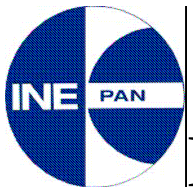

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Did structural funds affect economic growth and convergence across regions? Spanish case in the years 1989–2016

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DID STRUCTURAL FUNDS AFFECT ECONOMIC GROWTH AND CONVERGENCE ACROSS REGIONS? SPANISH CASE IN THE YEARS 1989–2016

ABSTRACT

The aim objective of this paper is to answer the questions of whether structural funds affected economic growth and convergence process across Spanish regions in the period 1989–2016. The different estimation procedures were applied such as first-difference generalized moments method estimator (FDGMM), the system GMM estimator (SGMM) or OLS and fixed effect (FE) models. It was introduced to the models other explanatory variables like human capital, investments rate or the employment share of each sector. The research found the structural funds had positive impact on economic growth in Spanish regions in analyzed period. Besides, it was demonstrated the influence of structural funds on convergence process was insignificant. The data used in the models was taken form database of Spanish Institute of Statistics (INE) and Fundación Bancaja e Ivie (Instituto Valenciano de Investigaciones Económicas).

Key words: regional policy, regional convergence, structural funds, Spain.

JEL classification: C23, R11, R58

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1 INTRODUCTION

The main objective of regional policy in the EU is social end economic cohesion. This goal is based on financial solidarity, whereby in the years 20014–2020 more than 50% of cohesion policy funding has been set aside for less developed regions. The increase of social cohesion consists in reducing the diversity of use of human capital. On the other hand, economic cohesion means diminishing income disparities between EU regions (Ardy et al. 2002; Molle 2005). The basic level of EU policy interventions is NUTS 2 level because regions are subjects who participate in and can have profit from UE regional policy.

In the 1960s in Spain unbalanced economic growth at the regional level caused migration. The lagged regions like Extremadura, Andalusia or Castilla-La Mancha constantly were losing population for rich regions like Madrid, Catalonia or Basque Country, where was concentrated the economic activity of the country. In that situation the government administration decided to pursue an active regional policy in the form of growth poles (Piętak, 2016). Over the years the Spanish regional policy has been evolving. It was equipped with new instruments, some of them, like the growth poles, were abandoned after several years.

Spain with Portugal acceded to European Economic Community in 1986. Since Spain was characterized by existing disparities between regions, it could obtain a significant support from structural funds. It is to stress that in the first planning period of regional policy 1989–1993 75% of Spanish regions had the GDP per capita lower than EU average and they belonged to the objective 1 regions. In the planning period 2000–2006 Spain received over 40 billion euro, while in the years 1989–2020 the support amounted to almost 180 billion euro. Therefore, structural funds have been the main instruments used by regional policy in this country.

The main objective of this study was to investigate whether the support of structural funds affected economic growth and convergence across Spanish regions in the period 1989–2016. It was built several dynamic panel data models. For their estimation were used the first-difference GMM estimator (FDGMM), system GMM estimator (SGMM) and other estimators like OLS or fixed effect

models (FE). Besides, they were introduced to the models other explanatory variables affecting economic growth like: investment rate, human capital or share of each sector in regional gross value added (GVA).

Spain consists of seventeen regions (autonomous communities). Fifteen of them are located on the European continent. Two regions are archipelagos, Balearic Islands and Canary Islands, belonging to Spain. Two Spanish cities (autonomous cities) situated in Africa, Ceuta and Melilla, were not taken into consideration in the study. The data used in the research was taken from database of Spanish Institute of Statistics (INE) and Fundación Bancaja e Ivie (Instituto Valenciano de Investigaciones Económicas)

The study consists of several parts. After introduction in the second part it was presented the review of literature about regional policy and their influence on economic growth and convergence across Spanish regions. In the third part there are analyzes of absolute convergence in Spain in the years 1986–2016. The concepts of beta and sigma convergence were used. Moreover the mathematical decompositions of GDP per capita and labor productivity were applied in order to show the basis of convergence process. The next part contains a description of the models, proposed exogenous variables and the results of the estimations. The study ends with conclusions.

2 LITERATURE REVIEW

The empirical studies on the effectiveness of regional policy in the EU are divided into two groups. To the first one belong papers which proved its insignificant or negative impact on the EU cohesion (Dall'erba and Le Gallo 2008; Boldrin and Canova 2001; Ederveen et al. 2006). The second group of studies found the effectiveness regional policy as both low but positive (De la Fuente and Vives 1995; Rodríguez-Pose and Fratesi 2004) and having the main role in achieving the social and economic cohesion in the EU (Cappellen et al. 2003; Beugelsdijk and Eijffinger 2005; Loddo 2006; Lolos 2009).

In the case of Spain, studies on the effectiveness of structural funds can be divided in terms of the territorial scope of the research. The first group includes studies examining the impact of structural

funds at the level of the whole country. Villaverde and Maza (2010) proved the negligible impact of structural support on the convergence process across Spanish regions in the years 2000–2006. Gumbau-Albert and Maudos (2010) showed that the structural funds had a positive impact on the reduction of the technological gap between objective 1 regions in the period 1987–2006. In turn, Sosvilla-Rivero (2010) proved that in the years 1988–2006 the difference of GDP per capita between Spain and EU average was reduced by 15 percentage points of which 5 percentage points was the result of the support of structural funds.

The second group includes studies examining the impact of structural funds on the objective 1 regions. Bande et al. (2010) proved the cohesion policy affected positively the economic activity in these regions and it had an influence on the reduction of the unemployment rate in the years 1999–2008. Pastor et al. (2010) demonstrated that in the period 1999–2007 the structural funds had a positive impact on reducing the gap in human capital resources between the objective 1 regions and the objective 2 regions. In turn, Escribá and Murgui (2010) showed the aid of structural funds in the years 2000–2006 let to increase the stock of capital by 1% in the regions of objective 1, while in Spain the increase reached 0.4%. Mas (2001) examined the importance of the road infrastructure, co-financed by structural funds, on the economic growth of objective 1 regions in the period 2000–2006. The research demonstrated the infrastructure investments had an insignificant importance. In the case of Extremadura and the Canary Islands it was 1%, while in the Valencia only 0.5%.

The third most numerous group of study refers to individual regions. Murillo and Sosvilla-Rivero (2003) and Lima et al. (2010) proved the positive impact of structural funds on the economic growth in Andalusia in the years 1994–1999 and 2000–2006. Sosvilla-Rivero (2004) used the Hermin model to verify the effectiveness of regional policy in the Canary Islands in the years 1989–2006. According to the research the support of structural funds contributed to the GDP growth by 2.97%. The other study based on the Hermin model demonstrated the positive impact of structural funds on economic growth in Castilla La Mancha in the years 2000–2006 (Sosvilla-Rivero and García, 2005). Marín-Rivero and Pardo Fanjul (2010) considered the region of Castilla and León. The research showed that in the years 2000–2006 both 10% of the economic growth and employment increase resulted from the structural fund absorption. The other studies, that confirmed positive impact of structural funds on

economic growth, include analyzes for Extremadura (Márquez Paniagua et al., 2010), Galicia (Armesto Pina and Lago Peñas, 2010; Cancelo et al., 2009), Murcia (García Solanes and Maria-Dolores, 2010) and Valencia (Gil Pareja and Soler I Marco, 2010).

3 CONVERGENCE ACROSS SPANISH REGIONS

The concept of absolute convergence assumes that poor economy tends to growth faster than a rich one. Its existence is confirmed by neoclassical models of economic growth, where the production function is characterized by the positive and diminishing marginal products of each input. On the other hand endogenous economic growth models no longer confirm convergence because the marginal products of inputs are at least constant.

The fundamental equation of the Solow–Swan model implies that the derivate of $\dot{k}/k$ with respect to *k* is negative, so the smaller value o *k* is associated with larger value of $\dot{k}/k$ (Barro, Sala-i-Martin, 2004; Sala-i-Martin, 2000).

$$\frac{\partial(\dot{k}/k)}{\partial k} = \frac{\partial\left(s\frac{f(k)}{\hat{k}} - (n+\delta)\right)}{\partial k} = -s\frac{f(k) - f'(k)\cdot k}{k^2} \tag{1}$$

The absolute convergence includes two kinds of convergence: σ *convergence* and β *convergence*. The σ *convergence* implies that the dispersion of per capita GDP between countries declines over time. The formula used to test the σ *convergence* is as follows:

$$\sigma_t = \sqrt{\sum_{t=1}^{n} (\ln y_{it} - \ln \bar{y}_t)^2 / n} \tag{2}$$

where $\ln(y_{i,t})$ is GDP per capita in state (region) *i* in period *t* and $\ln(\bar{y}_{i,t})$ is the average of per capita GDP of analyzed country (region) in period *t*.

In turn, β *convergence* implies faster growth in poorer countries (regions) than in rich ones. The formula used to test the β *convergence* is as follows:

$$\ln(y_{i,t}) - \ln(y_{i,t-1}) = a + \beta \ln(y_{i,t-1}) + u_{i,t} \tag{3}$$

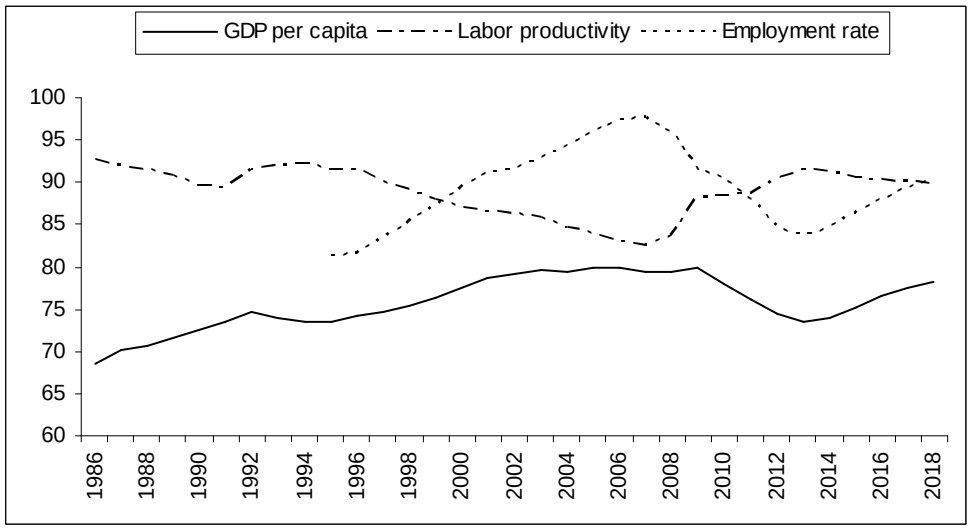
where $\ln(y_{i,t})$ and $\ln(y_{i,t-1})$ denote GDP per capita in state (region) i in period t and $t-1$, respectively. β is parameter of regression and $u_{i,t}$ effect of the error term.

The studies on the regional disparities between Spanish regions focused on two areas. Firstly, the researchers tried to explain this problem at the national level, taking into consideration all autonomous communities. Secondly, other papers described the regional disparities in Spain by comparing selected regions. According to Tortella (1994) the economic diversity between Spanish regions resulted from faulty system of land division and low productivity of agriculture. The existing both latifundia and a large number of smallholders did not create a favorable condition for economic growth. Regions inhabited by landowners were characterized by lower wages and low education level. On the other hand, Simpson (1997) pointed to the problem of agrarian reform initiated during the Second Republic, which did not improve the labor productivity in agriculture. Then the large latifundia were taken away from landowners, divided in to smaller parcels and given to the smallholders. Analyzing the disparities between selected autonomous communities, Domínguez (2002) showed the examples of Extremadura, Andalusia and Catalonia. Extremadura was the poorest region of Spain in 1800. In turn, Andalusia and Catalonia belonged to the richest ones. However, Andalusia lost the position the one of the most developed regions in the 19th century due to the non-egalitarian income distribution. Carreras (1990) stressed that the egalitarian income distribution allowed Catalonia to remain the position among the richest regions of Spain in the 20th century.

The Spanish Statistical Office offers the data at regional level form the year 1955, that's why empirical studies on the convergence across Spanish regions cover the period from this year. In the 20th century took place the convergence in Spain (Piętak, 2016). However some studies emphasize that the convergence did not base on the faster development of poor regions. Martín Rodríguez (1992) claimed that convergence in Spain resulted from migration. People from poor provinces were abandoning agriculture for industrial centers. This process could be called as "demographic adjustment" but not convergence. Delgado and Sánchez Fernández (1998) found the economic growth was polarized in Spain in the period 1955–1995 and the convergence of GDP per capita resulted from

the loss of population by poor regions for development areas. Raymond (1994) came to the identical conclusions analyzing the years 1955–1998.

Figure 1 Convergence of Spanish GDP per capita, labor productivity and employment rate against the background of the EU–15 in the years 1986–2016



Source: Eurostat.

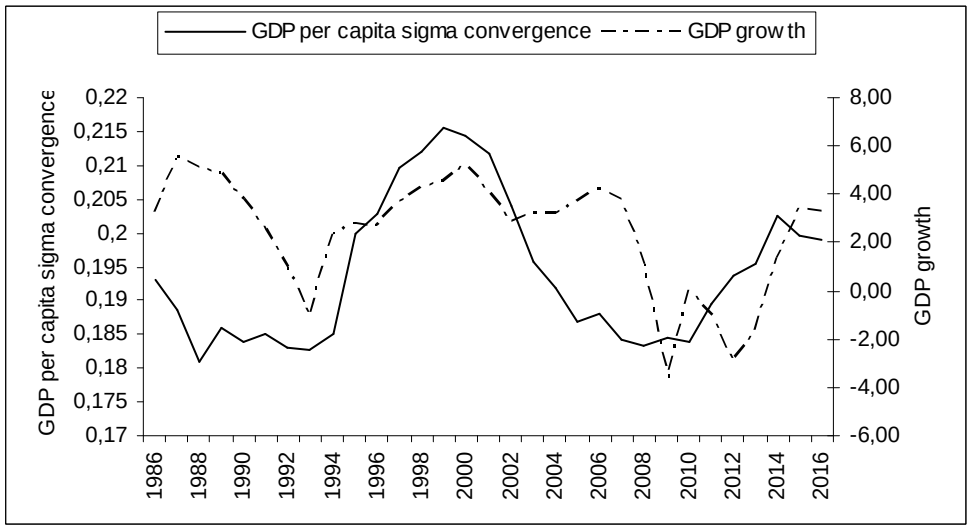
Note: In case of labor productivity the data is accessible from 1995.

Figure 1 presents the convergence of Spanish GDP per capita, employment rate and labor productivity against the background of the European Union countries. The analyzed indicators were calculated to the average for EU–15 in order to omit statistical effect caused by the accession of new poorer countries in 2004. In 1986 all analyzed indicators showed lower values than the EU–15. Spanish GDP per capita and labor productivity amounted to 68,4% and 92,6% of the EU average, respectively. In turn, the employment in 1995 was a 81,4%. In subsequent years Spanish GDP per capita and employment rate showed convergence with the EU–15 and at the end of 2008 their value were respectively 79,4% and 96,1% of the EU–15 average. During the crisis 2008–2013 Spanish GDP per capita and employment rate entered the divergence path. In 2013 their value were reduced to 73,6% and 83,8% of the EU–15 average, respectively. From the year 2014 GDP per capita and employment rate achieved upward trend. On the other hand the dynamic of labor productivity was quite different. Since 1986 labor productivity was declining and in 2007 its value was 82.5% of the EU–15 average.

Then the labor productivity began to increase and in 2013 reached 91.6%, but the upward trend resulted form growing rate of unemployment.

Figure 2 presents the dispersion of GDP per capita and economic growth in Spain. In the case of GDP per capita, the dispersion was increasing in the years 1995–1999, so the σ *convergence* did not apply. The convergence occurred in the period 2000–2008. Then the upward trend began in 2009 and the divergence took place to 2014. It is to stress that the dispersion of GDP per capita was slight correlated (0,34) with the economic growth. In the years 1955–1975 the convergence corresponded to a high rate of economic growth (Piętak 2016). This dependence did not confirm the analyzed period. For example, in the years 1988–1993 and 2008–2012 the economic growth had downward trend and GDP per capita dispersion decreased. In turn in the years 1994–2002 the dispersion of GDP per capita increased and the Spanish economy achieved positive value of economic growth.

Figure 2 Dispersion of GDP per capita an economic growth in Spain, 1986–2016

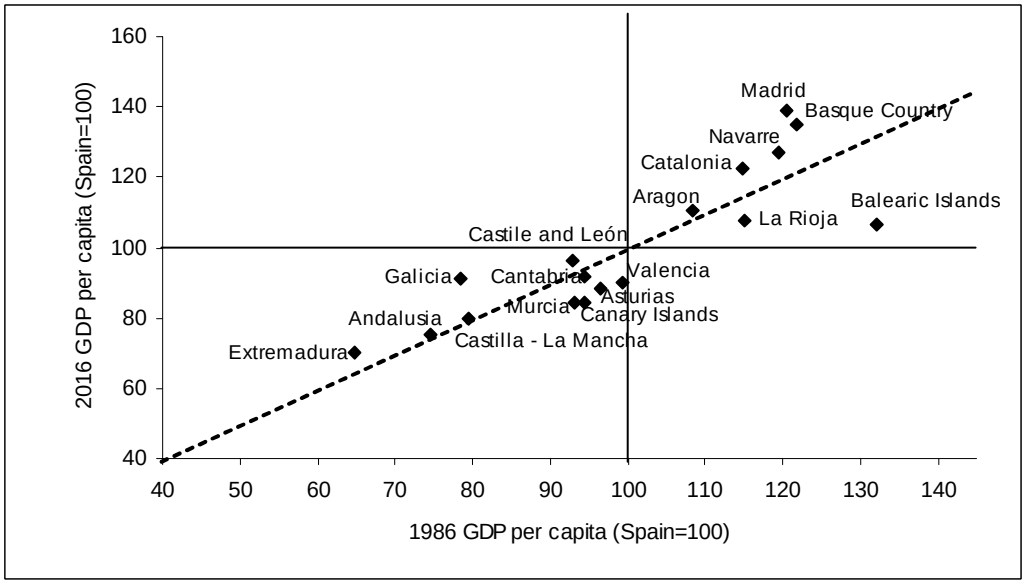


Source: own elaboration.

Figure 3 presents the share of each region in the σ *convergence* in 1986–2016. On the horizontal axis is the value of GDP per capita in 1986 (Spain = 100). On the vertical axis is the value of GDP per capita in 2016, relative to the national average. In case of regions that characterized the GDP per

capita below the national level in 1986, only Extremadura, Galicia and Castile and León confirmed the σ *convergence*. The situation of Andalusia, Castilla La Mancha and Cantabria resulted insignificant for equalizing GDP per capita across Spanish regions. In group of regions that achieved GDP per capita higher than national level in 1986, La Rioja and Balearic Country confirmed convergence. Regions like Madrid, Basque Country, Catalonia or Navarre improved their income situation against the background of the country.

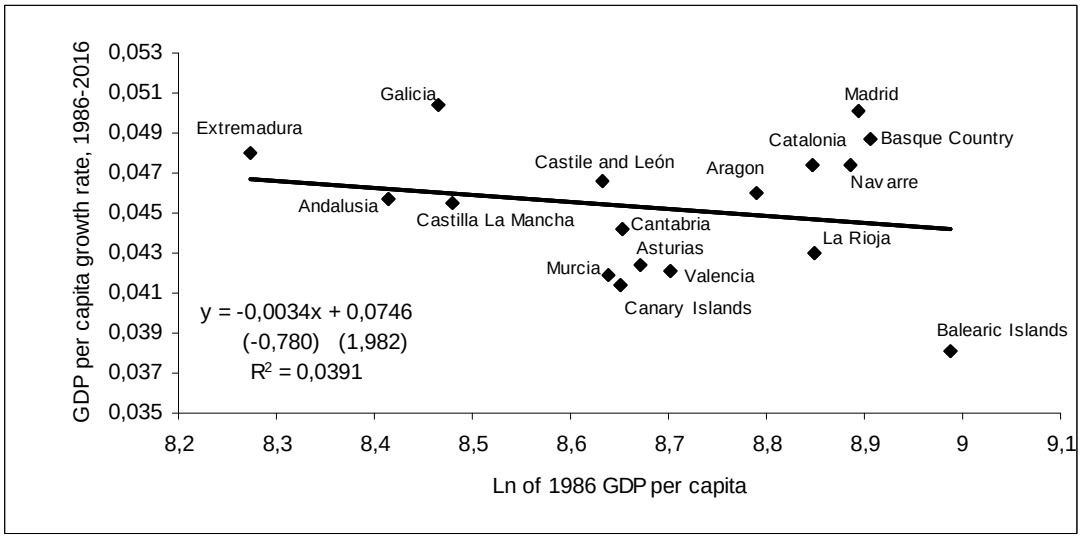
Figure 3 Share of Spanish regions in sigma convergence, 1986–2016



Source: own elaboration.

Figure 4 presents β *convergence* of GDP per capita. On the horizontal axis is the logarithmic value of the GDP per capita in 1986. On the vertical axis is its annual growth rate in 1986–2016. The relation between GDP per capita growth and its initial value was negative but statistically insignificant. Hence, it can not be state whether β *convergence* did apply or not. Also, figure 4 allows for distinguishing regions that had a negative impact on convergence. The regions like Madrid, Basque Country, Catalonia or Navarre, in spite of the high level of per capita GDP in 1986, achieved high growth rates during the thirty years. However, in their case the divergence had a positive aspect.

Figure 4 *β convergence* across Spanish regions, 1986–2016



Source: own elaboration.

The GDP per capita (y) is a ratio of GDP (Y) and population (L). Hence, the GDP per capita growth rate can be expressed as the difference between two components: GDP and population growth rates:

$$y = \frac{Y}{L}$$

$$\ln(y) = \ln(Y) - \ln(L)$$

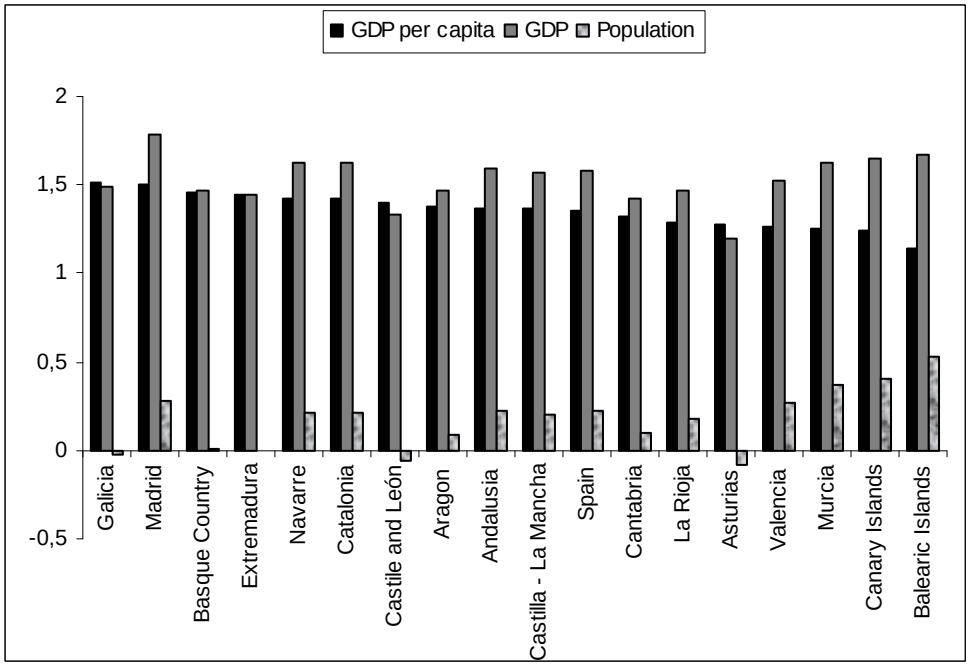
$$\frac{d\ln(y)}{dt} = \frac{d\ln(Y)}{dt} - \frac{d\ln(L)}{dt}$$

$$\frac{\dot{y}}{y} = \frac{\dot{Y}}{Y} - \frac{\dot{L}}{L}, \tag{4}$$

where $\frac{\dot{y}}{y}, \frac{\dot{Y}}{Y}, \frac{\dot{L}}{L}$ denote the growth rate of GDP per capita, GDP and population, respectively. Figure 5 presents the decomposition of GDP per capita growth rate for GDP and population growth rates. Regions are ordered from the highest to the lowest rate of GDP per capita. In all regions the decisive factor of GDP per capita growth rate was an increase of GDP, while the population growth had little significance. Moreover, in three regions – Galicia, Castile and León and Asturias – the growth of GDP per capita was conditioned by the loss of population. On the other hand regions with the lowest GDP

per capita growth rates like Balearic Islands, Canary Islands and Murcia achieved the highest growth of population which statistically reduced the level of GDP per capita.

Figure 5 Decomposition of per capita GDP growth rate for GDP and population growth rates



Source: own elaboration.

Another way to decompose the GDP per capita growth rate (g_{per_cap}) is its representation as a product of labor productivity (g_{prod}) and employment (g_{emplo}) growth rates.

$$y = \frac{Y}{L} = \frac{Y}{N} * \frac{N}{L}$$

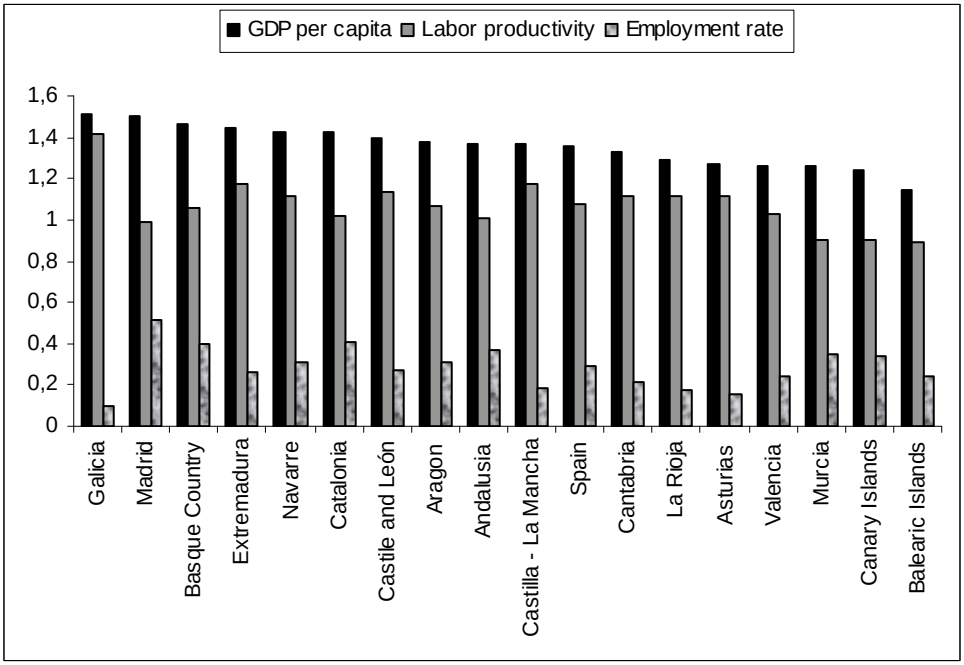
$$\ln(y) = \ln\left(\frac{Y}{N}\right) + \ln\left(\frac{N}{L}\right)$$

$$\frac{d\ln(y)}{dt} = \frac{d\ln(Y/N)}{dt} + \frac{d\ln(N/L)}{dt}$$

$$g_{per\_cap} = g_{prod} + g_{emplo} \tag{5}$$

In all regions (see figure 6), both with the highest and the lowest GDP per capita growth rate, the deciding role was played by the labor productivity growth rate. The dynamic of employment was significant in regions such as Madrid, Basque Country or Cantabria. In Galicia, the region with the highest dynamic of economic growth in analyzed period, the employment growth rate was the lowest.

Figure 6 Decomposition of per capita GDP growth rate for labor productivity and employment growth rates, 1986–2016



Source: own elaboration.

Previous analysis showed that the GDP growth rate had a decisive role in GDP per capita growth, while the population growth rate had little significance. The application of formula (3) allowed for determining the contribution of each sector in obtained gross value added (GVA):

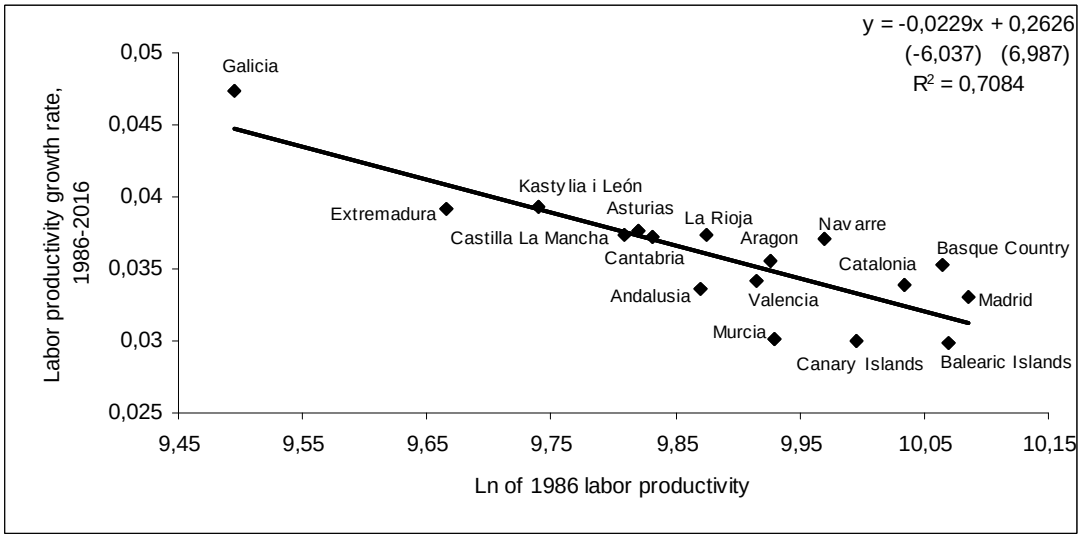
$$\frac{Y_t}{Y_0} = \sum_{i=1}^{n} S_{j0} \cdot \frac{Y_{jt}}{Y_{j0}}, \tag{6}$$

where j and S_{j0} denote the succeeding sector and share of j sector in gross value added, respectively. Table A.1 (see appendix) contains data concerning the share of each sector in gross value added in Spanish regions in 1986–2016. Each region is assigned two rows. The first row called "Share 1986–2016" indicates the share of each sector in obtained gross value added in 1986–2016. The second row "1986 (%)" denotes the contribution of each sector in gross value added in 1986. In all regions the contribution of agriculture and industry in GVA in 1986–2016 was smaller than the share in GDP in 1986. In case of construction sector, only in regions like Aragon, Valencia, Navarre, Basque Country

and La Rioja its importance in obtained GVD was higher in the years 1986–2016 than the share in GVD in 1986. In all regions the share of services sector in GVA in the period 1986–2016 resulted higher than its value in 1986. It is to stress that in the richest Spanish region Madrid the share of agriculture and services in GVA in the years 1986–2016 was 0.1% and 84.6% respectively. In the poorest region Extremadura this relation was considerably different and it was 8.1% and 70.2%.

In order to examine the convergence of labor productivity across Spanish regions the formula of β *convergence* was used. In figure 7 on the horizontal axis is the logarithmic value of the labor productivity in 1986, while on the vertical axis is its annual growth rate in the period 1986–2016. The value of convergence parameter is statistically significant, so the β *convergence* took place. The regions characterized by relatively high value of labor productivity in 1986 like Balearic Island, Madrid or Basque Country achieved its low growth rate. On the other hand in Galicia in 1986 the labor productivity was the lowest but in the period 1986–2016 its dynamic was the highest. Besides, previous analyzes proved that due to high dynamic of labor productivity Galicia achieved the highest growth rate of GDP per capita.

Figure 7 β *convergence* of labor productivity across Spanish regions, 1986–2016



Source: own elaboration.

The labor productivity (q) is a relation of the GDP (Y) and employment (N). Hence, the labor productivity growth rate can be decomposed for two components: GDP growth rate and employment growth rate:

$$q = \frac{Y}{N}$$

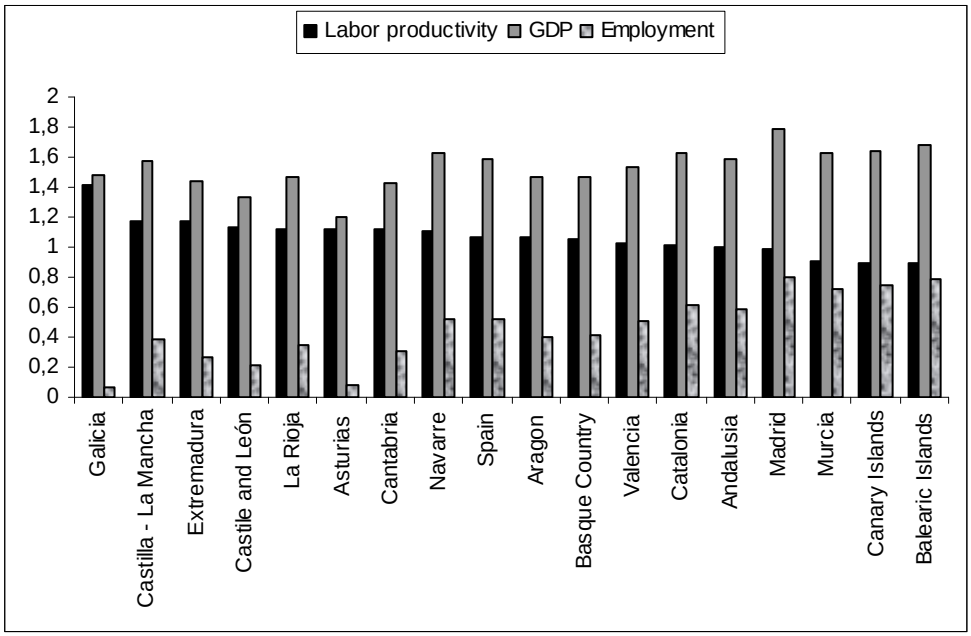
$$\ln(q) = \ln(Y) - \ln(N)$$

$$\frac{d\ln(q)}{dt} = \frac{d\ln(Y)}{dt} - \frac{d\ln(N)}{dt}$$

$$\frac{\dot{q}}{q} = \frac{\dot{Y}}{Y} - \frac{\dot{N}}{N}, \tag{7}$$

where $\frac{\dot{q}}{q}, \frac{\dot{Y}}{Y}, \frac{\dot{N}}{N}$ denote the growth rate of labor productivity, GDP and employment, respectively.

Figure 8 Decomposition of labor productivity growth rate for GDP and employment growth rates



Source: own elaboration.

In figure 8 regions are ordered from the largest to the smallest labor productivity growth rate. Regions with highest growth rate of labor productivity were characterized by a lower employment growth rate.

In addition, there was a negative correlation (–0.85) between the growth rate of labor productivity and the employment growth rate.

The equation of labor productivity can be expressed as follow:

$$\frac{Y}{N} = \frac{Y}{K} \cdot \frac{K}{N} \tag{8}$$

where Y/K and K/N denote capital productivity and capital per employed person, respectively. The estimations proved that both convergence of Y/K and K/N influenced positively on convergence of labor productivity across Spanish regions in analyzed period (see appendix A4-A5).

In order to estimate the share of labor productivity and employment rate in convergence of GDP per capita, Serrano (1999) used the equation of *β convergence*

$$\frac{1}{T}\Delta \log\left(\frac{Y}{L}\right)_t = \alpha + \beta \log\left(\frac{Y}{L}\right)_{t-1} + u_t \tag{9}$$

and the equation that GDP per capita (*Y/L*) is a product of labour productivity (*Y/N*) and employment rate (*N/L*). Serrano proposed the decomposition of β parameter for two parameters $\beta = \beta_L + \beta_N$:

$$\frac{1}{T}\Delta \log\left(\frac{Y}{N}\right)_t = \alpha_L + \beta_L \log\left(\frac{Y}{L}\right)_{t-1} + v_{1_t} \tag{10}$$

$$\frac{1}{T}\Delta \log\left(\frac{N}{L}\right)_t = \alpha_E + \beta_N \log\left(\frac{Y}{L}\right)_{t-1} + v_{2_t} \tag{11}$$

The estimations were carried out for planning periods of EU regional policy. The results (see appendix A.2) confirmed that in the years 1986–2016 the decisive role in GDP convergence played convergence of labor productivity. The convergence of employment rate, apart from the years 2000–2006, had negative impact on convergence.

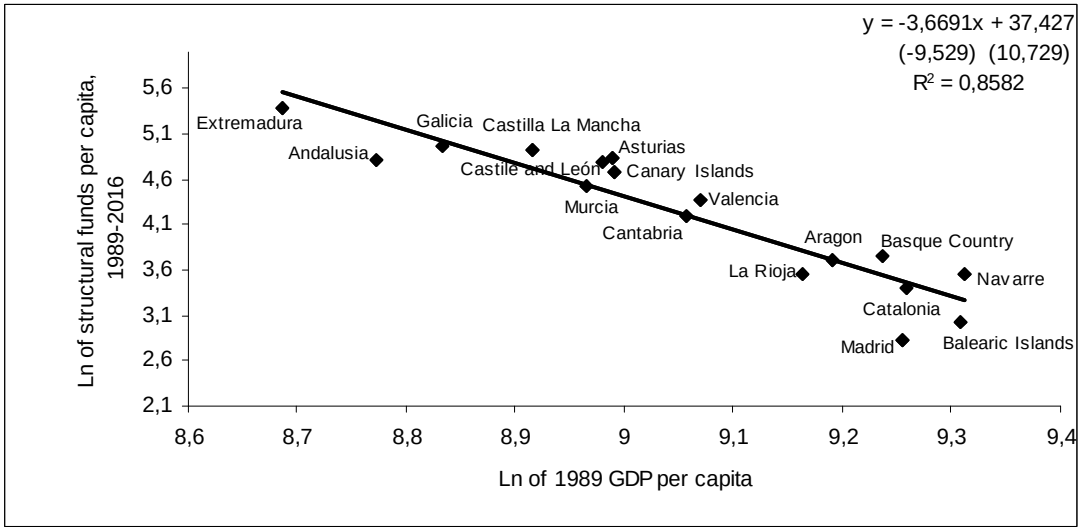
4 DATA AND ESTIMATION METHODS

Spain became a member of European Union in 1986 and participated in all planning periods of regional policy. Only in 1986 Spain was a net payer and its financial relations with EU closed with

negative balance of 8.3 billion pesetas (Sosvilla Rivero and Herce, 1999). However, in subsequent years Spain did not pay more than to receive from the EU budget. The highest support for Spain took place in the years 2000–2006. At that time, Spain received a 54.3 billion euro from the structural funds and the Cohesion Fund. In turn, the current financial perspective 2014–2020 guaranteed 26 billion euro for Spain. The decreasing level of support for Spanish regions is the result of a higher level of development, but also of the accession of poorer countries in 2004 (see appendix A6-A18).

The figure 8 presents the distribution of structural funds in Spain in the period 1989–2016. On the horizontal axis is placed the logarithmic value of 1989 GDP per capita. On the vertical axis is the value of annual average of structural funds per capita in the years 1989–2016. The regression coefficient is negative and statistically significant, which means that the increase of the GDP per capita by 1% caused a decreasing support of structural funds by 3,6%. The figure shows that the rich regions in 1989 like Balearic Islands, Navarre or Catalonia received less structural funds per capita than poor ones, Extremadura or Andalusia.

Figure 8 Distribution of the structural funds between Spanish regions, 1989–2016



Source: own elaboration.

In the empirical analysis of the study the dependent variable is the rate of economic growth of each region Δy_i expressed in the logarithmic value in euro in constant prices in 2010. The control

variables selection was based on economic literature which indicates other factors that influence economic growth, both at national and regional level, such as: human capital resources (Romer 2000; Aghion and Howitt 1992; Rodríguez-Pose and Vilalta-Bufi 2005), stock of physical infrastructure (Arrow 1962; Romer 1986; Gil et al. 2002), externalities located in regions (Frankel 1962; López-Bazo et al. 2004), the level of technical innovation (Foray et al. 2009; Bilbao-Osorio and Rodríguez-Pose 2004) or social capital (Field 2008; Beugelsdijk and van Schaik 2005).

The following list contains all explanatory variables which were included in the models.

1. Human capital *hum_cap* calculated according to the formula:

$$I = \sum_{i=1}^{n} w_i A_i \tag{12}$$

where w_i denotes the share of employees with the same level of education of each region and A_i is the weight assigned to each level of education. The parameter A_i has the following values: 0 – illiterate, 4 – elementary education, 8 – secondary education, 12 – higher education (see appendix A.3)

2. Investments per capita in each region in euro (2010) *invest_percap*,
3. Structural funds per capita in euro (2010) *fund_percap* (annual average). Structural funds include financing from European Regional Development Fund (ERDF); European Social Fund (ESF) and European Agriculture Guidance and Guarantee Funds-Section Orientation (EAGGF) and Finance Instrument for Fisheries Guidance (FIFG).
4. The share of i-sector in the regional employment: agriculture-*agri_sect*, industry-*indu_sect*, construction-*const_sect*, services-*serv_sect*, non market services-*serv1_sect*.

The estimation of the model by using the OLS estimator assumes that there are no period and country specific effects. Another problem is the exogeneity of the explanatory variables. If the independent variable is correlated with the error term the regression estimators can be biased and inefficient.

The estimations were based on the panel data model. The combination of time and cross-sectional data into one sample (panel) allows both to increase significantly the number of degrees of freedom

and to take into account specific effects for individual countries. In the study were used the first difference GMM estimator (FDGMM) developed by Arellano and Bond (1991) and the system GMM estimator (SGMM) elaborated by Blundella and Bond (1998) for dynamic panel models. The first difference GMM method consists in presenting the regression equation in a dynamic form with an endogenous delayed variable:

$$\gamma_{it} = a + \beta \ln(y_{i,t-1}) + \ln X_{it}\delta + \eta_i + v_t + e_{it}, \tag{13}$$

where: $\gamma_{it} = \ln\left(\frac{y_{i,t}}{y_{i,t-1}}\right)$ - the economic growth rate, $X_{i,t}$ - the matrix of exogenous variables, η_i - the individual effect for the i-th country, v_t - the periodic effect for the period *t*, e_{it} - error.

In the model (13), one of the explanatory variables has a delayed (endogenous) variable by one period, which means the autoregressive nature of the proposed model (dynamic panel model), so also can be written:

$$y_{it} = a + (1+\beta)\ln(y_{i,t-1}) + \ln X_{it}\delta + \eta_t + v_t + e_{it} \tag{14}$$

For the period $t-1$ the equation (14) will take the form:

$$y_{i,t-1} = a + (1+\beta)\ln(y_{i,t-2}) + \ln X_{i,t-1}\delta + \eta_i + v_{t-1} + e_{i,t-1} \tag{15}$$

This model can be presented in the form of the first differences:

$$\Delta y_{it} = (1+\beta)\Delta\ln(y_{i,t-1}) + \Delta\ln X_{it}\delta + \Delta v_t + \Delta e_{it} \tag{16}$$

In the model of the first differences (16) there are no individual effects and the condition of no correlation between exogenous variable and individual effects is no longer required. In turn, the system GMM method consists in including lagged levels as well as lagged differences. The including equations in levels makes that the individual effects remain in the model and the assumption is necessary to met: $E(a_i \Delta y_{i2}) = 0$ for $i = 1,...., N$.

The models were verified by using the Arellano-Bond (AR) serial correlation test and the Sargan test. The first order serial correlation AR (1) is expected and allowed. If it turns out that the second order serial correlation AR (2) takes places, it would mean either the moment conditions are not fulfilled or the instruments are chosen incorrectly. In the Sargan test the null hypothesis states the

model's instruments were selected correctly. The rejection of the null hypothesis indicates the problem of over-identifying restrictions.

Table 1 contains results of estimations with the one-step first differenced GMM estimator for Spanish regions in the years 1989–2016. The results within table 1 suggest the impact of structural funds as measured by *fund_percap* on economic growth is positive and this relationship is statistically significant at the 5% significance level at least. In the models 3 and 4 the structural funds were divided into two groups: structural funds derived from the European Regional Development Fund (ERDF) budget and European Social Fund (ESF) budget, respectively. The estimations proved that only funds of FSE had positive impact on GDP per head of population. The affect of ERDF resulted statistically insignificant. As regards the role of structural funds for convergence, it was insignificant. After introducing the variable of structural funds *fund_percap* in the model 2, the value of y_{t-1} changed insignificantly and the value of the speed of convergence β too. The same situation occurred in models 3 and 4, after dividing structural funds into ERDF and ESF. The estimations proved that the variable y_{t-1} is statistically significant at the 1% in all models, so the convergence process across Spanish regions took place in analyzed period. The poor regions developed faster than rich ones. In case of human capital only in the model 3 this variable resulted significant at the 10% significance level at least. In all models the variable expressing the volume of investments per head of population turned out insignificant. In the next step of the estimations were introduced other explanatory variables expressing the share of employment of each sector. Only the non-market services variable *serv1_sect* is statistically significant which means that raising share of employment in services not for sale sector affected positively GDP per capita in Spanish regions.

Table 1 One-step FDGMM estimates of GDP per capita convergence in Spain, 1989–2016

	(1)	(2)	(3)	(4)	*(5)*
y_{t-1}	0.9172***	0.9244***	0.9149***	0.9240***	*0.8990****
	(0.0299)	(0.0350)	(0.0305)	(0.0326)	*(0.0321)*
hum _ cap	0.1155	0.0838	0.1159*	0.0953	*0.1047*
	(0.0715)	(0.0646)	(0.0667)	(0.0663)	*(0.0711)*
invest _ percap	0.0099	0.0067	0.0109	0.0081	*0.0109*
	(0.0094)	(0.0100)	(0.0098)	(0.0098)	*(0.0104)*
fund _ percap		0.0054**			*0.0050***

		(0.0025)			*(0.0021)*
ERDF _ percap			–0.0000		
			(0.0035)		
ESF _ percap				0.0032**	
				(0.0012)	
agri _ sec *t*					*0.0081*
					(0.0072)
ind _ sec *t*					*0.0032*
					(0.0132)
const _ sec *t*					*0.0040*
					(0.0098)
serv _ sec *t*					*0.0243*
					(0.0298)
*serv*1 _ sec *t*					*0.0423***
					(0.0194)
N	391	391	391	391	*391*
Regions	17	17	17	17	*17*
Instruments	273	274	274	274	*279*
AR(1)	0.0015	0.0016	0.0016	0.0016	*0.0019*
AR(2)	0.3904	0.4159	0.3911	0.4307	*0.3706*
Sargan	0.8591	0.9017	0.8156	0.9410	*0.7458*
Wald	0.0000	0.0000	0.0000	0.0000	*0.0000*
β (%)	8.0	7.3	8.2	7.3	*9.6*
HL	*8.7*	*9.5*	*8.5*	*9.5*	*7.2*

Note: The dependent variable is Δy_t. * p<0.10, **p<0.05, ***p<0.01. Standard errors clustered in parentheses. Period dummies are included. AR(1) and AR(2) denote p-value for test of, respectively, first order and second order serial correlation. The speed of convergence and half-life measured as $\beta = -\ln(1+b)/T$ and $HL = \ln(2)/\beta$, respectively. The variable *fund_percap* express the annual average value of structural funds per capita. The value of structural funds allocated to Spanish regions were taken form: Dolores Correa and Manzanedo López (2002) for the years 1989–1999; Regional Operational Programmes for Objective 1 regions and Single Programming Documents for objective 2 regions for the years 2000–2006; Marco Estratégico Nacional de Referencia for the period 2007–2013; Acuerdo de Asociación de España for the period 2014–2020.

In table 2 there are the results of estimations for each planning period. Since the time series of panel data are shorter than in the period 1989–2016, in order to receive more efficient estimates of parameters two-step sys-GMM estimator (sys-GMM2) were used. The Sargan test confirmed instruments validity. In turn, the Arellano-Bond tests indicated that there is no first and second order serial correlation. It can be concluded, therefore, the conditions of a generalized method of moment (GMM) were met. All models confirmed convergence process across Spanish regions. Besides, apart form the years 1994–1999 there was a positive and statistically significant relationship between human capital and GDP per capita growth. In case of investments its impact on economic growth was positive in periods 1989–1993 and 2000–2007. The estimations proved that structural funds affected positively

GDP per head of population growth in two last planning periods 2000–2006 and 2007–2013. It was introduced to the models dummy variable (*dummy_f.percap*). The value of structural funds per head of population was multiplied by 1 in regions of objective 1 and by 0 in other regions (regions of objective 2). In all cases dummy variable turned out statistically insignificant, but if it not be taken into consideration the statistical significance, in the years 1994–2013 its value was negative, so it could not be state that regions of objective 1 make better use of EU funds than objective 2 regions.

In order to test the robustness check other estimation methods were used. Table 3 contains the results of estimations using two-step first differences GMM estimator (FDGMM2), one-step sys-GMM (sys-GMM1) and two-step sys-GMM (sys-GMM2) estimator, ordinary least squares estimator (OLS) and fixed effect (FE) model. Al estimations confirmed convergence process across Spanish regions. The variable y_{t-1} is statistically significant at the 1% significance level at least. The estimations confirmed in all models that the investments positive affected the level of GDP per capita. In case of human capital variable models FDGMM2 and OLS proved its positive impact on GDP per head of population. In other models its impact turned out statistically insignificant. As regards the structural funds the estimations, apart from FDGMM2 estimator, proved that there were positive and statistically significant relationship between Community support and GDP per capita growth. However, models presents problems of second order serial correlation AR(2). In case of model sys-GMM1 Sargan test confirmed invalid specification of instruments. The Breusch-Pagan test and Hausman test confirmed that FE estimator was better than OLS and random effect (RE) estimators.

Table 2 Sys-GMM2, the impact of structural funds on GDP per capita and convergence process across Spanish regions in each planning period

	1989–1993		1994–1999		2000–2006		2007–2013	
y_{t-1}	0.8592***	0.9256	1.0087***	0.9863***	0.9807***	0.9684***	0.7558***	0.6567***
	(0.1277)	(0.0877)	(0.0442)	(0.0631)	(0.0139)	(0.0124)	(0.0491)	(0.0761)
hum _ cap	0.0316	–0.0009	0.0943	0.1270	0.0727	0.1238***	0.5703***	0.8713***
	(0.0497)	(0.0245)	(0.0865)	(0.1054)	(0.0527)	(0.0386)	(0.1855)	(0.2675)
invest _ percap	0.0914	0.0281	–0.0224	–0.0034	0.0132	0.0103	0.1574***	0.1934***
	(0.0694)	(0.0306)	(0.0381)	(0.0527)	(0.0105)	(0.0114)	(0.0180)	(0.0260)
fund _ percap		–0.0192		0.0002		0.0147**		0.0340*
		(0.0175)		(0.0103)		(0.0066)		(0.0199)
dummy _ f.percap		0.0001		–0.0003		–0.0033		–0.0078
		(0.0038)		(0.0026)		(0.0027)		(0.0062)
N	68	68	85	85	102	102	102	102
Regions	17	17	17	17	17	17	17	17
Instruments	15	17	21	23	22	24	22	24
AR(1)	0.5796	0.5195	0.0472	0.0425	0.6808	0.5740	0.0009	0.0038
AR(2)	0.7799	0.9057	0.0803	0.1196	0.5592	0.5059	0.9683	0.9448
Sargan	0.2915	0.1810	0.2147	0.7338	0.6441	0.6483	0.6160	0.7338
Wald	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
β (%)	13.2	7.2	-	1.4	1.9	3.1	21.8	29.5
HL	5.3	9.7	-	50.9	36.3	22.3	3.2	2.3

Source: Author's calculations.

Note: see note to Table 1. For the periods 1989–1993 and 1994–1999 time dummies included. Two-step estimates with the Windmeijer (2005) correction.

Table 3 Robustness to estimation methods, 1989–2016

	FDGMM2	Sys-GMM1	Sys-GMM2	OLS	*FE*
y_{t-1}	0.5338***	0.9068***	0.9044***	0.9016***	*0.9118****
	(0.0393)	(0.0162)	(0.0309)	(0.0120)	*(0.0147)*
hum _ cap	0.6012***	0.0181	0.0262	0.0938**	*0.0267*
	(0.1240)	(0.0851)	(0.1346)	(0.0395)	*(0.0442)*
invest _ percap	0.2111***	0.0976***	0.0988***	0.0908***	*0.0202***
	(0.0209)	(0.0077)	(0.0147)	(0.0101)	*(0.0083)*
fund _ percap	–0.0135	0.0218***	0.0215***	0.0142***	*0.0048***
	(0.0136)	(0.0036)	(0.0047)	(0.0023)	*(0.0024)*
N	391	408	408	408	*408*
Regions	17	17	17	17	*17*
Instruments	258	281	281		
AR(1)	0.0315	0.1504	0.1327		
AR(2)	0.0020	0.0002	0.0004		
Sargan	1.0000	0.0000	1.0000		
Wald	0.0000	0.0000	0.0000		
Adjusted R^2				0.99	*0.99*
β (%)	38.3	8.9	9.1	9.4	*8.5*
HL	*1.8*	*7.8*	*7.6*	*7.4*	*8.2*

Source: own elaboration.

Note: see note to Table 1. Two-step estimates with the Windmeijer (2005) correction. The Hausman test confirmed the fixed effect model is better than random effect model ($\lambda^2 = 78{,}40$, q = 3,79497e-016)

In the next step of the research the impact of structural funds on labor productivity were estimated. The group of explanatory variables remained unchanged. The estimations proved the human capital affected positively labor productivity in all models. On the other hand the influence of investments per head of populations on labor productivity resulted statistically insignificant. The impact of structural funds on labor productivity turned out positive and statistically significant at the 10% significance level at least, which means that the financial support derived from the budgets of structural funds increased the level of labor productivity in Spanish regions. On the other hand by introducing the variable of structural funds *fund_percap* did not change significantly the value of $prod_{t-1}$ variable, so it could be state that structural funds did not affect the convergence of labor productivity across Spanish regions in the years 1989–2016. Also, it is to notice that in analyzed period convergence of labor productivity took place. The variable $prod_{t-1}$ is statistically significant in all estimated models. In the fourth model several variables were included expressing the employment share in each sector. Only share of employment in agriculture and construction sector turned out statistically insignificant.

In turn the increasing share of employment in industry sector, service sector and non market service sector influenced in positively way on labor productivity.

Table 4 One-step FDGMM, labor productivity convergence across Spanish regions 1989–2016

	(1)	(2)	(3)	(4)	*(5)*
$prod_{t-1}$	0.8975***	0.8872***	0.8970***	0.8894***	*0.7370****
	(0.0287)	(0.0327)	(0.0326)	(0.0300)	*(0.0368)*
hum _ cap	0.2214***	0.1970***	0.2065***	0.2082***	*0.1775****
	(0.0766)	(0.0694)	(0.0744)	(0.0740)	*(0.0646)*
invest _ percap	–0.0143	–0.0158	–0.0162	–0.0130	*–0.0063*
	(0.0124)	(0.0125)	(0.0125)	(0.0124)	*(0.0130)*
fund _ percap		0.0059*			*0.0063***
		(0.0033)			*(0.0029)*
ERDF _ percap			0.0045		
			(0.0046)		
ESF _ percap				0.0021**	
				(0.0010)	
agri _ sec *t*					*0.0096*
					(0.0061)
ind _ sec *t*					*0.0456****
					(0.0176)
const _ sec *t*					*0.0061*
					(0.0144)
serv _ sec *t*					*0.1283****
					(0.0464)
*serv*1 _ sec *t*					*0.0803***
					(0.0350)
N	391	391	391	391	*391*
Regions	17	17	17	17	*17*
Instruments	273	273	274	274	*273*
AR(1)	0.0014	0.0013	0.0013	0.0014	*0.0014*
AR(2)	0.2927	0.2997	0.3160	0.3064	*0.3544*
Sargan	0.1017	0.1001	0.1168	0.1019	*0.0207*
Wald	0.0000	0.0000	0.0000	0.0000	*0.0000*
β (%)	9.8	10.7	9.8	10.5	*23.3*
HL	*7.1*	*6.5*	*7.1*	*6.6*	*3.0*

Source: own elaboration.

Note: see note to Table 1

5 CONCLUSIONS

The purpose of this study was to investigate the impact of structural funds on economic growth and convergence process across Spanish regions. The panel data of Spanish regions was constructed with observation from 1989 to 2016. The different estimation procedures were applied such as first-difference generalized moments method estimator (FDGMM), the system GMM estimator (SGMM)

or fixed effect (FE) and random effect (RE) models. It was introduced to the models several explanatory variables such as human capital, investments per capita or share of each sector in obtained GDP. The empirical analyzes found that structural funds had positive impact on GDP per capita growth in the years 1989–2016. On the other hand the impact of structural funds on convergence process in Spain was insignificant. The study confirmed that human capital and investments influence positively on economic growth. Also, it was proved that the convergence process took place which means that Spanish regions characterized by lower GDP per capita achieved higher rate of economic growth. The estimations showed that in the period 1989–2016 structural funds had positive impact on the dynamic of labor productivity, but their influence on convergence process turned out insignificant.

REFERENCES

Acuerdo de Asociación de España for the period 2014–2020, http://www.dgfc.sepg.minhafp.gob.es/

Aghion, P., Howitt, P.: A Model of Growth through Creative Destruction. Econometrica 60(2), 323–351 (1992)

Ardy, B., Begg, I., Schelkle, W., Torres, F.: How will EMU Affect Cohesion? Intereconomics 37(6), 300–314 (2002)

Arellano, M., Bond, S.: Some tests of specification for panel data: Monte Carlo evidence and an application to employment equation. The Review of Economic Studies 58(2), 277–297 (1991)

Armesto Pina, J.F., Lago Peñas, S.: Fondos europeos y evolución de la economía gallega: 2000–2006. Papeles de economía española 123, 206–220 (2010)

Arrow, K. J.: The Economic Implications of Learning by Doing. The Review of Economic Studies 29(3), 155–173. (1962)

Bande, R., Fernández, M., Montuenga, V.M.: Actividad, ocupación y paro: Evaluación de la política regional comunitaria en las regiones objetivo 1. Papeles de Economía Española 123, 16–38 (2010)

Barro, R..J., Sala-i-Martin, X.: Economic Growth. Second Edition. The MIT Press, Cambridge, Massachusetts (2004)

Beugelsdijk, M., Eijffinger, S.C.W.: The effectiveness of structural policy in the European Union: An empirical analysis for the UE-15 in 1995–2001. Journal of Common Market Studies 43(1), 37–51 (2005)

Beugelsdijk, S., Van Schaik, T.: Differences in social capital between 54 Western European regions. Regional Studies 39(8), 1053–1064 (2005)

Bilbao-Osorio, B., Rodríguez-Pose, A.: From R&D to Innovation and Economic Growth in the EU. Growth and Change 35(4), 434–455 (2004)

Blundell, R., Bond, S.: Initial conditions and moment restrictions in dynamic panel data model. Journal of Econometric 87(1), 115–143 (1998)

Boldrin, M., Canova, F.: Europe's regions, income disparities and regional polices, Economic Policy 16, 207–253 (2001)

Cancelo, J.R., Faiña, J.A, López-Rodríguez, J.: Measuring the permanent impact of European structural funds on peripheral objective 1 regions: The case of Galicia. European Planning Studies 17(10), 1535–1558 (2009)

Cappellen, A., Castellacci, F., Fagerberg, J., Verspagen, B.: The impact of regional support on growth and convergence in the European Union. Journal of Common Market Studies 41(4), 621–644 (2003)

Carreras, A.: *Cataluña, primera región industrial de España*. In. Nadal. J, Carreras, A. (eds.) Pautas regionales de la industralización española, siglos XIX y XX. Ariel, Barcelona (1990)

Dall'erba, S., Le Gallo, J.: Regional convergence and the impact of structural funds over 1989–1999: A spatial econometric analysis. Papers in Regional Science 87(2), 219–244 (2008)

De la Fuente, A., Vives, X.: Infrastructure and education as instruments of regional policy: Evidence from Spain. Economic Policy 20(4), 13–51 (1995)

Delgado, M., Sánchez Fernández, J.: Las desigualdades territoriales en el Estado Español 1955–1995. Revista de Estudios Regionales 51, 61–89 (1998)

Dolores Correa, M., Manzanedo López J.: Política Regional Española y Europea. Período 1983–1999. Documento de trabajo SGFCC 2002-05, Madrid (2002)

Domínguez, R.: La riqueza de las regiones. Las desigualdades económicas regionales en España 1700–2000. Alianza, Madrid (2002)

Ederveen, S., De Groot, H., Nahuis, R.: Fertile Soil for Structural Funds? A Panel Data Analysis of the Conditional Effectiveness of European Cohesion Policy. Kyklos 59(1), 17–42 (2006)

Escriba, F.J., Murgui, M.J.: El estimulo al capital privado de los fondos estructurales (2000–2006) en las regiones españolas objetivo 1. Papeles de economía española 123, 55–72 (2010)

Eurostat, http://ec.europa.eu/eurostat/data/database/

Field, J.: Social capital. Second edition. Taylor and Francis Group, New York (2008)

Foray, D., David, P.A., Hall, B.: Smart Specialisation: the Concept'. In: Knowledge for Growth: Prospect for Science. Technology and Innovation, EUR 24047, European Union (2009)

Frankel, M.: The Production Function in Allocation and Growth: A Synthesis. The American Economic Review 52(5), 995–1022 (1962)

García Solanes, J., Maria-Dolores, R.: El impacto de los fondos estructurales europeos en la economía de la Región de Murcia. Papeles de economía española 123, 221–238 (2010)

Gil Pareja, S., Soler I Marco, V.: El impacto de los fondos estructurales europeos en la Comunidad Valenciana: 2000–2006. Papeles de economía española 123, 239–253 (2010)

Gil, C., Pascual, P., Rapún, M.: Structural change, infrastructure and convergence in the regions of the European Union. European Urban and Regional Studies 9(2), 115-135 (2002)

Gumbau-Albert, M., Maudos, J.: Fondos europeos, capital tecnológico y crecimiento económico de las regiones españolas. Papeles de economía española 123, 86–99 (2010)

Lima, M.C., Cardenete, M.A., Usabiaga, C.: Andalucia y el MAC 2000–2006: una evaluación de los fondos estructurales recibidos. Papeles de economía española 123, 102–118 (2010)

Loddo, S.: Structural funds and regional convergence in Italy. Documento de Trabajo 2006/03, CRENoS, Cagliari (2006)

Lolos, S.E.G.: The effect of EU structural funds on regional growth: assessing the evidence from Greece, 1990–2005. Economic Change and Restructuring 42(3), 211–228 (2009)

López-Bazo, E., Vayá, E., Artís, A.: Regional externalities and growth: Evidence from European regions. Journal of Regional Science 44(1), 43–73 (2004)

Marco Estratégico Nacional de Referencia 2007–2013, http://www.dgfc.sepg.minhafp.gob.es/

Marín Rivero, A., Pardo Fanjul, A.: El impacto de los fondos estructurales 2000–2006 sobre la región de Castilla y León: un análisis "input–output". Papeles de economía española 123, 157–177 (2001)

Márquez Paniagua, M., Ramajo Hernandez, J., De Miguel Vélez, F.: Evaluación de los efectos económicos de los fondos estructurales del periodo 2000–2006 sobre Extremadura. Papeles de economía española 123, 191–205 (2010).

Martín Rodriguez, M.: Pautas y tendencias de desarrollo económico regional en España: una visión retrospectiva. In. Velarde, J., García Delgado, J.L., Pedreño, A. (eds.) Ejes territoriales de desarrollo: España en la Europa de los 90. Colegio de Economistas de Madrid. 133–155 (1992)

Mas, M.: Los fondos FEDER (2000-2006) y la acumulación de capital público en las comunidades autónomas españolas. Papeles de economía española 123, 73–85 (2010)

Molle, W.: EU Cohesion Policies: Adequate Constitutional Foundations and Regulatory and Financial Construction, Need for Further Optimization. Working Paper 2005/08, Milan European Economy Workshop (2005)

Murillo, E., Sosvilla-Rivero, S.: Efectos a largo plazo sobre la economía andaluza de las ayudas procedentes de los fondos estructurales: el Marco de Apoyo comunitario 1994–1999. Documento de Trabajo 2003-07, FEDEA (2003)

Pastor, J.M., Raymond, J.L., Roig, J.L., Serrano, L.: Fondos estructurales, capital humano y convergencia en las regiones objetivo 1 en España. Papeles de economía española 123, 38–54 (2010)

Piętak, Ł.: Wpływ polityki regionalnej na poprawę spójności społeczno-gospodarczej w Hiszpanii w latach 1955–2013. INE PAN, Warszawa (2016)

Raymond, J.L.: La distribución regional de PIB per cápita y su evolución en el tiempo. Un análisis de la hipótesis de la convergencia. Revista Asturiana de Economía 1, 69–91 (1994)

Rodríguez-Pose, A., Fratesi, U.: Between development social policies: the impact of European Structural Funds in objective 1 regions. Regional Studies 38(1), 97–113 (2004)

Rodríguez-Pose, A., Vilalta-Bufi, M.: (2005), Education, migration, and job satisfaction: the regional returns of human capital in the EU. Journal of Economic Geography 5(5), 545–566 (2005)

Romer, P.: Increasing Returns and Long-Run Growth. Journal of Political Economy 94(5), 1002–1037 (1986)

Romer, P.: Endogenous Technological Change. Journal of Political Economy 98(5), 71–102 (1990)

Sala-i-Martin, X.: Apuntes de crecimiento económico. Segunda edición. Antoni Bosch, Barcelona (2010)

Serrano, L.: On Convergence Accounting. Applied Economic Letters 6, 219–221 (1999)

Simpson, J.: La agricultura española (1765–1965): la larga siesta. Alianza, Madryt (1997)

Sosvilla-Rivero, S.: Canarias y los Fondos Estructurales Europeos. Hacienda Canaria 8, 5–25 (2004)

Sosvilla-Rivero, S.: Macroeconomic effects of the European Cohesion Policy in the Spanish Economy. In: Cuadrado-Roura, J. (ed.) Regional Policy, Economic Growth and Convergence: Lessons from the Spanish Case. Springer, 85–101 (2010)

Sosvilla Rivero, S., Herce, J.A.: Los efectos macroeconómicos de la Agenda 2000. Documento de trabajo 99-21,FEDEA (1999)

Tortella, G.: Patterns of Economic Retardation and Recovery in South Western Europe in the Nineteenth and Twentieth Centuries. Economic History Review 47(1), 1–21 (1994)

Windmeijer, F.: A finite sample correction for the variance of linear efficient two-step GMM estimators. Journal of Econometrics 126(1), 25–51 (2005)

Villaverde, C., Maza A.: Los fondos estructurales europeos y la convergencia de las regiones en españolas: 2000-2006. Papeles de Economía Española 123, 2–15 (2010)

APPENDIX

Table A.1 Share of each sector in regional gross value added in 1989–2016

Region	Gross Value Added	Agriculture	Industry	Construction	Services
Andalusia	Share 1986–2016	6.4	12.5	6.3	74.9
	1986 (%)	10.4	22.6	7.7	59.4
Aragon	Share 1986–2016	5.1	24.3	6.0	64.7
	1986 (%)	7.5	31.8	5.7	55.0
Asturias	Share 1986–2016	1.6	21.2	6.8	70.5
	1986 (%)	3.9	36.9	7.1	52.1
Balearic Island	Share 1986–2016	0.5	7.1	6.1	86.3
	1986 (%)	2.7	11.6	7.4	78.3
Canary Island	Share 1986–2016	1,3	7.6	5.1	86.0
	1986 (%)	4.7	13.0	8.3	73.9
Cantabria	Share 1986–2016	1.5	21.8	7.0	69.7
	1986 (%)	5.3	30.3	5.0	59.4
Castile and León	Share 1986–2016	4.6	22.8	6.1	66.5
	1986 (%)	9.2	29.3	7.5	54.0
Castilla La Mancha	Share 1986–2016	8.2	21.7	6.9	63.3
	1986 (%)	13.2	28.8	8.0	49.9
Catalonia	Share 1986–2016	1.1	21.7	4.8	72.4
	1986 (%)	2.1	36.8	5.9	55.2
Valencia	Share 1986–2016	2.4	19.6	6.4	71.6
	1986 (%)	5.2	31.2	5.4	58.2
Extremadura	Share 1986–2016	8.1	14.1	7.5	70.2
	1986 (%)	13.1	19.1	11.0	56.7
Galicia	Share 1986–2016	5.4	20.4	6.9	67.3
	1986 (%)	11.8	27.5	7.0	53.7
Madrid	Share 1986–2016	0.1	11.0	4.4	84.6
	1986 (%)	0.3	22.2	6.4	71.2
Murcia	Share 1986–2016	5.4	19.4	6.0	69.1
	1986 (%)	9.4	25.0	7.0	58.6
Navarre	Share 1986–2016	3.4	33.1	5.3	58.1
	1986 (%)	6.7	37.0	5.1	51.2
Basque Country	Share 1986–2016	0.8	29.0	6.1	64.2
	1986 (%)	2.4	44.5	3.9	49.2
La Rioja	Share 1986–2016	5.9	29.1	6.0	59.0
	1986 (%)	9.7	44.3	4.7	41.2
Spain	Share 1986–2016	1.7	18.1	5.7	74.5
	1986 (%)	5.6	29.1	6.5	58.8

Source: own elaboration.

Table A.2 Decomposition of GDP per capita convergence, Serrano's method

	1989–1993		1994–1999		2000–2006		2007–2013		1989–2016	
	β	(%)	β	(%)	β	(%)	β	(%)	β	(%)
GDP per capita	−0.0056 (−0.780)	100.00	0.0222 (1,975)	100.00	−0.0209 (−2.773)	100.00	0.0075 (1.462)	100.00	−0.0034 (−0,780)	100.00
Labor productivity	−0.0163 (−1.958)	285.59	−0.0189 (−1,064)	–85.17	−0.0094 (−1.834)	45.18	−0.0036 (−0.850)	–49.02	−0.0097 (−1.958)	285.59
Employment rate	0.0107 (1.447)	−185.59	0.04115 (2.4 74)	185.17	−0.0115 (−2.309)	54.82	0.0112 (1.711)	149.02	0.0063 (1.447)	−185.59

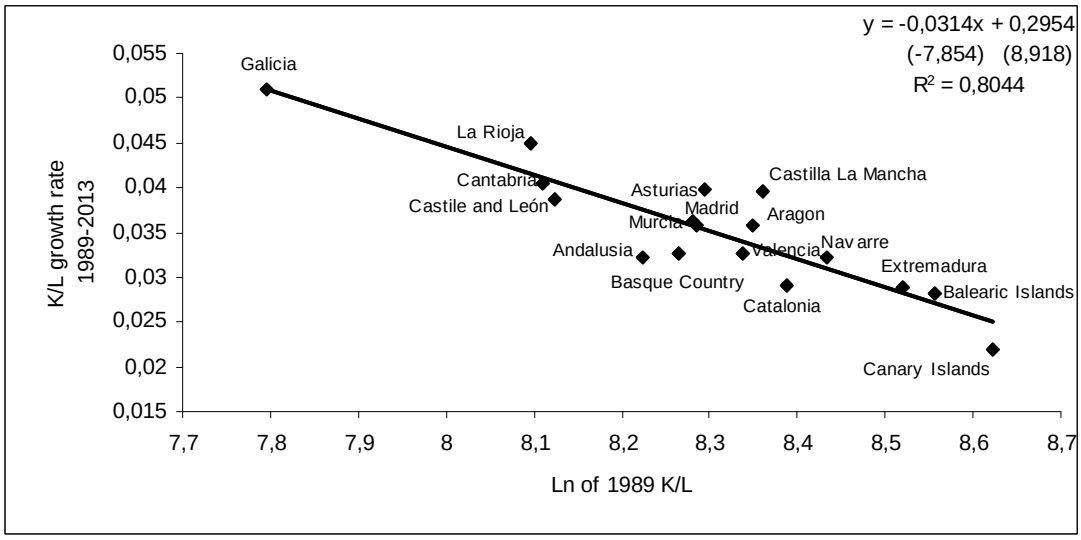
Source: own elaboration, t statistic between parentheses.

Table A.3 Human capita in Spanish region

Year	AND	ARA	AST	BAL	CAN	CANT	CL	CM	CAT	VAL	EXT	GAL	MAD	MUR	NAV	BAS	RIO
1986	4.32	4.89	4.98	4.64	4.60	5.08	4.86	4.29	4.92	4.61	4.17	4.56	5.47	4.40	5.06	5.37	4.92
1987	4.39	5.02	5.04	4.71	4.74	5.22	4.99	4.35	5.05	4.71	4.27	4.68	5.55	4.58	5.21	5.51	5.01
1988	4.48	5.03	5.11	4.81	4.87	5.34	5.10	4.40	5.11	4.79	4.33	4.66	5.62	4.55	5.40	5.69	5.20
1989	4.60	5.15	5.21	4.90	4.91	5.44	5.21	4.48	5.23	4.88	4.35	4.69	5.74	4.58	5.45	5.75	5.25
1990	4.64	5.24	5.28	5.01	4.97	5.51	5.24	4.53	5.32	4.88	4.43	4.82	5.81	4.57	5.63	5.85	5.37
1991	4.69	5.30	5.32	5.03	5.08	5.52	5.32	4.58	5.40	4.94	4.56	4.91	5.81	4.72	5.80	5.89	5.47
1992	4.79	5.34	5.42	4.99	5.05	5.62	5.37	4.60	5.47	5.02	4.56	4.98	5.92	4.84	5.87	5.94	5.56
1993	4.88	5.47	5.53	5.08	5.22	5.66	5.41	4.67	5.56	5.17	4.64	5.04	6.00	4.87	5.90	6.06	5.61
1994	4.91	5.59	5.65	5.15	5.38	5.71	5.49	4.75	5.64	5.26	4.70	5.14	6.20	4.91	6.08	6.23	5.73
1995	5.08	5.75	5.66	5.29	5.36	5.82	5.62	4.83	5.73	5.34	4.70	5.26	6.34	5.08	6.23	6.27	5.80
1996	5.22	5.88	5.68	5.48	5.42	5.95	5.71	4.96	5.89	5.45	4.85	5.41	6.40	5.47	6.26	6.40	5.66
1997	5.31	5.91	5.74	5.46	5.54	5.96	5.81	5.02	5.91	5.57	4.99	5.47	6.51	5.49	6.29	6.47	5.84
1998	5.42	5.95	5.77	5.57	5.64	6.07	5.88	5.04	5.98	5.65	5.06	5.52	6.62	5.56	6.44	6.56	5.90
1999	5.55	5.99	5.96	5.62	5.69	6.05	5.96	5.14	6.06	5.73	5.11	5.63	6.69	5.61	6.50	6.67	5.88
2000	5.58	6.07	5.97	5.73	5.79	6.18	5.97	5.15	6.16	5.78	5.22	5.62	6.82	5.67	6.57	6.75	6.03
2001	5.60	6.16	5.99	5.84	5.83	6.24	6.01	5.25	6.19	5.82	5.24	5.73	6.96	5.84	6.73	6.84	6.10
2002	5.66	6.14	6.13	5.94	5.98	6.28	6.05	5.35	6.27	5.84	5.34	5.81	6.98	5.83	6.75	6.87	6.22
2003	5.73	6.32	6.15	6.00	6.07	6.45	6.17	5.38	6.30	5.93	5.42	5.93	6.92	5.89	6.75	6.95	6.24
2004	5.80	6.42	6.26	5.92	6.12	6.48	6.24	5.46	6.40	6.14	5.44	6.01	7.02	6.00	6.78	7.06	6.35
2005	5.95	6.58	6.60	6.12	6.34	6.73	6.35	5.65	6.56	6.37	5.58	6.21	7.27	6.09	7.03	7.34	6.66
2006	5.98	6.65	6.48	6.26	6.26	6.76	6.42	5.75	6.63	6.41	5,60	6.29	7.34	6.10	7.05	7.40	6.65
2007	6.02	6.73	6.55	6.16	6.29	6.79	6.47	5.86	6.61	6.43	5.69	6.32	7.47	6.13	7.17	7.44	6.72
2008	6.05	6.73	6.68	6.24	6.27	6.87	6.51	5.84	6.61	6.46	5.74	6.35	7.48	6.13	7.12	7.47	6.70
2009	6.11	6.80	6.75	6.28	6.34	6.86	6.54	5.98	6.64	6.45	5.78	6,35	7.43	6.12	7.17	7.52	6.92
2010	6.18	6.87	6.77	6.35	6.39	7.05	6.59	6.04	6.70	6.56	5.84	6.39	7.62	6.14	7.29	7.58	6.84
2011	6.22	6.93	6.87	6.50	6.35	7.06	6.67	6.18	6.78	6.65	5.88	6.49	7.69	6.26	7,26	7.61	6.83
2012	6.27	6.94	6.97	6.60	6.47	7.18	6.76	6.17	6,77	6.65	6.51	6.98	7.71	6.31	7.28	7.70	6.83
2013	6.35	6.95	7.04	6.61	6.61	7.26	6.82	6.20	6.82	6.68	6.51	6.98	7.78	6.42	7.36	7.71	6.83

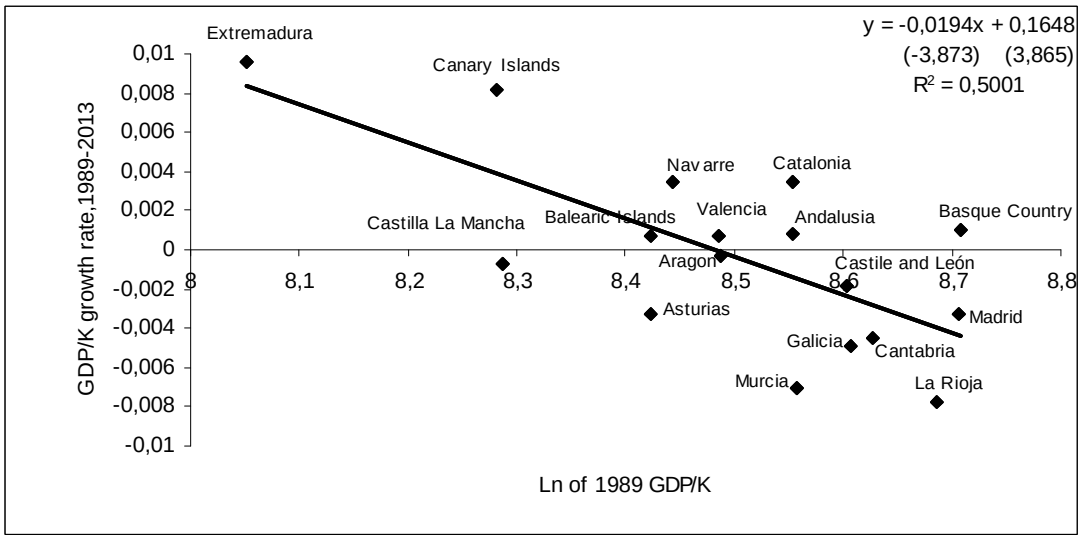
Source: own elaboration based on data Fundación Bancaja e Ivie (Instituto Valenciano de Investigaciones Económicas).

Table A.4 Convergence of K/N in Spain, 1989–2013



Source: own elaboration based on data Fundación Bancaja e Ivie (Instituto Valenciano de Investigaciones Económicas)

Table A.5 Convergence of GDP/K in Spain, 1989–2013



Source: own elaboration based on data Fundación Bancaja e Ivie (Instituto Valenciano de Investigaciones Económicas)

Table A.6 European Regional Development Fund (ERDF) in Spain 1986–1993 (million pesetas)

Region	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**
Andalusia	16079	18191	19602	34412	50742	59396	73197	38316
Aragon	0	157	1683	6596	5290	7448	3592	4714
Asturias	0	5433	3094	11201	3068	26406	7770	5955
Balearic Islands	0	0	0	0	0	1187	303	1577
Canary Islands	553	2163	4132	2816	4875	20669	25412	17994
Cantabria	0	0	3090	318	2904	2257	171	3281
Castile and León	8459	4834	7259	14295	20265	29724	23784	26081
Castilla - La Mancha	4385	5357	15365	17784	16153	24020	31236	7032
Catalonia	0	0	2335	1606	8402	17532	18732	14642
Valencia	0	0	3777	6357	1178	24261	26259	18254
Extremadura	6834	1477	4018	5462	3162	17671	13458	28969
Galicia	4148	3258	4110	6626	9956	9879	37176	27344
Madrid	0	0	467	2782	1553	6669	2465	6409
Murcia	0	6120	665	2479	4968	9280	6396	5150
Navarre	0	0	0	411	460	1059	2156	2088
Basque Country	0	0	0	2473	4853	8048	11572	19199
La Rioja	0	0	0	0	0	1106	865	502
Ceuta y Melilla	0	0	0	0	0	3398	660	5460
Spain	40458	46990	69597	115618	137829	270010	285204	232967

Source: Dolores Correa (2002).

Table A.7 European Social Fund (ESF) in Spain 1986–1993 (million pesetas)

Region	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**
Andalusia	4590	8775	9167	15036	12235	35871	21985	24102
Aragon	673	1033	1074	1876	1470	2310	3039	3142
Asturias	282	728	844	1570	1647	5500	4984	2984
Balearic Islands	264	355	269	695	576	1091	1300	1586
Canary Islands	786	1807	1692	3049	1615	7502	5063	4005
Cantabria	222	360	375	638	781	839	1385	1963
Castile and León	1804	3032	3093	5415	4930	11945	8006	5995
Castilla - La Mancha	1053	1730	1662	2831	2826	7282	4734	2273
Catalonia	3599	4914	5344	8209	7740	12463	15827	15073
Valencia	1671	2567	2338	3923	3978	10356	10589	8287
Extremadura	699	1312	1490	2480	2692	6884	4089	5325
Galicia	1893	3066	2571	4077	3709	9134	7215	7740
Madrid	2188	3785	3732	7375	5103	11728	8128	10072
Murcia	642	1172	1132	1868	1510	4836	2887	2282
Navarre	357	472	455	522	2539	654	1067	1180
Basque Country	2222	2133	2424	3676	2502	4860	7249	9166
La Rioja	69	186	246	261	226	423	470	956
Ceuta y Melilla	39	134	168	294	254	558	478	345
Spain	23053	37561	38076	63795	56333	134236	108495	106476

Source: Dolores Correa (2002).

Table A.8 European Agriculture Guidance and Guarantee Funds-Section Orientation (EAGGF) and Finance Instrument for Fisheries Guidance (FIFG) in Spain 1986–1993 (million pesetas)

Region	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**
Andalusia	0	100	1115	4454	3545	11598	12050	13497
Aragon	0	46	578	1890	1117	4494	7649	9049
Asturias	0	215	532	1375	1253	3747	2581	2868
Balearic Islands	0	2	7	462	213	562	871	1083
Canary Islands	0	13	268	1498	918	2024	3338	5341
Cantabria	0	77	332	885	266	1695	1730	1803
Castile and León	0	198	1124	2887	3263	12864	12445	13496
Castilla - La Mancha	0	96	877	2719	2396	10778	7726	6219
Catalonia	0	55	576	1878	841	3920	4154	5605
Valencia	0	178	919	4236	1611	4067	4332	3858
Extremadura	0	770	547	2014	1703	4378	4385	4700
Galicia	0	209	932	4473	3818	11028	8896	15804
Madrid	0	23	105	316	214	1081	794	1178
Murcia	0	3	189	1825	742	2083	1780	1344
Navarre	0	20	291	526	486	1661	1659	3021
Basque Country	0	319	1121	3155	1041	3035	1214	4705
La Rioja	0	9	162	232	152	638	859	744
Ceuta y Melilla	0	0	0	0	0	0	0	0
Spain	0	2333	9675	34825	23579	79653	76463	94315

Source: Dolores Correa (2002).

Table A.9 European Regional Development Fund (ERDF) in Spain 1994–1999 (million pesetas)

Region	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
Andalusia	77740	97979	56205	113969	37851	147558
Aragon	2018	4277	4080	5553	7298	4461
Asturias	10262	20637	18950	23840	18730	15679
Balearic Islands	96	1165	951	325	917	1274
Canary Islands	22977	23997	28442	25939	29108	29439
Cantabria	5834	5808	11045	22412	8464	10203
Castile and León	17847	42645	42178	26782	50701	65845
Castilla - La Mancha	10719	32551	23852	36918	5011	57696
Catalonia	9289	12551	23104	21537	48882	1313
Valencia	23303	50571	46833	15325	42377	28119
Extremadura	18610	22172	19962	4648	33624	25527
Galicia	27031	53838	49165	57306	20571	79022
Madrid	1710	4990	6737	119	13260	7328
Murcia	8283	16615	15151	6103	12326	28320
Navarre	555	3195	510	2491	1328	691
Basque Country	3549	10635	16847	419	42364	306
La Rioja	405	1051	789	854	1557	298
Ceuta y Melilla	1493	3601	3539	2856	1872	4371
Spain	241721	408278	368340	367396	376241	507450

Source: Dolores Correa (2002).

Table A.10 European Social Fund (ESF) in Spain 1994–1999 (million pesetas)

Region	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
Andalusia	19086	62069	55012	45565	63880	69329
Aragon	799	4166	4303	8313	6180	7214
Asturias	3291	9375	6842	9231	6191	18436
Balearic Islands	230	1954	1076	3438	2824	3940
Canary Islands	4729	10253	9356	25339	17953	11610
Cantabria	993	3597	2619	3410	3190	7484
Castile and León	5871	15815	13662	16063	19407	37111
Castilla - La Mancha	4840	12153	10226	12602	11180	18964
Catalonia	7897	20477	21821	44738	43328	21225
Valencia	7578	35061	23795	38978	27555	24433
Extremadura	4631	14844	16374	11418	16404	23440
Galicia	5918	19440	16652	21502	20781	23148
Madrid	4285	15505	10495	33077	24837	26933
Murcia	2621	4304	5183	6396	6111	21551
Navarre	550	3297	2583	5164	3323	1707
Basque Country	3343	10906	11481	14171	15140	4381
La Rioja	200	847	495	2394	1388	3455
Ceuta y Melilla	367	856	502	728	638	3423
Spain	77229	244919	212477	302527	290310	327784

Source: Dolores Correa and Manzanedo López (2002).

Table A.11 European Agriculture Guidance and Guarantee Funds-Section Orientation (EAGGF) and Finance Instrument for Fisheries Guidance (FIFG) in Spain 1994–1999 (million pesetas)

Region	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
Andalusia	4955	17095	18555	16214	23266	35122
Aragon	1862	7457	8389	7420	7680	10811
Asturias	1258	7426	5083	3736	6485	3778
Balearic Islands	282	689	1361	450	987	938
Canary Islands	1738	7751	5004	5157	3257	6795
Cantabria	1280	1773	1776	2872	5517	4981
Castile and León	3314	24617	14674	13755	15489	21225
Castilla - La Mancha	3168	15495	8671	9095	12939	17779
Catalonia	3005	3447	5887	4408	8170	10332
Valencia	1542	8269	7423	7772	9179	5677
Extremadura	1201	8047	7347	6561	5085	8407
Galicia	7337	19406	25858	23137	26045	28590
Madrid	215	643	1326	1860	1425	3606
Murcia	1103	2481	3374	2110	4560	3350
Navarre	736	1613	4163	1743	1732	1649
Basque Country	3382	3216	4962	2008	4755	3485
La Rioja	396	664	1138	773	745	2111
Ceuta y Melilla	38	7	0	0	68	62
Spain	36812	130096	124991	109071	137384	168698

Source: Dolores Correa (2002).

Table A.12 European Regional Development Fund (ERDF) in Spain 2000–2006 (thousand euros)

Region	2000	2001	2002	2003	2004	2005	2006
Andalusia	864516.4	881474.9	898742.5	916316.3	846607.5	863438.5	881603.9
Aragon	42301.0	42590.3	43077.6	43473.5	39529.7	39925.6	40504.2
Asturias	144528.7	147363.8	150250.5	153189.5	141534.5	144348.3	147384.7
Balearic Islands	12977.2	12902.4	12915.5	12871.0	11525.9	11481.4	11552.0
Canary Islands	200846.8	204825.5	208802.8	212899.0	196691.4	200610.0	204824.6
Cantabria	43800.0	38300.0	32300.0	26800.0	18100.0	18600.0	20300.0
Castile and León	317591.9	315922.0	322090.2	328204.7	303326.8	309248.3	308116.1
Castilla - La Mancha	202813.3	206831.8	210848.7	214984.5	198618.2	202574.2	206829.2
Catalonia	143608.9	144041.2	145237.0	146023.4	132179.9	132966.3	134571.4
Valencia	291229.5	295474.5	300531.4	305524.3	282645.4	286867.5	292926.3
Extremadura	210358.0	214484.0	218686.0	222962.0	206000.0	210095.0	214515.0
Galicia	328167.9	340523.9	347446.7	354329.3	320731.3	322081.5	322419.4
Madrid	55414.3	55183.6	55313.6	55214.0	49543.7	49444.1	49803.7
Murcia	129789.4	132335.4	134927.3	137566.0	127100.4	129627.0	132354.4
Navarre	13352.6	13159.0	13075.2	12911.2	11430.8	11266.8	11263.2
Basque Country	80311.5	81150.1	82316.4	83361.4	76112.8	77157.8	78445.3
La Rioja	5856.7	5907.9	5984.7	6050.9	5514.1	5580.3	5667.7
Spain	3087464.2	3132470.3	3182546.2	3232681.0	2967192.5	3015312.6	3063081.3

Source: Regional Operational Programme for Objective 1 regions and Single Programming Documents for objective 2 regions for the years 2000–2006.

Note: In case of regions: Aragon, Balearic Islands, Catalonia, Madrid, Navarre, Basque Country and La Rioja the data contain transitory support.

Table A.13 European Social Fund (ESF) in Spain 2000–2006 (thousand euros)

Region	2000	2001	2002	2003	2004	2005	2006
Andalusia	131016.3	133627.3	136238.3	138849.2	128312.0	130829.8	133627.3
Aragon	2086.9	2126.2	2171.0	2215.9	2042.0	2086.9	2131.8
Asturias	15128.5	15419.9	15711.1	16004.0	14080.5	14296.0	13535.1
Balearic Islands	595.2	606.4	619.2	632.0	582.4	595.2	608.0
Canary Islands	38567.3	39335.9	40104.5	40873.1	37771.2	38512.4	39335.8
Cantabria	7360.0	6440.0	5428.0	4508.0	3036.0	3128.0	3404.0
Castile and León	41684.4	47153.0	45585.8	46198.4	42463.9	43193.8	42573.7
Castilla - La Mancha	31859.8	33465.8	34690.9	35644.3	34464.8	35446.9	36627.5
Catalonia	36070.8	36749.6	37525.3	38301.0	35295.1	36070.8	36846.6
Valencia	66948.0	68282.5	69616.7	70950.9	65566.5	66853.0	68282.5
Extremadura	51085.2	52087.5	53108.1	54147.2	50027.7	51020.5	52096.8
Galicia	47984.0	64085.9	65275.9	66580.1	48370.9	49329.9	50373.3
Madrid	3510.8	3576.8	3652.3	3727.8	3435.3	3510.8	3586.3
Murcia	15146.9	14655.8	15277.0	15863.8	15266.6	15631.2	15958.8
Navarre	580.3	591.2	603.7	616.2	567.8	580.3	592.8
Basque Country	4041.7	4117.8	4204.7	4291.6	3954.8	4041.7	4128.7
La Rioja	2920	297.5	303.8	310.1	285.7	292.0	298.3
Spain	493957.8	522618.9	530116.2	539713.7	485523.2	495419.1	504007.0

Source: Regional Operational Programme for Objective 1 regions and Single Programming Documents for objective 2 regions for the years 2000–2006.

Table A.14 European Agriculture Guidance and Guarantee Funds-Section Orientation (EAGGF) in Spain 2000–2006 (thousand euros)

Region	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
Andalusia	106161.3	108302.9	110138.6	112433.1	103866.8	106008.4	108302.9
Aragon	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Asturias	28974.3	29558.8	30059.7	30686.0	28348.0	28932.5	29558.8
Balearic Islands	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canary Islands	19971.0	20366.0	20763.0	21163.0	19557.0	19940.0	20367.0
Cantabria	14400.0	12600.0	10600.0	8800.0	5900.0	6100.0	6600.0
Castile and León	90275.9	92096.9	93657.9	95609.1	88324.6	90145.7	92096.9
Castilla - La Mancha	59181.0	60374.0	61398.0	62677.0	57902.0	59094.0	60374.0
Catalonia	11870.6	9823.9	8186.6	6139.9	3274.6	1228.0	0.0
Valencia	29912.8	30516.3	31033.5	31680.0	29266.3	29869.7	30516.3
Extremadura	38172.0	38720.0	39305.0	39896.0	37576.0	38157.0	38733.0
Galicia	98612.0	100509.0	102614.0	104721.0	96505.0	98611.0	100786.0
Madrid	0.0	0.0	0.0	0.0	0.0	0	0.0
Murcia	14871.6	15171.6	15428.7	15750.2	14550.2	14850.2	15171.6
Navarre	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Basque Country	0.0	0.0	0.0	0.0	0.0	0.0	0.0
La Rioja	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spain	512402.5	518039.4	523185.0	529555.3	485070.5	492936.5	502506.5

Source: Regional Operational Programme for Objective 1 regions and Single Programming Documents for objective 2 regions for the years 2000–2006.

Table A.15 European Social Fund (ESF) in Spain 2007–2013 (thousand euros)

Region	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**Total**
Andalusia	155463.1	158572.3	161743.8	164978.7	168278.2	171643.8	175076.7	1155756.5
Castilla - La Mancha	24266.0	24751.3	25264.3	25751.3	26256.3	26791.6	27321.4	180402.2
Extremadura	33639.5	34312.3	34998.6	35698.5	36412.5	37140.8	37883.6	250085.8
Galicia	48222.8	49187.2	50171.0	51174.4	52197.9	53241.8	54306.7	358501.8
Asturias	23999.3	21020.3	17912.4	14671.9	11294.6	7776.3	4112.7	100787.5
Murcia	18036.0	15797.2	13461.6	11026.2	8488.1	5844.0	3090.8	75744.0
Ceuta	2440.6	2137.7	1821.6	1492.1	1148.6	790.8	418.2	10249.7
Melilla	1712.9	1500.3	1278.5	1047.2	806.1	555.0	293.5	7193.4
Castile and León	36014.0	29295.9	22294.6	15001.5	7407.8	7556.0	7707.1	125276.9
Valencia	57027.9	46389.8	35303.3	23754.8	11730.2	11964.8	12204.1	198375.0
Canary Islands	33718.5	27428.6	20873.5	14045.3	6935.7	7074.4	7215.9	117291.9
Cantabria	1706.2	1740.3	1775.1	1810.6	1846.8	1883.7	1921.4	12684.1
Aragon	10024.3	10224.8	10429.3	10637.9	10850.6	11067.6	11289.0	74523.4
Balearic Islands	5209.9	5314.1	5420.4	5528.8	5639.4	5752.2	5867.2	38732.1
Catalonia	38297.1	39063.1	39844.3	40641.2	41454.0	42283.1	43128.8	284711.5
Madrid	34556.5	35247.7	35952.6	36671.7	37405.1	38153.2	38916.3	256903.0
Navarre	2584.6	2636.3	2689.1	2742.8	2797.7	2853.7	2910.7	19215.0
Basque Country	8219.3	8383.7	8551.4	8722.4	8896.9	9074.8	9256.3	61104.8
La Rioja	1874.2	1911.7	1949.9	1988.9	2028.7	2069.3	2110.7	13933.4
Spain	537012.9	514914.4	491735.2	467386.2	441875.2	443516.9	445031.1	3341471.9

Source: Marco Estratégico Nacional de Referencia 2007–2013.

Table A.16 European Regional Development Fund (ERDF) in Spain 2007–2013 (thousand euros)

Region	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**Total**
Andalusia	920590.3	939002.1	957782.2	976937.6	996476.6	1016406.1	1036734.2	6843929.1
Castilla - La Mancha	193615.7	197488.0	201437.8	205466.5	209575.8	213767.4	218042.7	1439393.9
Extremadura	212544.2	216805.3	221141.4	225564.2	230075.5	234677.0	239370.5	1580177.9
Galicia	302522.0	298284.0	303929.5	309282.5	314742.6	320311.9	342471.7	2191544.3
Asturias	94107.9	82426.2	70239.6	57532.5	44289.1	30492.9	16127.1	395215.2
Murcia	124740.3	109256.2	93102.8	76259.5	58705.3	40418.4	21376.6	523859.0
Ceuta	4217.7	3694.2	3148.0	2578.5	1985.0	1366.6	722.8	17712.8
Melilla	3864.3	3384.7	2884.2	2362.5	1818.6	1252.1	662.2	16228.7
Castile and León	235210.7	191333.9	145607.9	97976.3	48381.2	49348.8	50335.8	818194.4
Valencia	381290.2	313163.3	236038.8	158825.2	78428.7	79997.3	81597.2	1329340.5
Canary Islands	119929.6	97557.6	74244.8	49965.3	24668.7	25162.0	25665.3	417193.3
Cantabria	11975.7	12215.2	12459.5	12708.7	12962.9	13222.2	13486.6	89030.9
Aragon	21939.1	22377.9	22825.4	23281.9	23747.6	24222.5	24707.0	163101.3
Balearic Islands	14419.2	14707.6	15001.8	15301.8	15607.8	15920.0	16238.4	107196.6
Catalonia	91343.6	93170.5	95033.9	96934.6	98873.3	100850.7	102867.7	679074.2
Madrid	45324.2	46230.7	47155.3	48098.4	49060.4	50041.6	51042.4	336953.1
Navarre	6336.7	6463.4	6592.7	6724.6	6859.1	6996.2	7136.2	47108.9
Basque Country	32361.2	33008.4	33668.6	34341.9	35028.8	35729.4	36443.9	240582.2
La Rioja	4338.1	4475.8	4565.3	4656.6	4749.8	4844.8	4941.7	32572.1
Spain	2820670.7	2685044.9	2546859.3	2404799.2	2256036.6	2265027.9	2289970.0	17268408.5

Source: Marco Estratégico Nacional de Referencia 2007–2013.

Table A.17 European Social Fund (ESF) in Spain 2014–2020 (thousand euros)

Region	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Andalusia	0.0	175278.4	149745.2	152742.1	155799.0	158916.8	162096.8
Aragon	0.0	14466.3	12345.1	12606.5	12873.0	13144.8	13422.1
Asturias	0.0	19822.8	12714.0	12994.7	13270.8	13552.5	14642.1
Balearic Islands	0.0	2452.9	7359.1	7520.2	7684.4	7851.9	8022.8
Canary Islands	0.0	22788.1	26831.4	27368.4	27916.2	28475.0	29044.7
Cantabria	0.0	4097.1	3536.5	3614.1	3697.2	3786.8	3871.1
Castilla - La Mancha	0.0	37062.2	31229.0	29312.3	29954.4	30609.4	31277.1
Castile and León	0.0	14097.0	16475.6	16846.0	16704.5	17082.9	17500.3
Catalonia	0.0	34080.4	51740.4	52912.8	54108.6	55328.3	56572.4
Ceuta	0.0	2949.1	1474.6	1474.6	1474.6	1474.6	1474.6
Valencia	0.0	17127.7	30548.3	31322.0	32056.5	32798.6	33555.4
Extremadura	0.0	63233.4	32834.8	41040.2	41861.7	42707.8	43562.4
Galicia	0.0	73032.1	45745.7	47341.6	47455.0	48197.9	51370.6
Madrid	0.0	50727.6	54400.0	55488.7	56599.2	57731.9	58887.1
Melilla	0.0	1325.4	1183.3	1209.0	1235.2	1262.0	1289.2
Murcia	0.0	14691.3	15763.3	15234.7	14423.2	14883.6	15942.8
Navarre	0.0	3222.4	3144.5	3214.4	3285.8	3358.5	3432.7
Basque Country	0.0	6722.3	9069.4	9268.5	9471.5	9678.6	9908.7
La Rioja	0.0	1111.9	1891.2	1929.0	1967.6	2007.0	2047.2
OP Employment, Training and Education	0.0	392582.8	353795.7	362310.9	306672.6	335418.1	364250.5
OP Youth Employment	549994.6	435808.8	88646.5	292705.6	299675.3	304340.2	305257.1
OP Promotion of Social Inclusion	0.0	120849.5	105161.4	107443.2	173854.5	155490.8	137250.6
OP Technical Assistance	0.0	5630.8	6344.1	5791.6	5467.8	5743.8	6021.9
Spain	549994.6	1513160,4	1061979.1	1291691.0	1317508.5	1343841.9	1370700.2

Source: Acuerdo de Asociación de España for the period 2014–2020.

Table A.18 European Regional Development Fund (ERDF) in Spain 2014-2020 (thousand euros)

Region	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Andalusia	0.0	772536.9	395251.4	497157.2	507105.8	509253.2	519602.9
Aragon	0.0	25524.2	12084.9	19976.8	20376.6	20784.4	21200.3
Asturias	0.0	68888.9	35482.2	38675.5	39449.5	40238.9	41044.1
Balearic Islands	0.0	27830.9	13007.6	23499.6	23969.9	22449.6	22938.8
Canary Islands	0.0	264011.5	134921.0	156030.1	159152.5	159837.4	163085.7
Cantabria	4772.8	2468.4	2668.0	11255.1	11480.3	11710.1	11944.4
Castilla - La Mancha	69160.5	67545.2	69085.0	95147.7	97051.7	98993.7	100974.5
Castile and León	0.0	80125.1	40473.2	52003.2	53043.9	54105.3	55187.9
Catalonia	101809.0	96647.6	99032.6	130560.3	133173.2	135838.2	138556.3
Ceuta	0.0	10492.3	6028.1	6956.5	7126.0	7298.9	7475.3
Valencia	0.0	133136.7	65388.7	96254.4	98180.6	97645.4	99649.2
Extremadura	0.0	158080.3	77440.0	122540.6	124992.8	127493.9	130045.0
Galicia	117085.5	117629.7	120097.0	135594.1	138307.7	141075.4	143898.3
Madrid	0.0	18917.4	15328.1	51686.5	53142.5	54627.6	56142.3
Melilla	0.0	13290.3	6845.4	7892.1	8050.0	8211.1	8375.4
Murcia	0.0	78768.1	40305.2	52020.5	53061.5	54123.3	55206.2
Navarre	5833.9	5950.7	6069.9	6467.0	6596.4	6728.4	6863.0
Basque Country	22578.5	21830.6	22342.7	26614.9	27147.5	27690.8	28244.9
La Rioja	3969.7	3449.2	3555.8	5539.5	5650.3	5763.4	5878.7
OP Spain	514324.3	1965725.2	1250890.5	1543563.2	1457905.7	1620107.2	1651802.8
OP Small and medium small business	200009.2	300013.7	300013.7	0.0	116125.1	0.0	0.0
Spain	1039543.3	4232862.8	2716310.8	3079434.9	3141089.6	3203976.2	3268116,1

Source: Acuerdo de Asociación de España for the period 2014–2020.