 5. Correlation matrix (Pearson coefficient). 2007

	GDP	PR	W	HE	DI	1/UR	ER	I11	I12	I13	I14	I15	I21	I22	I23	I24	I25	I31	I32	I33	I34	I35	I41	I42	I43	I44	I45	PCA	RCI
GDP	1.00																												
PR	0.92	1.00																											
W	0.81	0.83	1.00																										
HE	0.61	0.57	0.60	1.00																									
DI	0.79	0.76	0.79	0.68	1.00																								
1/UR	0.44	0.26	0.29	0.29	0.39	1.00																							
ER	0.56	0.20	0.31	0.37	0.39	0.59	1.00																						
I11	0.88	0.78	0.71	0.55	0.73	0.80	0.59	1.00																					
I12	0.76	0.62	0.59	0.48	0.64	0.91	0.62	0.97	1.00																				
I13	0.84	0.71	0.66	0.52	0.70	0.85	0.61	1.00	0.99	1.00																			
I14	0.91	0.81	0.73	0.56	0.75	0.76	0.58	1.00	0.96	0.99	1.00																		
I15	0.96	0.89	0.79	0.59	0.78	0.65	0.54	0.98	0.90	0.95	0.99	1.00																	
I21	0.86	0.79	0.83	0.58	0.78	0.75	0.52	0.97	0.94	0.96	0.97	0.96	1.00																
I22	0.75	0.64	0.68	0.51	0.68	0.89	0.58	0.96	0.99	0.98	0.95	0.90	0.97	1.00															
I23	0.82	0.73	0.77	0.55	0.74	0.82	0.55	0.98	0.97	0.98	0.97	0.94	0.99	0.99	1.00														
I24	0.88	0.82	0.86	0.59	0.79	0.72	0.50	0.96	0.92	0.95	0.97	0.96	1.00	0.95	0.99	1.00													
I25	0.91	0.88	0.92	0.62	0.82	0.59	0.44	0.92	0.84	0.89	0.93	0.95	0.97	0.89	0.95	0.99	1.00												
I31	0.80	0.70	0.69	0.81	0.77	0.75	0.56	0.92	0.90	0.92	0.92	0.89	0.92	0.91	0.92	0.91	0.87	1.00											
I32	0.72	0.58	0.59	0.67	0.68	0.89	0.61	0.93	0.96	0.95	0.92	0.86	0.91	0.96	0.94	0.89	0.82	0.97	1.00										
I33	0.77	0.66	0.66	0.76	0.73	0.81	0.58	0.93	0.93	0.94	0.92	0.89	0.92	0.94	0.93	0.91	0.86	0.99	0.99	1.00									
I34	0.81	0.72	0.71	0.83	0.78	0.71	0.54	0.91	0.88	0.90	0.91	0.89	0.91	0.89	0.91	0.90	0.88	1.00	0.96	0.99	1.00								
I35	0.83	0.78	0.75	0.89	0.81	0.59	0.49	0.86	0.80	0.84	0.87	0.88	0.87	0.82	0.86	0.88	0.87	0.98	0.89	0.95	0.99	1.00							
I41	0.83	0.74	0.72	0.59	0.83	0.81	0.55	0.97	0.96	0.97	0.97	0.94	0.97	0.97	0.97	0.96	0.92	0.93	0.95	0.95	0.92	0.88	1.00						
I42	0.72	0.59	0.59	0.50	0.70	0.92	0.59	0.95	0.99	0.97	0.94	0.87	0.93	0.99	0.96	0.91	0.83	0.91	0.97	0.94	0.89	0.81	0.97	1.00					
I43	0.79	0.68	0.67	0.56	0.78	0.86	0.57	0.97	0.98	0.98	0.96	0.92	0.96	0.98	0.98	0.95	0.89	0.93	0.96	0.95	0.91	0.85	1.00	0.99	1.00				
I44	0.85	0.77	0.74	0.61	0.85	0.77	0.54	0.97	0.95	0.97	0.97	0.95	0.97	0.95	0.97	0.96	0.93	0.93	0.93	0.94	0.93	0.89	1.00	0.96	0.99	1.00			
I45	0.89	0.85	0.81	0.65	0.91	0.66	0.48	0.95	0.88	0.92	0.95	0.96	0.95	0.90	0.94	0.96	0.95	0.91	0.87	0.90	0.91	0.90	0.98	0.90	0.95	0.99	1.00		
PCA	0.79	0.77	0.79	0.69	1.00	0.39	0.39	0.74	0.64	0.70	0.75	0.79	0.78	0.68	0.74	0.79	0.83	0.77	0.68	0.74	0.78	0.81	0.83	0.70	0.78	0.85	0.91	1.00	
RCI	0.71	0.55	0.62	0.47	0.50	0.44	0.65	0.67	0.62	0.65	0.68	0.69	0.67	0.62	0.65	0.67	0.67	0.63	0.60	0.62	0.63	0.62	0.61	0.57	0.60	0.61	0.61	0.50	1.00

Table 6. Correlation matrix (Spearman coefficient). 2007

	GDP	PR	W	HE	DI	1/UR	ER	I11	I12	I13	I14	I15	I21	I22	I23	I24	I25	I31	I32	I33	I34	I35	I41	I42	I43	I44	I45	PCA	RCI
GDP	1.00																												
PR	0.87	1.00																											
W	0.77	0.81	1.00																										
HE	0.50	0.43	0.45	1.00																									
DI	0.75	0.76	0.70	0.55	1.00																								
1/UR	0.57	0.34	0.31	0.30	0.41	1.00																							
ER	0.65	0.26	0.32	0.32	0.36	0.66	1.00																						
I11	0.90	0.75	0.66	0.49	0.70	0.83	0.66	1.00																					
I12	0.82	0.64	0.57	0.44	0.62	0.91	0.68	0.98	1.00																				
I13	0.87	0.71	0.62	0.47	0.66	0.86	0.67	1.00	0.99	1.00																			
I14	0.92	0.77	0.67	0.50	0.71	0.81	0.65	1.00	0.97	0.99	1.00																		
I15	0.96	0.84	0.72	0.51	0.74	0.73	0.62	0.98	0.93	0.97	0.99	1.00																	
I21	0.88	0.78	0.78	0.50	0.72	0.78	0.57	0.97	0.94	0.96	0.97	0.96	1.00																
I22	0.82	0.66	0.65	0.46	0.65	0.89	0.63	0.98	0.99	0.98	0.97	0.93	0.98	1.00															
I23	0.85	0.73	0.72	0.49	0.69	0.83	0.60	0.98	0.97	0.98	0.98	0.96	0.99	0.99	1.00														
I24	0.89	0.80	0.80	0.50	0.74	0.75	0.55	0.96	0.93	0.95	0.97	0.96	1.00	0.96	0.99	1.00													
I25	0.90	0.87	0.89	0.49	0.76	0.63	0.48	0.91	0.85	0.89	0.92	0.94	0.97	0.90	0.94	0.98	1.00												
I31	0.81	0.68	0.61	0.72	0.69	0.78	0.57	0.93	0.91	0.92	0.93	0.91	0.91	0.92	0.92	0.90	0.85	1.00											
I32	0.78	0.62	0.56	0.62	0.65	0.88	0.63	0.95	0.96	0.96	0.94	0.90	0.93	0.96	0.95	0.91	0.83	0.98	1.00										
I33	0.80	0.66	0.59	0.68	0.68	0.82	0.60	0.94	0.94	0.94	0.94	0.91	0.92	0.94	0.94	0.91	0.85	1.00	0.99	1.00									
I34	0.81	0.69	0.62	0.74	0.70	0.75	0.56	0.92	0.90	0.91	0.92	0.90	0.90	0.90	0.91	0.90	0.85	1.00	0.97	0.99	1.00								
I35	0.81	0.71	0.63	0.80	0.71	0.66	0.51	0.87	0.84	0.86	0.88	0.88	0.87	0.85	0.86	0.86	0.83	0.98	0.92	0.96	0.99	1.00							
I41	0.86	0.74	0.66	0.52	0.79	0.82	0.61	0.98	0.96	0.98	0.98	0.96	0.97	0.97	0.97	0.96	0.91	0.93	0.95	0.94	0.92	0.88	1.00						
I42	0.79	0.62	0.57	0.47	0.68	0.92	0.65	0.97	0.99	0.98	0.96	0.92	0.94	0.98	0.97	0.93	0.85	0.92	0.97	0.94	0.90	0.84	0.98	1.00					
I43	0.84	0.69	0.63	0.50	0.75	0.86	0.63	0.98	0.98	0.98	0.97	0.95	0.96	0.98	0.98	0.95	0.89	0.93	0.96	0.95	0.92	0.87	1.00	0.99	1.00				
I44	0.87	0.76	0.68	0.53	0.81	0.80	0.60	0.97	0.95	0.97	0.97	0.96	0.97	0.96	0.97	0.96	0.92	0.93	0.94	0.94	0.92	0.88	1.00	0.97	0.99	1.00			
I45	0.90	0.83	0.74	0.53	0.87	0.70	0.54	0.94	0.90	0.93	0.95	0.96	0.95	0.91	0.94	0.95	0.93	0.90	0.89	0.90	0.90	0.87	0.98	0.92	0.96	0.99	1.00		
PCA	0.75	0.77	0.71	0.55	1.00	0.41	0.36	0.70	0.62	0.67	0.71	0.74	0.73	0.65	0.70	0.74	0.77	0.69	0.65	0.68	0.70	0.71	0.79	0.68	0.75	0.81	0.88	1.00	
RCI	0.77	0.56	0.59	0.44	0.44	0.47	0.67	0.71	0.66	0.69	0.72	0.73	0.67	0.65	0.67	0.67	0.66	0.63	0.62	0.63	0.63	0.63	0.64	0.62	0.64	0.64	0.63	0.45	1.00

Table 7. Transition matrices (GDP *versus* the rest of indicators)

PR GDP	Q1	Q2	Q3	Q4	Q5
Q1	86.8	7.5	5.7	0.0	0.0
Q2	13.2	56.6	20.8	9.4	0.0
Q3	0.0	25.0	30.8	36.5	7.7
Q4	0.0	9.4	37.7	35.8	17.0
Q5	0.0	1.9	3.8	18.9	75.5
SMI			0.43		

W GDP	Q1	Q2	Q3	Q4	Q5
Q1	83.0	15.1	1.9	0.0	0.0
Q2	17.0	49.1	11.3	11.3	11.3
Q3	0.0	25.0	25.0	26.9	23.1
Q4	0.0	7.5	43.4	32.1	17.0
Q5	0.0	3.8	17.0	30.2	49.1
SMI			0.52		

HE GDP	Q1	Q2	Q3	Q4	Q5
Q1	77.4	15.1	7.5	0.0	0.0
Q2	11.3	20.8	22.6	26.4	18.9
Q3	3.8	21.2	25.0	23.1	26.9
Q4	5.7	26.4	17.0	26.4	24.5
Q5	1.9	17.0	26.4	24.5	30.2
SMI			0.64		

DI GDP	Q1	Q2	Q3	Q4	Q5
Q1	86.8	7.5	5.7	0.0	0.0
Q2	11.3	43.4	32.1	11.3	1.9
Q3	1.9	15.4	25.0	42.3	15.4
Q4	0.0	22.6	22.6	28.3	26.4
Q5	0.0	11.3	13.2	18.9	56.6
SMI			0.52		

1/UR GDP	Q1	Q2	Q3	Q4	Q5
Q1	50.9	22.6	13.2	13.2	0.0
Q2	35.8	22.6	18.9	17.0	5.7
Q3	9.6	32.7	21.2	25.0	11.5
Q4	1.9	15.1	17.0	28.3	37.7
Q5	1.9	7.5	28.3	17.0	45.3
SMI			0.66		

GDP \ ER	Q1	Q2	Q3	Q4	Q5
Q1	50.9	22.6	17.0	7.5	1.9
Q2	35.8	30.2	15.1	18.9	0.0
Q3	7.7	38.5	25.0	25.0	3.8
Q4	1.9	3.8	26.4	32.1	35.8
Q5	3.8	5.7	15.1	17.0	58.5
SMI			0.61		

GDP \ I11	Q1	Q2	Q3	Q4	Q5
Q1	81.1	18.9	0.0	0.0	0.0
Q2	18.9	52.8	24.5	3.8	0.0
Q3	0.0	26.9	40.4	32.7	0.0
Q4	0.0	1.9	28.3	39.6	30.2
Q5	0.0	0.0	5.7	24.5	69.8
SMI			0.43		

GDP \ I12	Q1	Q2	Q3	Q4	Q5
Q1	75.5	15.1	9.4	0.0	0.0
Q2	22.6	43.4	20.8	11.3	1.9
Q3	1.9	34.6	30.8	26.9	5.8
Q4	0.0	7.5	26.4	34.0	32.1
Q5	0.0	0.0	11.3	28.3	60.4
SMI			0.51		

GDP \ I13	Q1	Q2	Q3	Q4	Q5
Q1	79.2	18.9	1.9	0.0	0.0
Q2	18.9	49.1	22.6	9.4	0.0
Q3	1.9	26.9	38.5	30.8	1.9
Q4	0.0	5.7	30.2	34.0	30.2
Q5	0.0	0.0	5.7	26.4	67.9
SMI			0.46		

GDP \ I14	Q1	Q2	Q3	Q4	Q5
Q1	81.1	18.9	0.0	0.0	0.0
Q2	18.9	54.7	22.6	3.8	0.0
Q3	0.0	26.9	42.3	30.8	0.0
Q4	0.0	0.0	30.2	41.5	28.3
Q5	0.0	0.0	3.8	24.5	71.7
SMI			0.42		

I15 GDP	Q1	Q2	Q3	Q4	Q5
Q1	84.9	15.1	0.0	0.0	0.0
Q2	15.1	71.7	13.2	0.0	0.0
Q3	0.0	13.5	63.5	21.2	1.9
Q4	0.0	0.0	22.6	56.6	20.8
Q5	0.0	0.0	0.0	22.6	77.4
SMI			0.29		

I21 GDP	Q1	Q2	Q3	Q4	Q5
Q1	79.2	18.9	1.9	0.0	0.0
Q2	20.8	45.3	28.3	5.7	0.0
Q3	0.0	25.0	40.4	28.8	5.8
Q4	0.0	9.4	22.6	39.6	28.3
Q5	0.0	1.9	5.7	26.4	66.0
SMI			0.46		

I22 GDP	Q1	Q2	Q3	Q4	Q5
Q1	73.6	20.8	5.7	0.0	0.0
Q2	24.5	41.5	20.8	13.2	0.0
Q3	1.9	28.8	36.5	25.0	7.7
Q4	0.0	7.5	24.5	32.1	35.8
Q5	0.0	1.9	11.3	30.2	56.6
SMI			0.52		

I23 GDP	Q1	Q2	Q3	Q4	Q5
Q1	75.5	22.6	1.9	0.0	0.0
Q2	22.6	43.4	24.5	9.4	0.0
Q3	1.9	23.1	42.3	25.0	7.7
Q4	0.0	9.4	22.6	37.7	30.2
Q5	0.0	1.9	7.5	28.3	62.3
SMI			0.48		

I24 GDP	Q1	Q2	Q3	Q4	Q5
Q1	81.1	18.9	0.0	0.0	0.0
Q2	18.9	49.1	28.3	3.8	0.0
Q3	0.0	23.1	40.4	30.8	5.8
Q4	0.0	9.4	22.6	41.5	26.4
Q5	0.0	0.0	7.5	24.5	67.9
SMI			0.44		

GDP \ I25	Q1	Q2	Q3	Q4	Q5
Q1	83.0	17.0	0.0	0.0	0.0
Q2	17.0	54.7	20.8	7.5	0.0
Q3	0.0	23.1	38.5	30.8	7.7
Q4	0.0	5.7	30.2	35.8	28.3
Q5	0.0	0.0	9.4	26.4	64.2
SMI			0.45		

GDP \ I31	Q1	Q2	Q3	Q4	Q5
Q1	84.9	15.1	0.0	0.0	0.0
Q2	9.4	49.1	28.3	11.3	1.9
Q3	3.8	23.1	32.7	28.8	11.5
Q4	1.9	11.3	22.6	32.1	32.1
Q5	0.0	1.9	15.1	28.3	54.7
SMI			0.49		

GDP \ I32	Q1	Q2	Q3	Q4	Q5
Q1	77.4	18.9	3.8	0.0	0.0
Q2	20.8	39.6	22.6	15.1	1.9
Q3	1.9	25.0	38.5	23.1	11.5
Q4	0.0	11.3	22.6	32.1	34.0
Q5	0.0	5.7	11.3	30.2	52.8
SMI			0.52		

GDP \ I33	Q1	Q2	Q3	Q4	Q5
Q1	83.0	15.1	1.9	0.0	0.0
Q2	15.1	45.3	26.4	11.3	1.9
Q3	1.9	23.1	36.5	28.8	9.6
Q4	0.0	11.3	22.6	28.3	37.7
Q5	0.0	5.7	11.3	32.1	50.9
SMI			0.51		

GDP \ I34	Q1	Q2	Q3	Q4	Q5
Q1	86.8	13.2	0.0	0.0	0.0
Q2	7.5	54.7	24.5	11.3	1.9
Q3	3.8	21.2	34.6	26.9	13.5
Q4	1.9	9.4	24.5	35.8	28.3
Q5	0.0	1.9	15.1	26.4	56.6
SMI			0.46		

GDP \ I35	Q1	Q2	Q3	Q4	Q5
Q1	83.0	17.0	0.0	0.0	0.0
Q2	11.3	47.2	26.4	13.2	1.9
Q3	5.8	21.2	30.8	26.9	15.4
Q4	0.0	13.2	24.5	39.6	22.6
Q5	0.0	1.9	17.0	20.8	60.4
SMI			0.48		

GDP \ I41	Q1	Q2	Q3	Q4	Q5
Q1	77.4	22.6	0.0	0.0	0.0
Q2	20.8	45.3	24.5	9.4	0.0
Q3	1.9	19.2	44.2	26.9	7.7
Q4	0.0	11.3	20.8	41.5	26.4
Q5	0.0	1.9	9.4	22.6	66.0
SMI			0.45		

GDP \ I42	Q1	Q2	Q3	Q4	Q5
Q1	69.8	20.8	9.4	0.0	0.0
Q2	28.3	35.8	22.6	9.4	3.8
Q3	1.9	30.8	34.6	25.0	7.7
Q4	0.0	11.3	18.9	35.8	34.0
Q5	0.0	1.9	13.2	30.2	54.7
SMI			0.54		

GDP \ I43	Q1	Q2	Q3	Q4	Q5
Q1	75.5	24.5	0.0	0.0	0.0
Q2	22.6	43.4	24.5	9.4	0.0
Q3	1.9	19.2	44.2	26.9	7.7
Q4	0.0	11.3	18.9	39.6	30.2
Q5	0.0	1.9	11.3	24.5	62.3
SMI			0.47		

GDP \ I44	Q1	Q2	Q3	Q4	Q5
Q1	77.4	22.6	0.0	0.0	0.0
Q2	20.8	50.9	20.8	7.5	0.0
Q3	1.9	13.5	50.0	26.9	7.7
Q4	0.0	11.3	20.8	43.4	24.5
Q5	0.0	1.9	7.5	22.6	67.9
SMI			0.42		

I45 GDP	Q1	Q2	Q3	Q4	Q5
Q1	81.1	18.9	0.0	0.0	0.0
Q2	18.9	54.7	20.8	5.7	0.0
Q3	0.0	13.5	50.0	30.8	5.8
Q4	0.0	11.3	22.6	43.4	22.6
Q5	0.0	1.9	5.7	20.8	71.7
SMI			0.40		

PCA GDP	Q1	Q2	Q3	Q4	Q5
Q1	86.8	7.5	5.7	0.0	0.0
Q2	11.3	43.4	32.1	11.3	1.9
Q3	1.9	15.4	26.9	40.4	15.4
Q4	0.0	22.6	22.6	28.3	26.4
Q5	0.0	11.3	11.3	20.8	56.6
SMI			0.52		

RCI GDP	Q1	Q2	Q3	Q4	Q5
Q1	62.3	37.7	0.0	0.0	0.0
Q2	28.3	24.5	35.8	11.3	0.0
Q3	7.7	25.0	25.0	34.6	7.7
Q4	1.9	11.3	18.9	37.7	30.2
Q5	0.0	1.9	18.9	17.0	62.3
SMI			0.58		