Regional convergence in Spain: 1980-2015

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This article aims to analyse the process of per capita income convergence between the different Spanish regions and the factors that may have played a role in this process over the last three decades. The main conclusion is that the distance between the per capita income of the different regions has narrowed, albeit slightly. As regards the factors underlying this process, the convergence of labour productivity is the main element that has helped to reduce regional income dispersion, mainly due to a greater accumulation of capital in regions where income was initially lower. Conversely, neither the labour market variables (employment, unemployment) nor total factor productivity have contributed significantly to the reduction of regional differences during the course of the period analysed.

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Introduction

The economic literature has analysed thoroughly the problem of per capita income convergence between different countries or regions [see for example Barro (1991), Barro and Sala-i-Martin (1992) or, for the Spanish case, De la Fuente (2002b)]. This interest arises from the fact that there is normally substantial heterogeneity in the level of GDP per capita in different areas and, accordingly, it is important to analyse whether or not such differences tend to diminish over time.

In the case of Spain, GDP per capita for the Spanish economy as a whole displayed a profile of strong growth during the decade preceding 2007 (see Chart 1.1[1]), peaking at more than €29,000 per inhabitant. The economic crisis that started in 2008 brought an end to this growth phase, which has only begun to recover in recent years, although GDP per capita levels are still lower than those seen in 2007 (€28,776 per inhabitant in 2016).

At regional level, Chart 1.2 shows certain differences in GDP per capita levels that have persisted over the last 20 years. In this connection, the growth profile of the different Spanish autonomous regions is very similar to that described above for the Spanish economy.[2]

This article analyses, first, the magnitude of the regional differences during the period 1980-2015, comparing them with other geographical areas to assess their relative level. Second, it analyses whether differences, regardless of their magnitude, tend to decrease over time. These two issues are addressed sequentially in the following section of this article. The variables that may have enabled the process of convergence between regions to take place are reviewed subsequently.

Regional differences and convergence

In order to analyse the magnitude of regional differences in Spain it is useful to compare them with those seen between regions in other European Union countries.[3] Table 1 shows the dispersion observed in 2014 for various variables and countries, measured by means of the coefficient of variation.[4] As can be seen, the differences in GDP per capita between regions are slightly above 20% in Spain and Germany, while in France and Italy they are somewhat larger (27%). In terms of productivity, Spain has the lowest regional differences (12%), together with Italy, while in France dispersion is double that. Dispersion of the labour force participation rate is very small and homogenous among countries, with the exception of Italy where it is higher. Finally, unemployment rate dispersion is similar in all the countries except for Spain, which once again has a substantially lower coefficient of variation.
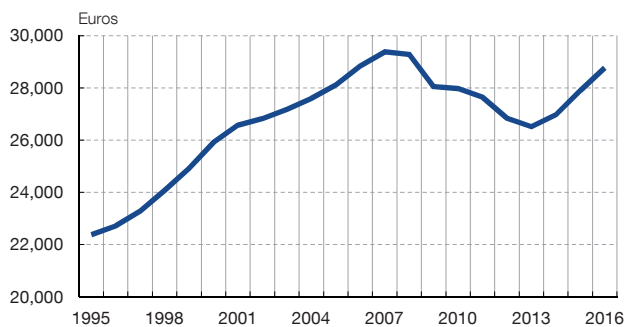

1　In the chart, GDP per capita is represented at constant 2010 prices. The population taken into account is that over 16 years of age, for purposes of comparison with the rest of the article.

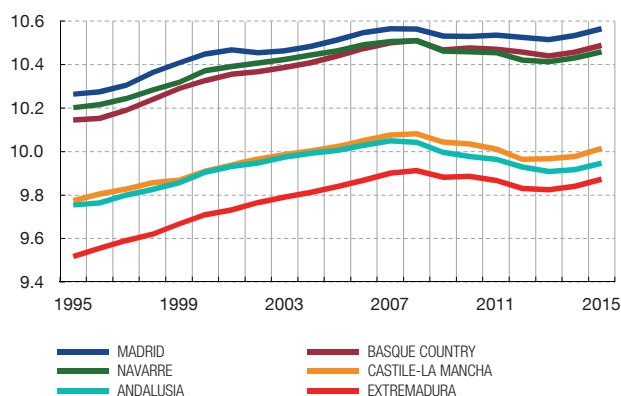2　For clarity, only the three richest and the three poorest regions at the end of the period are represented.

3　To carry out an appropriate comparison, the exercise is conducted at the NUTS 2 regional aggregation level. In the case of Spain, this coincides with the division by autonomous regions.

4　The coefficient of variation is defined as the ratio of the standard deviation to the mean. It is therefore a measure of relative dispersion.

GDP PER CAPITA IN SPAIN (a)

CHART 1

1 GDP PER CAPITA

Euros

2 REGIONAL CONVERGENCE (b)

MADRID
NAVARRE
ANDALUSIA
BASQUE COUNTRY
CASTILE-LA MANCHA
EXTREMADURA

SOURCES: INE and Banco de España.

a Data for the total economy, referenced to the over 16s.
b Data in natural logarithms.

REGIONAL DIFFERENCES BY COUNTRY IN 2014
Coefficients of variation

TABLE 1

As a percentage

	GDP per capita	Productivity	Participation rate	Unemployment rate
Countries				
Spain	21	12	6	25
France	27	24	6	42
Italy	27	12	12	44
Germany	22	20	4	43
EU (a)	38	32	6	32

SOURCES: Eurostat and Banco de España.

a The regional data are divided by the average of the country to which they belong.

If the comparison is made with the EU countries as a whole,[5] the dispersion between Spanish autonomous regions continues to be comparatively small, coming close to half the average dispersion seen between regions in each European country. This pattern of low dispersion is maintained for other variables such as productivity or the unemployment rate, whose dispersion in the Spanish economy is once again low.

As regards changes in regional dispersion over time, they may be analysed based on traditional growth regressions, where the income per capita growth rate in each *i* region depends on its initial level of income, such that:[6]

$$\Delta\gamma_{i,\,t} = \alpha + \beta\gamma_{i,\,t-k} + \varepsilon_{i,\,t} \qquad [1]$$

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5 For this purpose, the value of each variable in each region was rescaled by the country average before calculating the coefficients of variation. Thus, only the average differences between regions within each country are considered, neutralising the differences between countries.

6 Equation [1] shows an absolute beta-convergence approach. The literature has analysed more extensively conditional beta-convergence [see for example Sala-i-Martin (1996a)] where, additionally, a set of control variables

In these regressions, the parameter of interest is β. A negative β coefficient indicates that regions which were poorer k periods ago have grown more on average over the course of the period analysed. The k value chosen must be sufficiently high to capture long-term patterns beyond possible cyclical or short-term fluctuations. In this article a period of 35 years was chosen, so that each autonomous region represents a single observation during the period from 1980 to 2015,[7] and the result may be analysed in terms of diagrams of dispersion across regions, where the level of each particular variable in 1980 and its average rate of change between 1980 and 2015 are represented on the x- and y-axes, respectively.

Chart 2.1 shows that there is a certain negative relationship between the initial level of GDP per capita (in logarithms) and its variation during the period analysed, which indicates the presence of regional convergence. In any event, the relationship is fairly weak, in terms of both statistical adjustment (low R^2) and estimated magnitude, since, based on the estimated slope, the differences between regions would only decrease to one half over a 70-year period.[8] Overall, it may be concluded that although the differences among Spanish regions are not very high in comparison with other countries, the rate of convergence between them is slow and, accordingly, the initial differences in terms of income per capita have persisted over time.

Factors contributing to the convergence process

In order to determine the factors behind the aforementioned convergence process, it is useful to break down income per capita as follows:

$$\frac{\text{Real GDP}}{\text{Pop. Age 16+}} = \frac{\text{Real GDP}}{\text{Employment}} \cdot \frac{\text{Employment}}{\text{Labour force}} \cdot \frac{\text{Labour force}}{\text{Pob. Age 16+}} \qquad [2]$$

That is:

$$\text{DPpc=Productivity·(1-Unemployment Rate)·Participation Rate} \qquad [3]$$

In other words, GDP per capita may be broken down into the output produced by each worker (productivity), multiplied by the percentage of the labour force that is in work (1 - unemployment rate), multiplied by the percentage of the population that participates actively in the labour market (labour force participation rate). This permits analysing which of these three factors has contributed most to the convergence process. For this purpose, the structure of Chart 2.1 will be used, replacing GDP growth per capita on the y-axis with growth in each of the three factors of equation [3] above and keeping the x-axis unchanged.[9]

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is introduced. When applying this methodology to Spanish regions, the problem found is that most of these control variables that are traditionally used only include differences between countries, since they are measures of economic freedom, democracy, stability, etc. The only customary control that can be used in regional regressions is educational level. This has been tested, obtaining very similar results to those set forth in this article.

7 In order to avoid the influence of an economic cycle in a longer-term analysis of convergence, the initial and final years were chosen such that they would share the same cyclical position to the extent possible (emergence from recessions) (see http://asesec.org/CFCweb/archivo-historico-del-ciclo-economico-espanol/).

8 This speed of convergence is lower than that estimated for the different states of the USA, as shown by Barro *et al*. (1991) and Sala-i-Martin (1996b). De la Fuente (2002b) also finds faster convergence between Spanish regions (with differences declining to one half in 24 years), although for a substantially earlier period (1955-91) than that considered here. Indeed, De la Fuente (2002a) shows that the speed of convergence between the Spanish regions has diminished gradually over time.

9 An alternative is to represent on the x-axis the level of the factor in question in 1980. However, this alternative would measure convergence within each variable, which may or may not be related to the factor's contribution to convergence in GDP per capita.
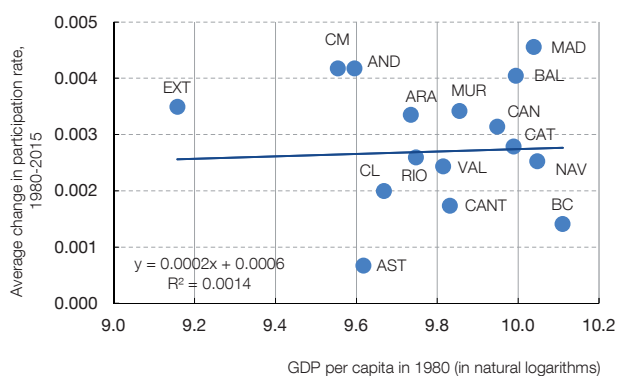
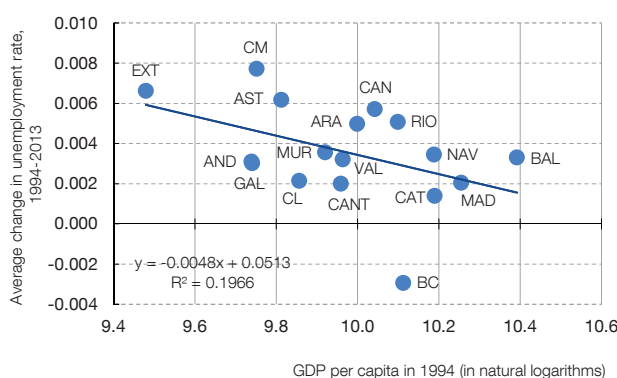**1 RELATIONSHIP BETWEEN AVERAGE GROWTH IN GDP PER CAPITA AND ITS STARTING POINT**
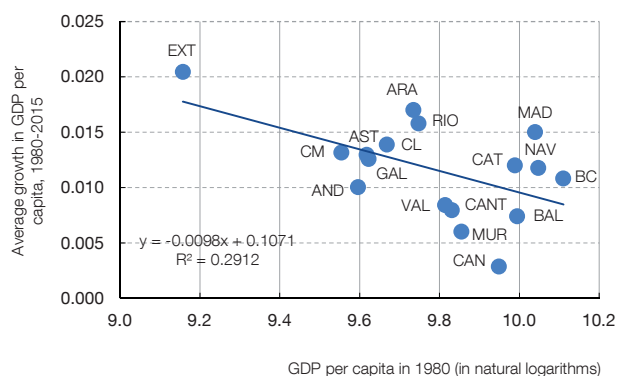
2 RELATIONSHIP BETWEEN AVERAGE GROWTH IN PRODUCTIVITY AND GDP PER CAPITA STARTING POINT
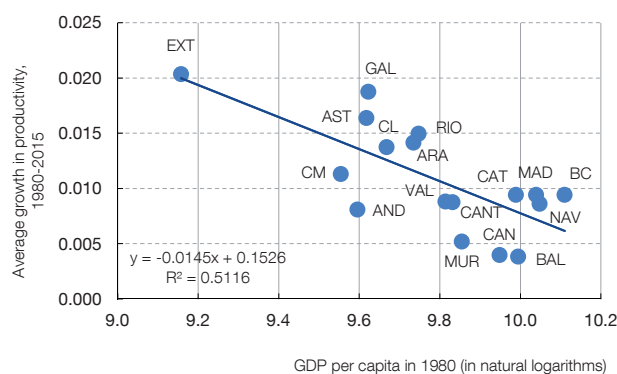
3 RELATIONSHIP BETWEEN AVERAGE CHANGE IN PARTICIPATION RATE AND GDP PER CAPITA STARTING POINT

4 RELATIONSHIP BETWEEN AVERAGE CHANGE IN UNEMPLOYMENT RATE AND GDP PER CAPITA STARTING POINT


SOURCES: INE and Banco de España.

a Except for the unemployment rate, which is for the period 1994-2013.

Charts 2.2, 2.3 and 2.4 show the results of this exercise. In the case of labour productivity, the relationship is clearly negative, i.e. productivity has grown more in the period in the regions that were initially poorer; therefore, this factor was decisive in the convergence process observed in income per capita. Conversely, changes in the labour force participation rate do not appear to be related to the differences in GDP per capita, since the participation rate has grown similarly in rich and poor regions; accordingly, its contribution to reducing regional disparities in the last 35 years has been negligible. Finally, the relationship between the change in the unemployment rate and initial GDP per capita is negative, albeit relatively weak. This means that the poorer regions have also endured the highest increases in unemployment rates; in other words, unemployment has contributed to widening the differences between regions, in stark contrast to productivity. This result is similar to that found by Bentolila and Jimeno (1998), who analyse in detail the explanatory factors for the high persistence of regional differences in the unemployment rate. In particular, these authors underscored wage rigidity and the scant response of the participation rate and migration to wage differences across autonomous regions. In a subsequent analysis, Izquierdo and Lacuesta (2005) obtained similar results, emphasising the scant role played by cross-regional migration in reducing the high unemployment differentials observed between autonomous regions.
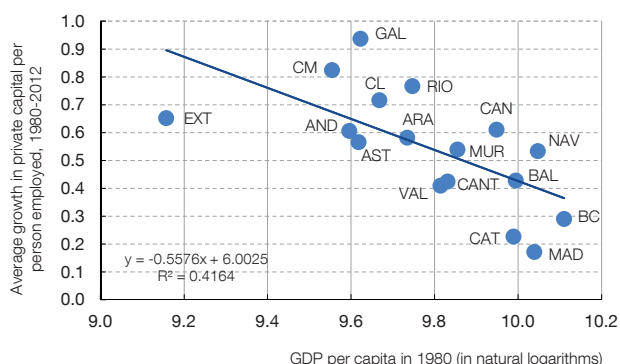
1 RELATIONSHIP BETWEEN GROWTH IN CAPITAL TO PERSON EMPLOYED
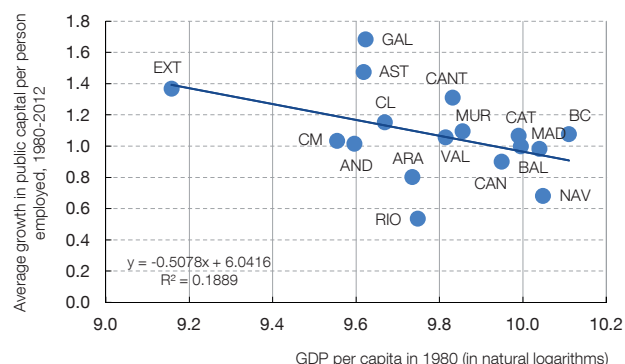   RATIO AND GDP PER CAPITA STARTING POINT
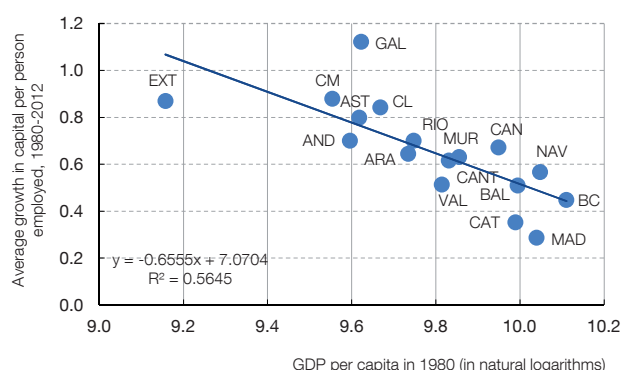
2 RELATIONSHIP BETWEEN GROWTH IN TFP AND GDP PER CAPITA
   STARTING POINT
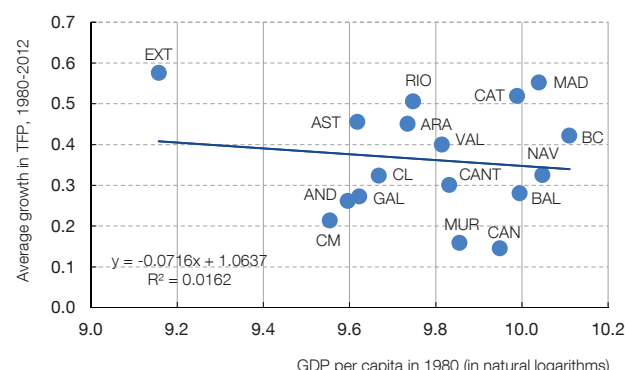
3 RELATIONSHIP BETWEEN GROWTH IN PRIVATE CAPITAL TO PERSON
   EMPLOYED RATIO AND GDP PER CAPITA STARTING POINT

4 RELATIONSHIP BETWEEN GROWTH IN PUBLIC CAPITAL TO PERSON
   EMPLOYED RATIO AND GDP PER CAPITA STARTING POINT

SOURCES: INE, Instituto Valenciano de Investigaciones Económicas and Banco de España.

Because labour productivity has been identified as a driver of the convergence process, in order to analyse in greater depth the possible causes of this process, it is useful to break down this factor. Specifically, this new breakdown divides labour productivity into capital intensity and total factor productivity (TFP). Assuming a Cobb-Douglas production function with constant returns to scale, labour productivity may be broken down as follows:

$$\frac{GDP}{Employment} = TFP \cdot \left(\frac{Capital}{Employment}\right)^{\alpha} \qquad [4]$$

Where α is the relative participation of capital income[10] in total added value. Equation [4] illustrates in a straightforward way the fact that the productivity of each worker may increase either because more capital is available (higher capital-labour ratio) or because the efficiency of other factors has increased (higher TFP), such as, for example, better organisational capacity, more human capital, etc.

As before, it is useful to analyse the role played by both these factors (capital intensity and TFP) in the productivity convergence process identified. Charts 3.1 and 3.2 analyse the

10 This participation is allowed to change over time.

contribution to convergence of these two factors separately. The results suggest that the decisive factor in the convergence process has been capital intensity, where a clear negative relationship is seen between the growth of capital stock per employee and initial regional income, while changes in TFP appear to be independent of initial levels of wealth. Therefore, the factor explaining convergence in labour productivity relates to the accumulation of capital in the initially poorer regions.[11] In this connection, determining the relative role of public capital versus private capital in this process is of interest. Charts 3.3 and 3.4 show that the two types of capital have accumulated more intensely in the poorer regions in the last 35 years, although the relationship is stronger in the case of private capital, which is therefore more relevant for the purpose of explaining the regional convergence seen.

In conclusion, the convergence process in the Spanish economy has mainly followed a pattern of accumulation of physical capital, with other variables, such as efficiency of the production process, playing a minor role. Additionally, changes in the labour market variables have played a part in widening the differences across regions. Finally, the findings point to possible economic or institutional barriers preventing convergence in TFP, despite a common regulatory framework, which should be the object of further research. In any event, it should be borne in mind that Spain's regional differences are not greater than those present in other European Union countries.

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11 De la Fuente (2002a) obtains similar results for the average in the 1975-95 period, with the accumulation of physical capital explaining most of the convergence seen. However, for the 1965-75 period, participation rate increases in the poorer regions also played a significant role.