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Unbalanced Regional Impact of the crisis in Spain. An explorative analysis through structural changes, sectorial specialization and productivity

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Unbalanced Regional Impact of the crisis in Spain.

An explorative analysis through structural changes, sectoral specialization and productivity

Juan R. Cuadrado-Roura and Andrés Maroto-Sánchez[1]

Abstract: The economic and financial crisis has generated significant adverse effects in all European economies, although with substantial differences by countries. The regional impacts of the crisis have also been very clear in the EU. In Spain, the effects of the crisis have been particularly severe. From the mid 90s to 2008, the Spanish economy had experienced a period of strong expansion (average growth rate of up to 3.2%), high job creation and a sharp increase in public and private spending. However, this masked low productivity, a growing external imbalance and, among other, high household, corporate and public indebtedness thanks to the lax financing and low interest rates applied by the ECB. Construction, real estate and some services led the expansion process and they have also led the strong fall of the Spanish economy. The imbalances developed along the expansion process already called for some stabilization policies, but the sudden onset of the international crisis caused a rapid and dramatic downturn. The economy as a whole and all the Spanish regions were strongly affected -unemployment, negative growth rates, need for financial adjustment...-, albeit with regional differences.

The aim of this paper is twofold: 1) to evaluate how the crisis has affected Spanish inter-regional disparities, which have worsened, and 2) to explain this divergence pattern using regional productive specialization, changes in productive structures and their effects in terms of within regional productivity. In doing so, the paper firstly presents a synthetic description of the features that have characterized the Spanish crisis and their most visible regional effects. Secondly, the differences that existed in regional productive structures and the changes they have gone through are analyzed, attempting to find a possible explanation for the diverse regional behavior. Finally, the possibilities of future regional recovery are also explored, taking into account the dynamics of regional productivity behavior. These analyses are performed using public statistics together with data from other reliable sources and applying various analytical and decomposition methods and techniques.

Key words: Economic crisis, regional disparities, the Spanish case.

JEL: R11, R12, E3.

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1. Introduction

The economic and financial crisis has generated very negative effects in almost all European economies, although with substantial differences by countries. In Spain, the effects of the crisis have been particularly severe. From the mid 90s to the beginning of 2008, the Spanish economy had experienced a period of strong expansion (average growth rate of up to 3.2%), high job creation and a sharp increase in public and private spending. However, this masked low productivity, a growing external imbalance and, among other, high household, corporate and public indebtedness thanks to the lax financing and low interest rates applied by the ECB. Construction, real estate, the industries particularly linked to construction and some services led the expansion process and they have also led the strong fall of the Spanish economy. The imbalances developed during the expansion process already called for some stabilization policies, but the sudden onset of the international crisis caused a rapid and dramatic downturn. The economy as a whole and all the Spanish regions were strongly affected - unemployment, negative growth rates, need for financial adjustment,...-, albeit with regional differences.

This paper aims, firstly, to explain the general characteristics of the impact of the crisis in Spain on a national and regional level, providing the necessary information and empirical evidence to do so. From this starting point, it seeks to add some factors and elements that not only explain what happened, but also the reasons why there are significant differences between the behaviors of the richer or more developed regions and the poorer or least developed. To these ends, this analysis delves deeper into specialized regional production, the trends observed around the evolution of productive structures in the regions and the relationships between sectoral specialization and productivity on a regional scale. This will allow us to understand and interpret the disparity in Spanish regional behaviors before and during the crisis and the increase in interregional disparities. It will help also to explain why some regions –generally the richer and most specialized– have coped with the crisis somewhat more successfully and are emerging more easily from it.

The innovation of this paper lies in offering not only a very up-to-date analysis of the regional effects of the crisis in Spain, within the context of what has also happened in other EU countries, but also in offering elements that explain why there are discrepancies in the behavior of the different regions, driving a process of interregional divergence since 2006. To demonstrate this fact, the paper works along two main research hypotheses: 1) prior to and during the crisis, there were significant differences between the behavior of the richer Spanish regions and the rest, and 2) these differences can be explained by specialization patterns and the movement of

productive structures towards more productive and dynamic sectors in those regions that have best dealt with the crisis.

The following section describes the national and regional effects of the recent economic crisis in Europe to give some context. Section 3 delves deeper into the Spanish case, analyzing regional effects on the main economic variables of the crisis and differentiating the two groups of regions that will later be analyzed. Sections 4, 5 and 6 will then introduce, respectively, specialization, the changes in productive structures, and productivity as factors explaining the differing regional behavior in Spain before and during the crisis. The paper concludes with some final reflections. The databases used for the analysis are specified in sections 3 and 4, and the various analytical techniques employed are described before they are used.

2. The crisis in the EU and its regional effects: a contextual framework.

As is well-known by now, the EU-27[2] entered a recession in the second quarter of 2008 –or even earlier in some cases– which lasted for the following six quarters, although in some countries this extended until almost 2013. From the aforementioned date onwards, average growth in the European Union dropped significantly and most member states presented negative rates GDP in 2009 and significant falls in their employment rates. Furthermore, in the last quarter of 2011 and the first two and last quarters of 2012, EU GDP (EU-27) contracted once again.

The effects of the crisis were particularly severe in Ireland, Greece, Portugal, and Spain, as well as in the three Baltic nations. Italy, Denmark, Hungary and Slovenia were also severely impacted by the crisis, although not as much as the other countries mentioned. The recovery of Ireland and the Baltic countries began at the end of 2010 and took effect, to a limited degree, during 2011. Greece, Spain, Portugal and even Italy, however, have fared worse. In Greece, the recession continued practically until this year. In 2011, Spain seemed to be leaving the recession (+0.1%), but GDP fell again in 2012 and 2013 (percentage change of -1.6% and -1.2%, respectively) and unemployment continued to increase, although a hint of a recovery could be envisaged towards the end of 2013.

It is important to remember, however, that the recession was not as severe in other EU countries. In fact, in nine member states it was comparatively moderate, while Poland's growth merely slowed.

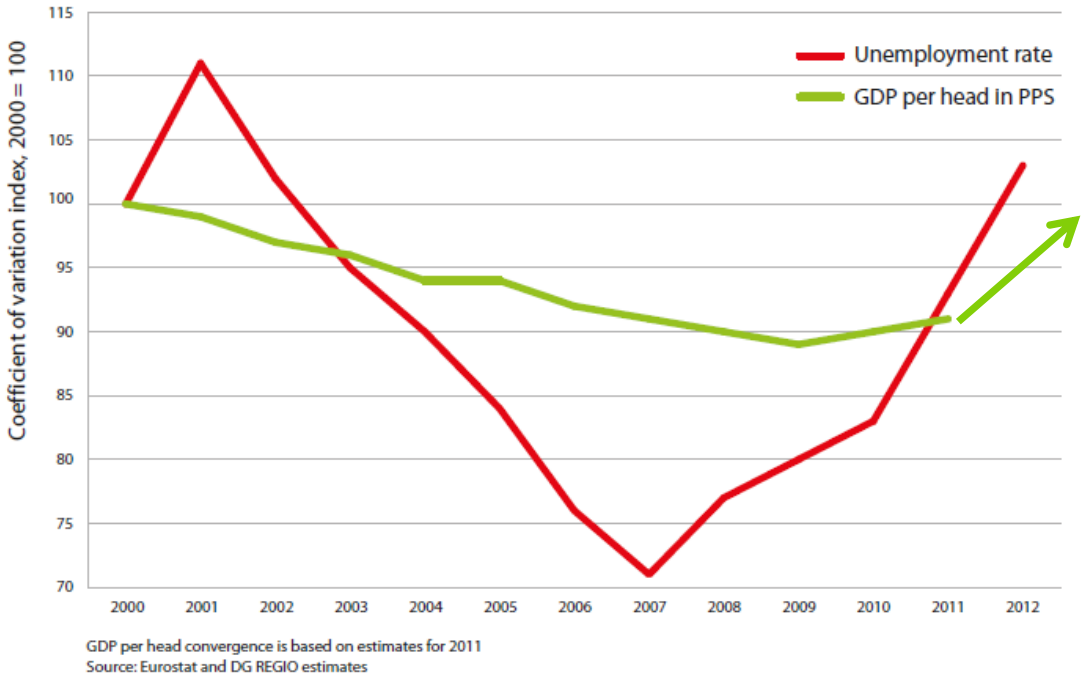
Looking at it by sector, the crisis began in finance and insurance in 2007, although the global contribution of these industries to GVA barely registered a change in 2007-2011. In the seven countries worst affected by the crisis, however, employment in the sector and its contribution to GVA showed negative growth. Unlike the finance sector, the construction did register negative growth from the beginning of the crisis in several member countries, with falls in GVA of between 6-20% and falls in employment of between 10-20% in some cases. The housing bubble was at the root of the crisis in Ireland, Lithuania, Estonia, Portugal, Greece and Spain, with significant falls in residential and non-residential construction and, as a result, in employment. In parallel, the industrial sector also saw significant drops (more than -2% between 2007-2011 for the EU as a whole and around -5% or more in the worst-affected countries). That said, falls in manufacturing had no significant effect in certain EU countries. Contraction in

[2] Currently EU-28, but this study will limit itself to the 27 members that existed previously, given the data available.

the industry was due in part to the close relationship of some branches of manufacturing with construction, as well as to shrinking international commerce, as well as internal investment and consumption.

In almost all countries, the impact of the crisis on average family income was quite clear, a consequence of increased unemployment, reductions in working hours and salary cuts linked to austerity and cutback policies. In parallel, the rates of risk of poverty and social exclusion[3] also increased. These levels reached 15% in Ireland, Greece and Spain at the end of 2010, while lower but still significant increases were seen in Belgium, Hungary, Germany, Holland, Luxemburg and the UK.

Figure 1 – The crisis and regional convergence in the EU, 2000-2012



Source: own elaboration with data from Eurostat (2014)

Obviously, the set of effects deriving from the crisis has significantly influenced interregional disparities in the EU and within various member states. Nevertheless, significant differences become apparent when countries are compared, which means that a case-by-case assessment is necessary to evaluate relevance and causes. It seems clear that the crisis has ended a long period in which interregional differences in GDP per capita (in PPS) and unemployment were falling. As can be seen in Figure 1, part of the *8th Progress Report on Economic and Social Cohesion*[4], interregional differences in GDPpc were falling on a regular basis between 2000 and 2008, but this trend stabilized in 2008 and clearly reversed direction in 2009 and the following three financial years. As the aforementioned report lays out, two thirds of EU regions registered a fall in GDPpc of up to 6% annually between 2007 and 2010, and total

[3] Calculated using the poverty line established in 2005 with the aim of avoiding the effects of a reduction in average incomes on the aforementioned poverty line.

[4] See European Commission (2013)

production figures showed sharp declines in the Baltic nations and certain regions of other member states (Table 1), and not only in the south (of Europe).

Table 1 - Ten regions where GDP shrunk fastest between 2007 and 2010

(in % average annual change)

Country	Region	GDP growth,%
LV	Latvija	-6.2
EE	Eesti	-4.8
HU	Észak-Magyararország	-4.0
FI	Etelä-Suomi	-3.7
LT	Lietuva	-3.5
HU	Közép.Dunántúl	-2.8
IT	Molise	-2.0
DK	Djaelland	-1.7
BG	Severozapaden	-1.6
IE	Border, Midland &Western	-1.6

Source: Eurostat (2014).

A similar situation, although even more dramatic, took place in the area of unemployment. From 2001 to 2007, disparity in the unemployment rate had fallen by around 40 points (index 2000 = 100). However, as shown in Figure 1, from 2007 onwards, the differences began to increase at a fast rate, so that by the end of 2012, the coefficient of variation was higher than in 2002. This is one of the worst consequences of the crisis. In fact, 4 out of every 5 EU regions recorded unemployment increases from 2008 onwards, although some improvements were observed from 2010/2011 onwards. In contrast, unemployment figures in Germany fell throughout this period, while very little variation was seen in countries like Luxembourg, Belgium and Austria.

The crisis had other territorial effects that we will not go into in this work. The impact on cities was uneven, but very significant in many cases (neighborhoods and the populations of metropolitan areas) and more than 3 out of 5 of such areas recorded falls in GDPpc. The risk of poverty and social exclusion was also concentrated in the cities, especially in the northeast of Europe, and available figures show "severe material deprivation" was higher in cities than in intermediate and/or rural areas. These topics, however, will be excluded from the analysis conducted in this work.

3. The crisis in Spain and its regional effects

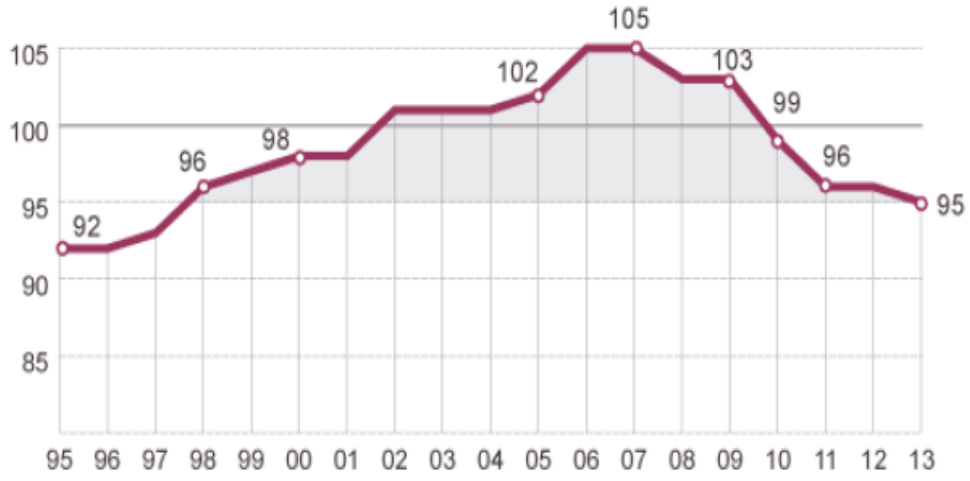
In Spain, the crisis showed particular traits that the country is very familiar with. In truth, the imbalances created during the steep expansive phase 2000-2007[5] should have led the Spanish authorities to apply an economic stabilization program in 2007 or even earlier. However, there were two well-known obstacles to do so: 1) an inability to devalue the currency, and 2) a lack of control over monetary policy, decided by the ECB with low interest rates and lines of credit available to banks. To that we can add

[5] Negative current account balances, credit increases that quadrupled GDP increases, increasing Public Administration costs, banks, businesses and families severely indebted, reaching more than three times the GDP in a year, and an unprecedented housing bubble.

the Spanish government's erroneous assessment of the probable impact of the international crisis on the Spanish economy. The eruption of the international economic crisis and the lack of confidence it generated in the Spanish economy precipitated, from the 2nd quarter of 2008, a sharp and severe fall in the economy. Although it began discreetly in the financial sector, it extended to all sectors, especially construction and related industrial sectors.

A severe economic recession resulted from these factors, reaching a climax in 2009 and lasting until almost the end of 2013, except for a brief lull in 2011. The effects of the macro variables worked quickly: solvency issues in some banking entities, businesses closing, a sharp increase in unemployment (mainly unqualified laborers in the building industry, related industries and routine services), a fall in consumption and private investment, a significant increase of the risk premium, as well as the tax deficit and sovereign debt, etc. All this was exacerbated by a tardy financial policy (supposedly Keynesian) which was the opposite of what the situation required. Only in the middle of 2010, as a result of pressure from the European Commission, the IMF and the ECB, were the first stabilizing measures adopted, followed by, at the end of 2011, a cutback and reform policy at the hand of the new 'Partido Popular' government. These policies helped deepen the economic depression in 2012 and almost all of 2013, although they have helped to stabilize the economy and have allowed some positive economic data to emerge in 2014[6]. The most positive aspect of the 2009-2013 period, and of course the most important, is the increase in Spanish exports to Europe and the rest of the world, thanks to recuperated competitiveness and productivity[7].

Figure 2 – Convergence in GDPpc between Spain and the EU in 1995-2013



Source: Eurostat figures. GDPpc figures taken in PPA

More than 5 years of recession and adjustment policies have had a very negative effect on the Spanish economy: a considerable number of people are out of work (5.9 million unemployed at the end of 2013, equivalent to a rate of 25.7%) to the extent that the nearly 3 million jobs created between 2000 and 2007 have all disappeared. To this we

[6] Progressive adjustment of the fiscal deficit, positive percentage GDP change in the first quarter of 2014, positive external commercial balances, stabilization of the increase in unemployment, the financial system is considerably healthier, etc.

[7] The latter mainly due to the significant adjustments in employment carried out by businesses. See: Cuadrado-Roura, J.R. and Maroto-Sanchez, A. (2012)

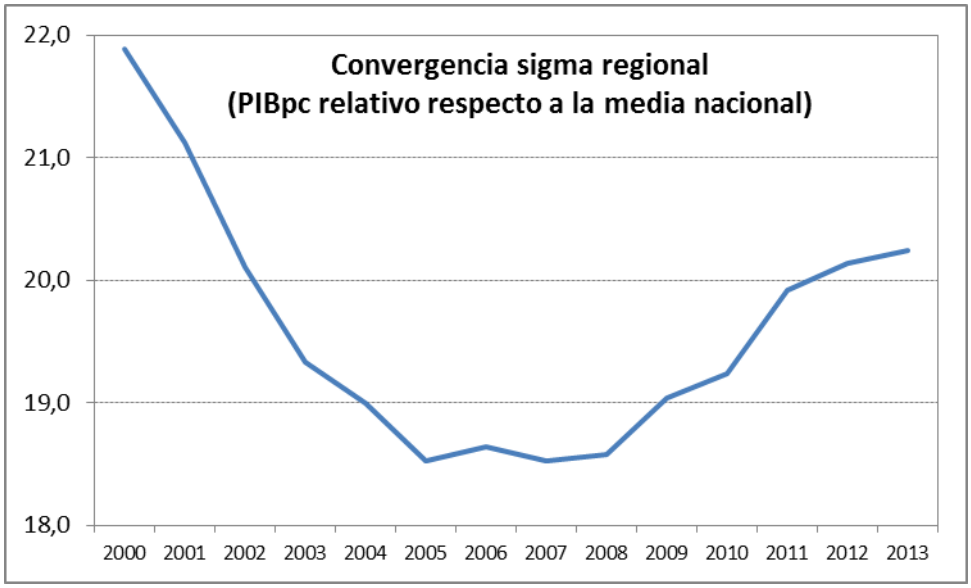
can add the fall in average earnings per Spanish resident, the increase in long-term and youth unemployment, significant cutbacks in social provisions and public investment, and an increase in tax (VAT and income tax), among other changes.

The fall in Spain's GDPpc is well illustrated in Figure 2, where levels in comparison to the EU average returned to values last seen 16 years ago. The convergence of Spanish levels with the average EU GDPpc stalled in 2007 and dropped off until 2013. In the intense expansive phase from 1995 to 2007, the Spanish GDPpc not only approached the EU average, it actually exceeded the average from 2002[8] onwards, reaching a high of 105 in 2007. The crisis precipitated a 10 point drop in GDP, settling at below 95 at the close of 2013.

a. The performance of Spanish regions before and after the crisis

From a regional point of view, the effects of the crisis in Spain materialized, firstly, in a very clear about turn in interregional GDPpc convergence. Figure 3 shows the results of calculated conversion sigma 2000-2003: until 2005, there was interregional convergence, but from then on, it stalled and from 2008 onwards, reversed direction.

Figure 3



Source: own estimation based on data from Regional Accounts, Spanish National Statistics Institute (INE).

Upon calculation of the variation range, in other words, the max/min regional variation of GDPpc in comparison to the national Spanish average, the results are similar. The confirmation of a U-shaped curve before and after the crisis and the data indicate that the differences between regions increased. Divergence in the Basque Country increased by 6 pp compared to the region with the lowest GDPpc (Extremadura), with an increase in divergence noted also in Andalusia, Melilla and Castile-La Mancha, among other regions.

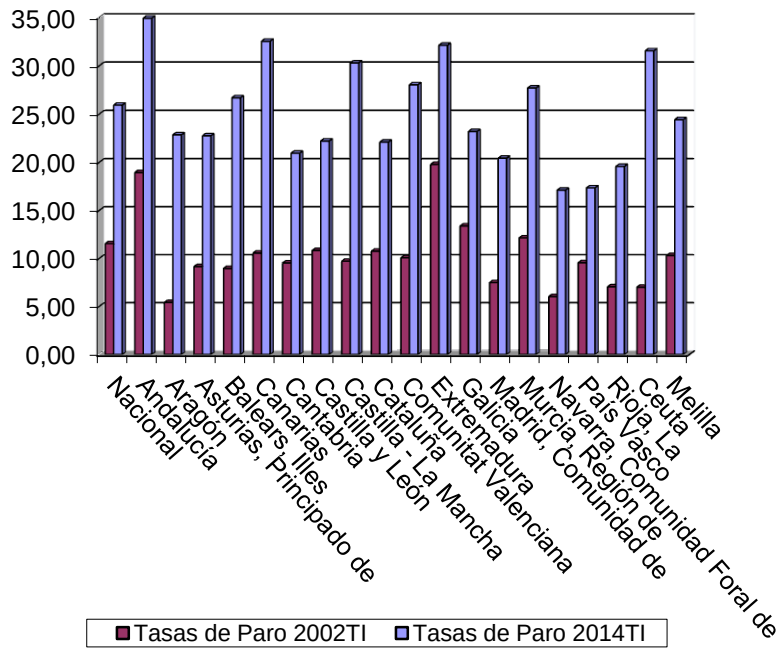
[8] It is worth noting that this refers to the average of 27 countries which undoubtedly amplifies the approximation of the Spanish average to the EU average, which fell as a result of the incorporation of new member countries.

b. The evolution of employment and unemployment on a regional level

The effect of the crisis on unemployment levels has been even more dramatic. In 2002, Spain's unemployment rate was 11.5% of the active population, a percentage that dropped to 7.93% at the end of 2007 as a result of strong economic growth that allowed the absorption of an increase of up to 20% of the active population, largely due to foreign immigration. From 2008 onwards, however, the unemployment rate began an uninterrupted increase that by the start of 2014 had reached 25.9%.

The impact of the process on a regional scale has been uneven. Regions such as Andalusia, traditionally one of the comparatively poorest regions, have tripled their unemployment rate between 2007 and 2013. The same happened in Aragon, Valencia, Murcia and other less-prosperous regions, especially those worst affected by the construction crisis. Extremadura, which already had the country's highest unemployment rate in 2002 (19.2%), reached a high of 32.1% in 2014. Meanwhile, increases seen in the Basque Country, Navarra and La Rioja, richer regions that already had lower unemployment rates, were more contained. This was also the case in Cantabria, Castile y León, Catalonia and Galicia, although there were some differences that we will not go into in this work.

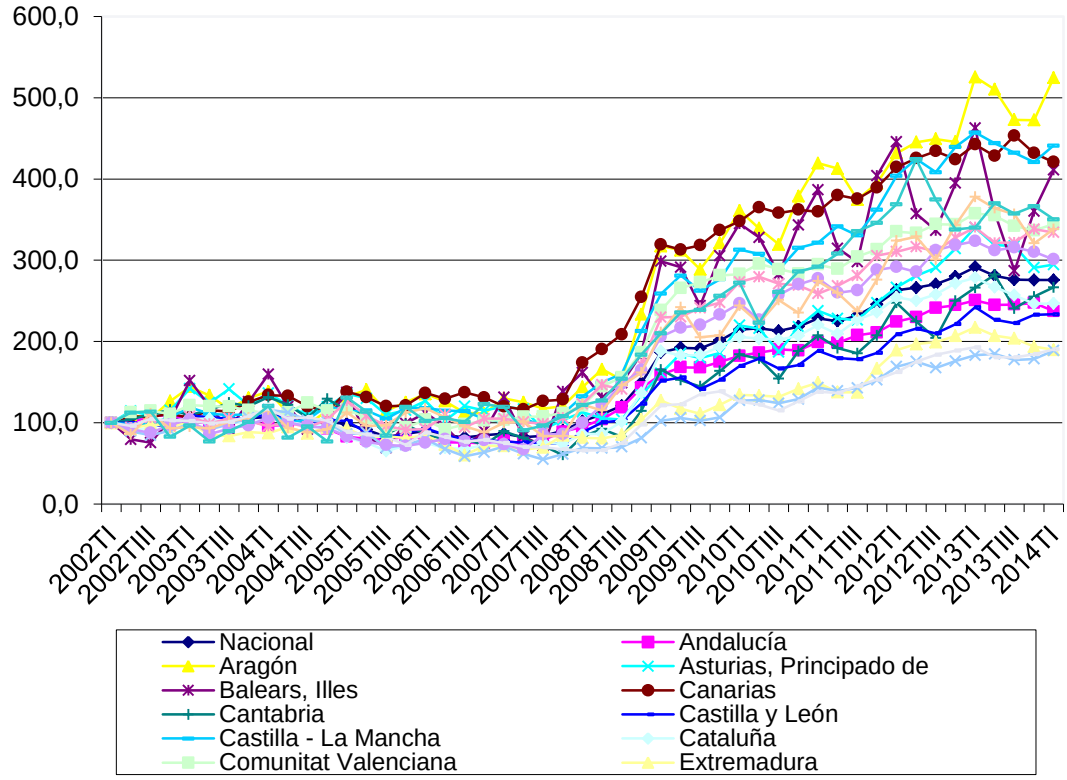
Figure 4 – Regional unemployment rates in 2002 and 2014



Source: Data from the EPA, produced quarterly by the National Institute of Statistics

Figure 4 shows unemployment rates in all regions in the first quarter of 2002 and 2014. It is obvious that all regions have suffered the effects of the crisis on unemployment, but the differences between regions are fairly clear (Figure 5) and, in general, the regions that suffered the least were the richest, which led to greater disparity in GDPpc, as already noted.

Figure 5 – Evolution of regional unemployment rates 2002 - 2014.



Source: Data from EPA, quarterly produced by the National Institute of Statistics

c. Differentiated performance of two groups of regions

Analyzing the evolution of all regions allows us to observe a fact that will enable us to explore the causes of dissimilar regional performance before and after the crisis.

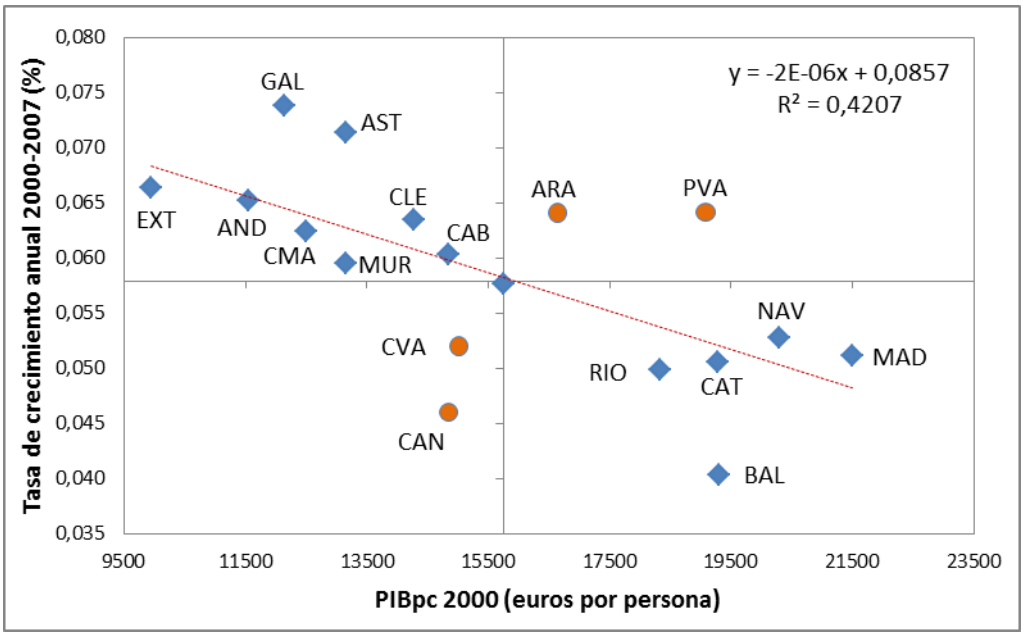
As can be seen in Figures 6 a) and b), in the 2000-2007 period where convergence was experienced, the majority of the poorer regions (or those with lower GDPpc) reached higher levels of growth than richer regions, with the exception of the Basque Country, a region that can be classified as richer, but which experienced rates of GDPpc growth above the Spanish average. Later, between 2008 and 2013, this behavior changed significantly: regions with lower GDPpc showed more negative changes than the average, while the richer regions (although not all of them) performed more positively, among them the Basque Country, Navarra, La Rioja and Catalonia[9].

Figure 6

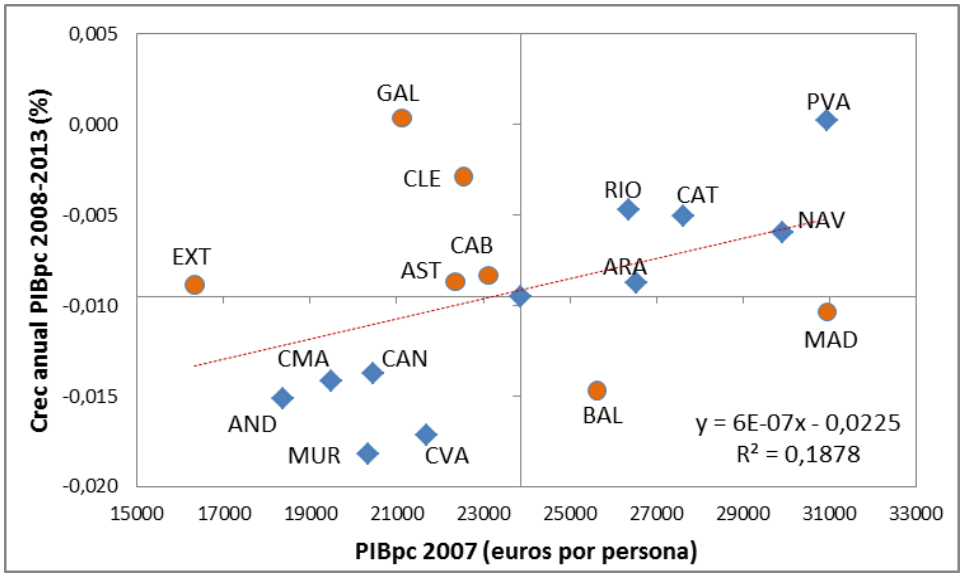
Growth rate of each region and relationship with GDPpc

a) Pre-crisis period (2000-2007)

[9] Percentage changes in both cases are very low. Figure A-1 (in the Annex) shows that all regions saw a growth in GDP until 2007, but fell to negative average growths from then onwards.



b) During the crisis (2008-2013)



Source: own elaboration with data from Spanish Regional Accounts, Spanish National Statistics Institute (INE)

Taking this data into account, more specifically the data regarding GDPpc change, we believe that it is possible to distinguish two large regional groups, although there are of course some internal differences. The first group includes the regions that exited the economic crisis earlier and stronger for the experience, and which already had per capita income levels above the Spanish average. This group, as shown in Figure 6a and 6b, includes the regions from around the Ebro River (Basque Country, La Rioja, Navarra, Aragon and Catalonia) which experienced above average growth since 2007, as well as Madrid and the Balearic Islands which, although they have experienced below-average growth levels in recent years, still show a difference in terms of per capita income in comparison to the remaining Spanish regions. In the following section, we will call this group of regions “richer” (group 1).

On the other hand, we have the remaining Spanish regions, already experiencing lower per capita income levels before the crisis and which were unable to catch up with the leading regions, remaining below the national average in 2013. Within this second group, which we will call “poorer regions” in the next section (group 2), differences can also be observed. On one hand, regions like Extremadura, Cantabria, Asturias and, particularly, Galicia and Castile y León, have shown levels of GDPpc growth above the national average after the crisis, but even so still register levels below the Spanish average. On the other hand, the remaining regions in less favorable positions at the end of the 90s have not only failed to converge, but have even diverged from the rest in the intervening years.

With the aim of explaining this behavior, the following section will analyze the role of production specialization, structural change and its impact on regional productivity, differentiating between the two groups of regions. The final aim is, firstly, to establish if these variables and their changes can explain –along with other factors that have not been analyzed in this paper– the divergent process observed at a regional level in Spain during the crisis. Secondly, to find out if the characterization in terms of these differences has been significantly different between the two groups of regions, something that could also help to explain the differences observed between the two groups in their recovery from the crisis.

4. Regional specialization as a source of differentiation to combat the crisis

In section 2, we saw the effects of the recent economic-financial crisis on a regional level in Europe, while in section 3, we have shown what happened in the Spanish case. The main conclusion that we can extract from the Spanish case is that neither the consequences of the crisis nor performance prior to it were homogeneous across regions. It can be observed that the regional convergence in terms of GDPpc that was seen during the years of significant economic expansion drew to a halt from 2007 onwards, and that the majority of the richer and leading regions are the ones that have best and most quickly been able to recover in the aftermath of the crisis.

The reasons that explain this dichotomous panorama are varied. They include factors ranging from aspects related to the need for fiscal consolidation in each region’s public sector to the level of leverage in the private sector, to the factors that underlie the positive performance of the exterior sector in the richer regions. However, this paper will focus on another possible cause of this phenomenon: the different productive structures and patterns of regional specialization and their effects on productivity and structural changes in Spanish regions. To do this, it will be important to bear in mind the changes observed since 2006, as well as how some regions were faring at the beginning of the crisis, which favored a quicker and more positive recovery.

With this in mind, this section will analyze the specialization patterns in Spanish regions before and after the crisis. The main conclusion is that these patterns and structures are significantly different in many of the leading regions, something that has allowed them to emerge much more quickly from the crisis. We will then introduce the effects of structural changes on regional employment (in section 5) and the differences in regional productivity (in section 6) as a complement to the analysis in this section. Again, the differences between the group of richer regions and the others are evident (see section 3.3) and help to explain the contrasting performance of Spanish regions since 2007.

The analysis of the economic evolution in the regions, similarly to any national economy, can be carried out from various viewpoints. One of the most common in specialized literature is to focus on the specific performance of the different productive sectors and the role they play in economic growth. Studies that relate regional structural change to growth processes clearly make the link from this focus. The conclusion drawn by most studies is that the analysis of productive structures, regional specialization and their differences in relation to the national average can explain regional economic growth and, naturally, in relation to the possible convergence or divergence of the regions in a country in terms of productivity and per capita income.

Following this line of thinking, this section tries to answer two fundamental questions: 1) are there significant differences in productive specialization patterns between the two groups highlighted at the end of section 3.3? and 2) can these differences explain the heterogeneous behavior of Spanish regions after the crisis? Can the fact of being specialized in sectors which exited the crisis more quickly or having greater productivity have helped a certain group of regions?

To carry out the analysis data have been taken from a database created by BBVA Research that offers production data (GDP and value added to current and constant prices), employment and population at a regional level in various economic sectors from 1990 until 2013. This database links and corrects various errors from the databases provided by the Spanish National Statistics Institute's (INE) Regional Accounting. The use of this database also allows us to work with a wider time frame (1990-2013), a necessary requisite when studying the role of structural changes, as we will do in section 4.2. However, this database has one drawback: it does not include sufficient sectoral segregation, splitting the economy into only seven sectors: agriculture, livestock and fishing (*AGR*); mining, extraction and energy (*ENEXT*); manufacturing (*MAN*); construction (*CON*); commerce, tourism, transport and communications (*CHTC*); financial and business services (*FINBUS*); and finally, non-commercial services, like Public Administration, health and education (*SNM*). Some of the conclusions obtained in this work should bear these limitations in mind and, for the same reason, some of the analytical techniques that have been used are not as powerful as they could have been if the database were better segregated. That said, this regional statistical source provided a balanced combination between segregation and broad timeframe.

Methodologically, the productive specialization analysis carried out will be based on the known specialization coefficients, which compare the relative weight of a sector within a region with the percentage participation of that sector on a national level. A generic expression of this index would be:

$$IE_{irt} = \left[\frac{\xi_{ir}}{\sum_{i=1}^{n} \xi_{ir}} \Big/ \frac{\sum_{r=1}^{N} \xi_{ir}}{\sum_{i} \sum_{r} \xi_{ir}} \right]_{t=t_k}$$

Where i is the sector in question, r the regional indicator, ξ the analyzed variable calculated in terms of a specific year t_k. This IE_{irt} is always positive. When it exceeds the unit, we can confirm that region r shows specialization in sector i for year t. In our case, the variable used to calculate these indicators was employment, segregating for the different Spanish NUTS 2 regions. Table 2 shows the specialization coefficients for the two regional groups analyzed in 1990, 2006, and 2013, as well as rates of growth.

The aim of this analysis is to observe if there are any significant differences in the productive specialization patterns in the regions belonging to each group and whether these differences might explain their diverging performance during the crisis. Moreover, the differences in regional productive specialization will have an effect on the productivity analysis that will be carried out in the next point.

The figures shown in Table 2 demonstrate that the regional productive specialization patterns in Spain were already clearly dichotomous at the beginning of the 90s. While the richer (or "advanced") regions specialized in areas such as the manufacturing industry and market services, poorer (or "less advanced") regions specialized in construction and particularly extraction, energy and primary sector activities. Although some of these characteristics have been maintained after the crisis, others have changed significantly, helping advanced regions to grow more quickly than the rest and thus halting the process of convergence observed until 2006. Among the most notable changes are the increases in specialization (in comparative terms) in construction among the richer regions, and in services related to Public Administration in the poorer areas, something that can be observed in the analysis of the specialization coefficients at the end of 2013.

Table 2 Regional productive specialization in Spain 1990 - 2013[10]

	1990	2006	2013	1990-2006	2007-2013
RICH REGIONS					
Agriculture and fishing	0.438	0.586	0.517	1.840	-2.075
Extraction industry and energy	0.960	0.830	0.844	-0.902	0.282
Manufacturing industry	1.204	1.129	1.156	-0.398 Attenuates	0.391 Reinforces
Construction	0.856	0.939	1.025	0.584	1.466 Specializes
Commerce and hospitality + transport and communications	0.995	0.955	0.948	-0.254	-0.119
Other market services	1.078	0.943	0.909	-0.831 Desespecializes	-0.615
Non-commercial services (pro memoria)	0.935	0.965	0.960	0.196	-0.080
POORER REGIONS					
Agriculture and fishing	1.516	1.520	1.507	0.018 Reinforces	-0.147 Attenuates
Extraction industry and energy	1.035	1.209	1.216	0.973 Reinforces	0.102 Reinforces
Manufacturing industry	0.807	0.980	1.030	1.224	0.838 Specializes
Construction	1.024	1.097	1.127	0.433 Reinforces	0.453 Reinforces
Commerce and hospitality + transport and communications	0.937	0.909	0.951	-0.189	0.759
Other market services	0.726	0.793	0.737	0.553	-1.204
Non-commercial services (pro memoria)	0.984	1.021	1.036	0.227 Specializes	0.242 Reinforces

Source: own elaboration using data from BBVA Research (2014)

[10] Regional specialization is shown in the Annex via maps.

Regarding the inertia[11] in productive specialization, significant differences can be seen between the two groups of regions. While post-crisis differences are barely noticeable in the richer regions –with the single exception of an increase in specialization in construction and the reinforcement of the manufacturing industry– the less-developed regions saw many more changes. Specialization in the primary sector, mining and extraction continued to strengthen and, in parallel, there was an increase in specialization in non-commercial industries which began just before the economic crisis.

However, two factors must be kept in mind. Firstly, as mentioned earlier, the low segregation level used to carry out these calculations; in order to better register these changes, datasets would be required which segregated branches of activity to a greater extent. This is especially relevant in the services sector, as this sector comprises many and diverse branches of activity. Secondly, it is worth noting that this analysis was carried out in relative terms. This means that a given region increases or decreases its level of specialization in the context of what the other regions do, and not in the context of whether or not the economic activity is increasing or decreasing *within* that region. As a result, although it is useful for carrying out statistical comparisons, it can become problematic when analyzing temporary changes, as it can mask smaller, interesting variations that do not manage to constitute trends in themselves[12].

5. Changes in productive structures and competitive advantages at a regional level as a source of differentiation in Spain

The results obtained in the previous section suggest that an increasing equality in the productive structures of the regions did not take place during the studied period. Instead, it seems that the registered changes left the regions in similar positions to the ones they were in at the beginning of the studied period. Nevertheless, it is important to confirm or disprove this assumption. In order to do so, we have first used the following *indicator of inequality*[13] in the productive structure:

$$ID_r = \left[\frac{\sum_{i=1}^{m} \left(s_{ir} - \overline{s}_i \right)}{m} \right]^{1/2} ; \qquad \overline{ID} = \frac{\sum_{r=1}^{17} ID_r}{17}$$

[11] A specific region is said to "**reinforce**" its specialization when, beginning from a coefficient greater than 1, its growth rate is positive; it "**attenuates**" when, beginning from a coefficient greater than 1, it is negative. A region "**specializes**" when it goes from having coefficients less than one to greater than one, and it "**despecializes**" when the change is the opposite.

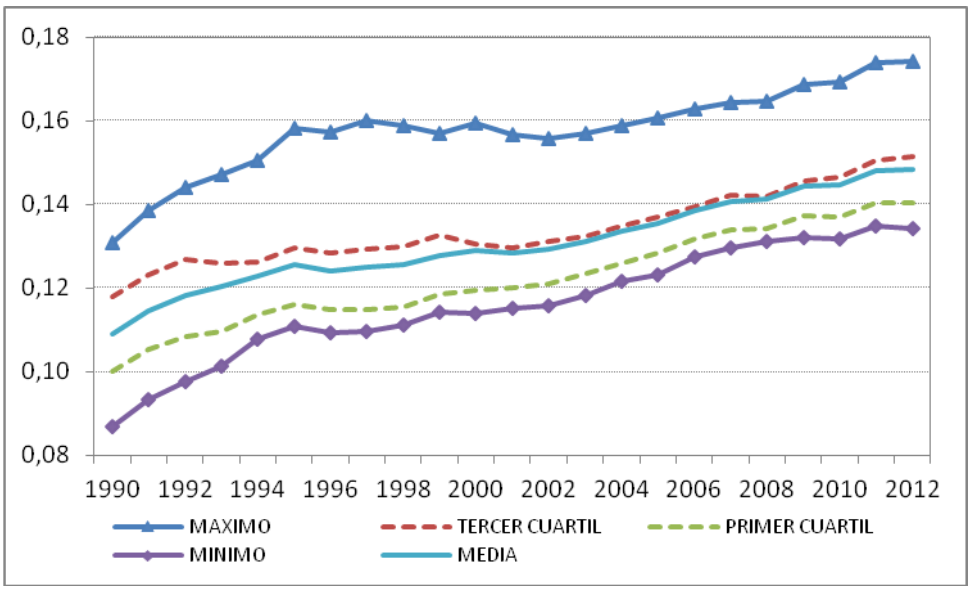
[12] While elaborating this paper, an analysis of the intensity of change in regional specialized production was carried out using a non-parametric correlation coefficient: Spearman's rho. The results obtained show that the changes in regional specialization have been of differing intensity depending on each sector. Among other factors, it shows that figures change from positive to negative in most sectors from 2006 onwards during the preceding period. At the same time, it was shown that although inertia is more intense in market services, it was less intense in public services and the other sectors. The complete results and commentary were not incorporated into the paper as it was not thought that they contributed to clarify events.

[13] Used previously by, among others, Cuadrado et al. (1999), Cuadrado et al. (2002), Cuadrado and Maroto (2009) or Maroto and Cuadrado (2012).

where S_{ir} is the percentage participation (in terms of occupation) of sector *i* in region *r* and $\bar{S}_i$ is the percentage participation of sector *i* in the Spanish economy; *m* is the number of sectors analyzed. The total index $I\bar{D}$ is calculated as the mean of the indices of each of the analyzed regions. The value of the previous index would be zero if the productive structure were the same in the *N* = 17 Spanish regions. As can be seen, what the indicator does is measure the level of mean dispersion of a variable like sectoral participation in terms of employment. Figure 7 shows the results obtained when we calculate this indicator.

The solid intermediate line in the figure indicates that, in terms of employment, the productive structure of Spanish regions became progressively less homogeneous over the period analyzed. The progress towards greater relative homogeneity which had characterized Spanish regions in the 80s, practically came to a standstill in the following years, and it was even possible to see a trend towards divergence of regional structures which became more pronounced with the onset of the crisis. The explanation for the events of these years lies, essentially, in the considerable destruction of employment in some highly productive sectors, such as construction and manufacturing. This destruction was more intense in less favored regions, thus contributing to explain the evolution of sigma divergence in terms of per capita income analyzed in the previous section. Figure 7 also shows that, despite a certain level of convergence within the quartiles of the sample, the range of variation between the end values is not only maintained since the 90s, but even increase after 2007.

Figure 7 - **Evolution of the inequality index of the Spanish regional productive structure between 1990-2013, in terms of employment**



Source: Own elaboration with data from BBVA Research (2014)

The conclusion drawn from the previous data is that, until the first third of the 90s, there was a converging trend in terms of employment, although the dispersion of this variable was higher than in terms of production. Nevertheless, it is worth bearing in mind that a converging specialization process can be compatible with *an increase in regional inequality and vice versa*. The relative importance of each economic sector in each regional economy can result in a higher level of inequality if those activities become

more relevant over time. Therefore, the question that arises is whether the observed change processes allow us to say that a greater equality in the productive structures of Spanish regions has taken place, or not. In order to answer this question, we have elaborated a *Florence-type geographical association index,* which quantifies the difference or similarity in the productive structures of each region, comparing them to the national mean. Its expression is the following:

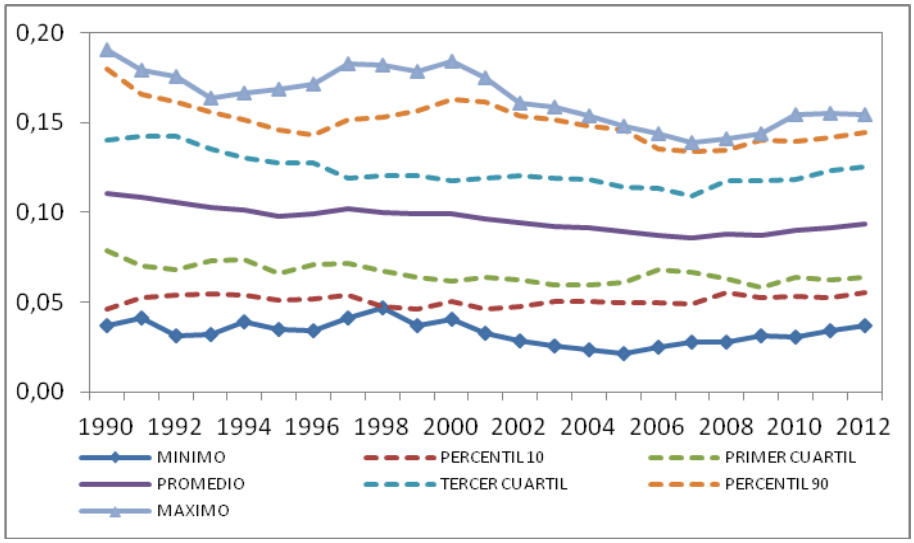
$$IF_r = \frac{1}{2}\sum_{i=1}^{m}\left|\left(\frac{\xi_{ir}}{\sum_{i=1}^{m}\xi_{ir}}\right)-\left(\frac{\sum_{r=1}^{N}\xi_{ir}}{\sum_{i}\sum_{r}\xi_{ir}}\right)\right|$$

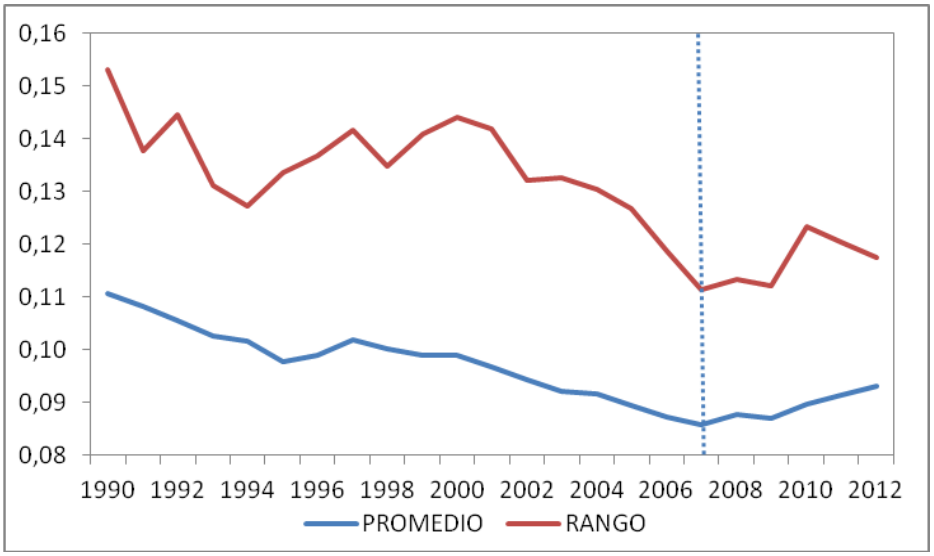
where *j* indicates the region, *i* the sector and ξ the studied variable (in this case, employment). The first brackets identify the weight (in terms of employment) of a given sector *i* over the total of the region, whilst the second brackets do the same for the entire country. Values approaching zero indicate similar sectoral structures between the region and the nation, whereas values approaching one reflect highly differing sectoral structures. The results of this index are shown in Figure 8.

The evolution experienced by the index enables us to highlight several facts. Firstly, the existence of a large discrepancy between the extreme values: between the region which, in 1990, had the closest productive structure to the national average (Aragon) and that furthest away from it (Galicia), there was a difference of 0.15 in their respective IF_j. The coefficient decreases throughout the studied period until it registers a mean value of 0.09 in 2013, when the less and most unequal regions are Asturias and La Rioja, respectively.

Secondly, in most cases, the Florence index estimated for each region decreases from 1990 until 2006. This indicates that the sectoral productive structures have come gradually closer over time. Only the regions of Murcia and Navarra and, to a lesser extent, Castile La Mancha, have registered an increase in their indices, thus growing farther from the mean overall structure of Spain. Nevertheless, this process of convergence is slowed down by the onset of the crisis, when all the indices can be seen to start increasing once again. In other words, Spanish regions have faced the economic crisis by differentiating their productive structures and attempting to capitalize on their specialization advantages, as we will see in the next point. As a result, their behavior has not been homogeneous and those regions with a productive fabric that was already specialized in more productive, dynamic and open to the exterior activities before the crisis have been able to overcome its negative effects sooner.

Figure 8 – Florence index of the Spanish regional productive structure





Source: Own elaboration with data from BBVA Research (2014)

Following the reasoning introduced in this section, our analysis of the change in productive structures and its effect on advantages and disadvantages for Spanish regions concludes with a *shift-share* analysis which breaks down the regional growth of a specific variable –in our case, sectoral occupation, which determines the specialization patterns seen in the previous section– following a multiplicative model. Each index or effect can be greater than one (if the region has grown above the national average) or lower than one (if otherwise). The mathematical expression in the analysis of production and employment would be as follows:

$$\dot{\xi}_r = \frac{\xi_T}{\xi_0} = \frac{\sum_{i=1}^{N} \xi_{ir,0} \left(\frac{\sum_i \sum_r \xi_{ir,T}}{\sum_i \sum_r \xi_{ir,0}} \right)}{\sum_{i=1}^{N} \xi_{ir,0}} \cdot \frac{\sum_{i=1}^{N} \xi_{ir,T}}{\sum_{i=1}^{N} \xi_{ir,0} \left(\frac{\sum_i \sum_r \xi_{ir,T}}{\sum_i \sum_r \xi_{ir,0}} \right)} = NS_\xi \cdot RE_\xi$$

$$NE_r = \frac{\sum_{i=1}^{N} \xi_{ir,T}}{\sum_{i=1}^{N} \xi_{ir,0} \left(\frac{\sum_i \sum_r \xi_{ir,T}}{\sum_i \sum_r \xi_{ir,0}} \right)} = \frac{\sum_{i=1}^{N} \xi_{ir,0} \left(\frac{\sum_r \xi_{ir,T}}{\sum_r \xi_{ir,0}} \right)}{\sum_{i=1}^{N} \xi_{ir,0} \left(\frac{\sum_i \sum_r \xi_{ir,T}}{\sum_i \sum_r \xi_{ir,0}} \right)} \cdot \frac{\sum_{i=1}^{N} \xi_{ir,T}}{\sum_{i=1}^{N} \xi_{ir,0} \left(\frac{\sum_r \xi_{ir,T}}{\sum_r \xi_{ir,0}} \right)} = IM_{\xi} \cdot RS_{\xi}$$

where ξ represents the variable analyzed (occupation in this case), *i* represents *N* productive sectors, *r* corresponds to the regions considered, and *T* and *0* are, respectively, the final and base reference years.

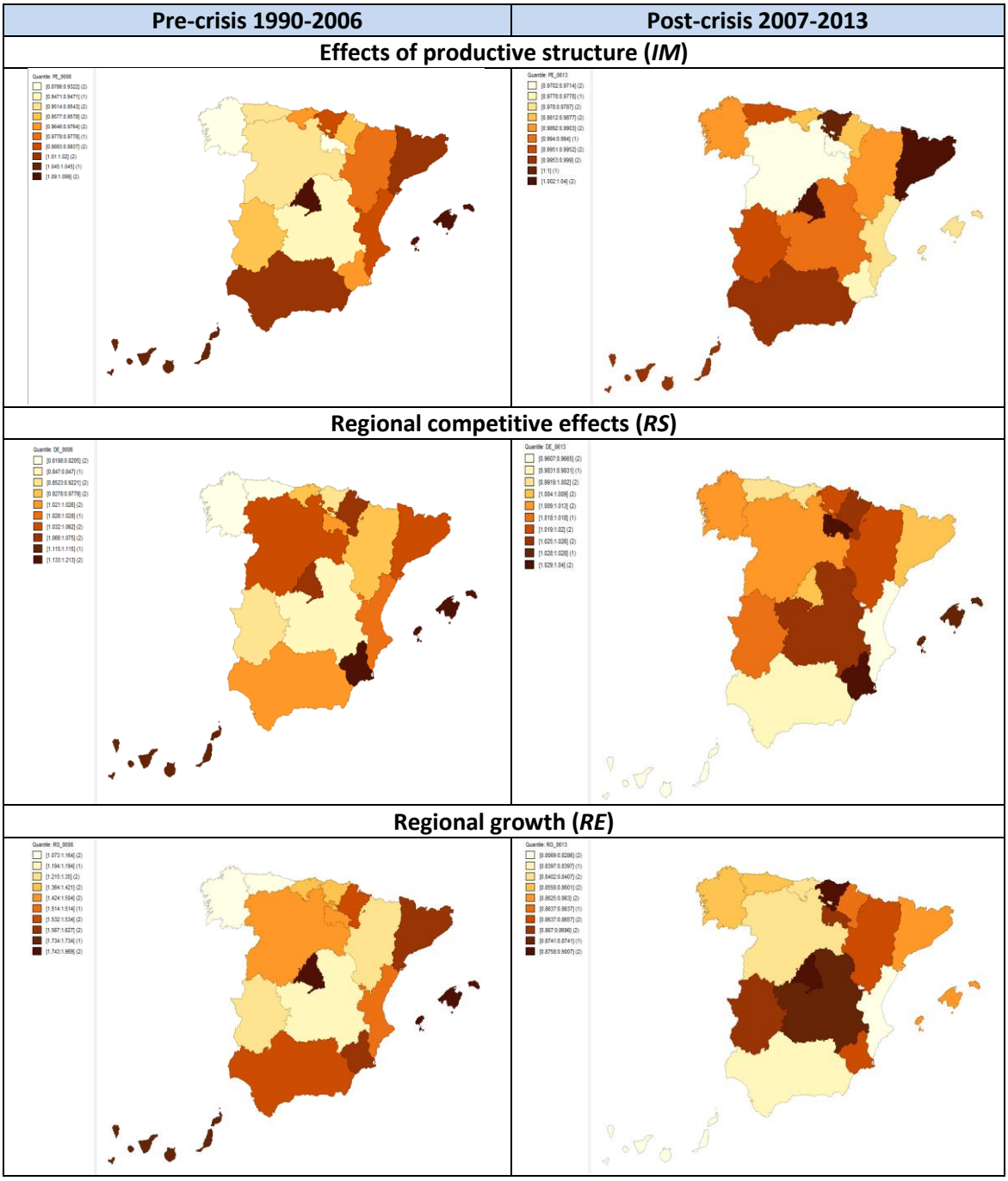
The *national component* (*NS*) measures which part of the total growth of employment in a sector and region can be explained through the aggregated growth of the country it belongs to over the studied period. Meanwhile, the *structural component* (*IM*) identifies the productive sectors of a region with a faster or slower growth rate than the national average. Thus, a region with a percentage which is above the average for dynamic sectors should grow faster compared to another in which low growth sectors are predominant. The sum of these two components (*NS* + *IM*) is the growth expected for a specific sector *i* in a region *r*. Finally, the *regional component* or regional competitive advantage (*RS*) will be the difference between real and expected growth. That is, it measures the competitive advantage of a specific sector *i* in a region *r*, allowing us to identify the leading activity sectors (when the sector in region *r* grows faster than the national average) compared to other, slower sectors (when the sector in region *r* grows at a slower rate than the national average). The sum of *IM* + *RS* is the overall result of the regional effect (*RE*).

Figure 9 summarizes the results obtained for Spanish regions between 1990-2013 differentiating the net effects – structural and regional– which have driven growth in those regions in these years. Likewise, and following the objective of the present work, we distinguish between the period before and after the crisis. In the period before the crisis, the greatest structural changes are observed in the Mediterranean regions, the archipelagos and Madrid (including all the rich regions). On the other hand, the effects had values lower than one in the central regions and northwestern regions. After the onset of the crisis, those effects became more notable in some rich regions, such as Madrid, the Basque country and Catalonia, although they were also higher (albeit, without reaching a unit value) in the central and northwestern regions.

Regarding the structural effects at a regional level, Figure 9 shows that a significant change has also taken place since the economic crisis, going from a centre-periphery model to a more homogeneous one with particular regions, such as Murcia, the Balearic Islands and La Rioja, standing out. This has helped the latter regions to become part of the group which have overcome the crisis sooner, specifically Murcia has reduced the distance separating it from the richer regions, as shown at the end of section 3. Lastly, if we only compare the two control groups mentioned in the work, the differences in terms of growth and components become evident. On the one hand, in the period before the crisis, richer regions (group 1) behaved as dynamic regions, with proportional (1.010) and differential (1.037) effects greater than one. This effect was greater during the 90s since, after the year 2000, the net effect dropped to a value slightly under one (0.972). On the other hand, during the same period, poorer regions (group 2) behaved as delayed regions, since both their proportional (0.967) and differential (0.968) effects showed values lower than one. If we look at the structural

effects (*IM*) we can see that there are no large differences between the two groups of regions in terms of the sign of the effect (although there are differences in their values). Thus, regardless of the regional group, we can refer to non-market services, finance and services for businesses as dynamic sectors in terms of job creation, whereas the remaining market services, construction and manufacturing behaved as low-growth sectors throughout the entire period analyzed. The main changes are observed in energy and extraction activities, and the primary sector, which ceased to be slow-growing sectors after the onset of the crisis, although their positive structural effect has been practically non-existent in recent years.

Figure 9 - **Role of structural changes and regional effects in Spain, 1990-2013**



Source: Own elaboration with data from BBVA Research (2014)

One of the most notable regional conclusions extracted from the results of Figure 9 are the significant differences existing in terms of competitive effects. Two key facts emerge when we analyze the *regional shift* (*RS*) data: first, the competitive effects between both groups of regions are opposed. Those sectors in which the leading regions have a competitive advantage are precisely the ones in which delayed regions have disadvantages. Second, a radical change can be seen after the onset of the crisis: those sectors in which Spanish regions had competitive advantages before the crisis become delayed sectors –as in the case of manufacturing and financial services, as well as services for businesses in less favored regions and services in general in leading regions. Only construction in the rich regions maintained its competitive advantage in terms of employment, both during the period before the crisis and in the following years.

Likewise, in addition to differences between both control groups, after 2007 it is also possible to observe significant differences regarding their past behavior. Thus, after the crisis, rich regions start to gain localization advantages, since the value of their net regional effect is greater than one (1.015), but only due to the role of the differential effect (1.021). On the other hand, poorer regions have suffered productive specialization problems, as their net regional effect was lower than one (0.988) despite their differential effect being greater than one. The combination of these two trajectories has caused regions in the rich group to distance themselves from the others in terms of growth, which contributes to explain the diverging trend observed at the beginning of the work.

These data, added to those from section 4, allow us to conclude that rich regions have been better able to overcome the crisis because their productive specialization pattern before the crisis was based on sectors with a low relative employment growth ($IM < 0$), so the considerable loss of jobs suffered by the entire Spanish economy since 2006 has not affected these regions to the same extent as those specializing in sectors with a rapid growth of employment. Furthermore, another reason which helps to explain this divergence of rich regions in recent years are the competitive advantages in the mentioned sector ($RS > 0$) which they presented before the crisis, as well as their capacity to adapt their productive structure –as shown previously– to those sectors where they could capitalize on greater regional advantages since 2007.

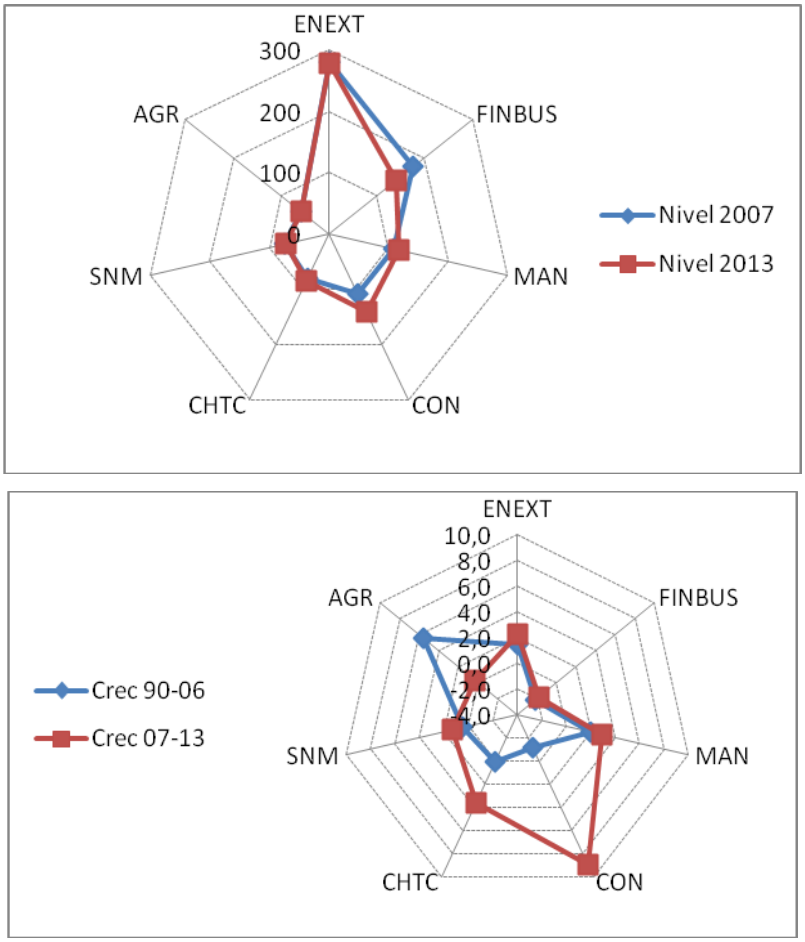
6. Effects of divergence of productive structures on the productivity of Spanish regions, 1990-2013:

Nevertheless, we must not forget that these relationships between regional specialization and the capacity of regional economies to face the crisis can be explained through the internal productivity of those sectors in which each region specializes, since only by directing productive structures towards highly productive activities is it possible to transform competitive advantages into improvements in the quality of life within a region. For this reason, Figure 10 shows the levels and growth rates of sectoral productivity in Spain during the period 1990-2013.

Regarding the levels of sectoral productivity (top graph in Figure 10) we can see that the most productive branches of activity in Spain are energy and extraction activities, followed by financial and business services, as well as the construction and manufacturing industries. All these sectors have productivity levels above the aggregated mean throughout the analyzed period. On the other hand, the remaining services and activities in the primary sector present productivity levels below the aggregate mean. The main changes observed from the end of 2006 are a fall in the relative productivity of financial services, which had already began with the process of

liberalization and mergers in the mid-90s, and an increase in those of manufacturing and, particularly, construction.

Figure 10 - Sectoral productivity in Spain. Levels and growth, 1990-2013



Sources: Own elaboration with data from BBVA Research (2014)

Regarding the time evolution of these sectoral productivities (bottom graph in Figure 10), during the period before the crisis the most dynamic activities were the primary sector and industry –both manufacturing and energy. However, after the onset of the crisis, both non-market and some market services (transport, communications, tourism and commerce), and especially construction presented the highest mean annual growth rates, mainly due to the fact that these activities require more workers and that their productivity increased via job restructuring processes in recent years.

Nevertheless, as previously mentioned, the most important conclusion drawn from the analysis of sectoral productivity is its link with the regional specialization patterns described previously (section 4) and its evolution through structural changes (section 5) as a result of the crisis.

To analyze the impact of structural changes on productivity growth we will use the data described above, pointing out the heterogeneity of the different branches within the service sector. This has been done through a *shift-share* type analysis. This technique provides a convenient tool to investigate how aggregate growth is mechanically linked to differential growth of labor productivity and the reallocation of labor between

industries. It breaks down overall productivity growth into two effects: structural changes (net or static effect and dynamic effect) and the within-sector productivity growth. Formally, the method applied here may be derived as follows:

$$\dot{\pi}_r = \frac{\pi_{rT} - \pi_{r0}}{\pi_{rT}} = \frac{\sum_{i=1}^{n} \pi_{ir0}\left(s_{irT} - s_{ir0}\right) + \sum_{i=1}^{n}\left(s_{irT} - s_{ir0}\right)\left(\pi_{irT} - \pi_{ir0}\right) + \sum_{i=1}^{n} s_{ir0}\left(\pi_{irT} - \pi_{ir0}\right)}{\pi_{rT}}$$

$$\dot{\pi}_r = SSE_r + SDE_r + ISE_r = SCE_r + ISE_r$$

where: π is the labor productivity; *0* is the initial year; *T* is the final year; *i* corresponds to each economic sector; *r* to regions, and *s* is the sector weight in terms of employment $s_i = L_i / L$.

The average regional results for the 1990-2013 period, according to the previous equation, are displayed in Table 3, broken down into individual contributions by the seven economic sectors analyzed. In line with the equation for the breakdown of overall productivity, the sum of the static and dynamic structural effects (*SCE* = *SSE* + *DSE*), as well as the intra-sectoral effect (*ISE*), is equal to the average growth rate of labor productivity in the corresponding aggregate (first cell in each sub-table). This is how the data sums up horizontally. Vertically, for each of the three components, the contributions of each sector also add up to the corresponding figure in the first line of each sub-table. As additional information, the number in brackets shows the average growth of labor productivity within individual sectors or service industries, and does not add up either in the horizontal or in the vertical dimensions. The figures allow us to identify whether there are any regular patterns of differential productivity growth between industries.

Supported by data from Table 3, some stylized facts can be underlined. First of all, consistent with results obtained by some authors referred to other economic areas[14] and time horizons, the structural components (*SE* + *DE*) seem to be generally dominated by the within effects of productivity growth both during the entire period (1990-2013) and from 2007. This means that, in aggregate terms, the reallocation of labor among those sectors with low and high productivity had a positive role on overall growth in the period before the crisis. However, this role seems to disappear after 2007.

Table 3 - **Shift share analysis of productivity growth, 1990-2013**
(average annual growth, 17 Spanish regions)

	Labor productivity growth	**Static Structural Effect (SSE)**	**Dynamic Structural Effect (DSE)**	**Intra-sectoral Effect (ISE)**
1990-2013				
TOTAL	**0.21 =**	**0.21**	**- 0.18**	**0.18**
		=	=	=
Agriculture	(1.12)	-0.02	-0.02	0.04
Mining and energy	(0.39)	-0.00	-0.00	0.01
Manufacturing	(0.59)	-0.07	-0.04	0.10

[14] See: Peneder (2002 and 2003) for 28 countries of the OECD; Havlik (2005) for the new Eastern European countries belonging to the EU; Fagerberg (2000) for the manufacturing sectors in 39 countries based on the UNIDO; Timmer and Szirmai (2000) for the manufacturing sectors of four Asian countries; Maroto and Cuadrado (2009 and 2013) for OECD nations and regions, respectively; van Ark (1995) for a group of 8 countries of the EU and the USA; and Maudos et al. (1998) for the EU-15 and US.

Construction	(0.21)	-0.05	-0.01	0.03
Trade, Tourism, Transport & Communications	(0.23)	0.01	0.00	0.05
Finance & Business services	(-0.40)	0.30	-0.12	-0.08
Non market services	(0.19)	0.04	0.01	0.03
1990-2006 Pre-crisis				
TOTAL	**0.07 =**	**0.15**	**- 0.09**	**0.01**
		=	=	=
Agriculture	(0.90)	-0.02	-0.02	0.03
Mining and energy	(0.24)	-0.01	-0.00	0.01
Manufacturing	(0.32)	-0.05	-0.01	0.05
Construction	(-0.18)	0.05	-0.01	-0.02
Trade, Tourism, Transport & Communications	(0.02)	0.02	0.00	0.00
Finance & Business services	(-0.34)	0.16	-0.05	-0.07
Non market services	(0.08)	0.00	0.00	0.01
2007-2013 Post-crisis				
TOTAL	**0.12 =**	**0.02**	**- 0.04**	**0.14**
		=	=	=
Agriculture	(0.02)	0.00	0.01	0.00
Mining and energy	(0.13)	0.01	0.00	0.00
Manufacturing	(0.17)	-0.02	-0.00	0.02
Construction	(0.54)	-0.07	-0.04	0.07
Trade, Tourism, Transport & Communications	(0.22)	-0.01	-0.00	0.05
Finance & Business services	(-0.11)	0.08	-0.01	-0.02
Non market services	(0.08)	0.03	0.00	0.02

Source: Own elaboration with data from BBVA Research (2014)..

Secondly, the *structural burden* of resource reallocation seems to be robust in our case, where the dynamic effect is negative for the broad 7-sector breakdown (-0.18 in average terms), although this effect is the opposite for the years after the crisis in some sectors such as agriculture, mining and extraction and non-market services. Finally, if we analyze the performance by sectors, most of the effects on the overall productivity growth before the crisis come from non-tertiary activities, especially manufacturing, extraction and primary activities (the latter due to the strong reductions in employment experienced by these industries). However, after the crisis the highest within productivity effects are seen in construction and some market services, such as trade, tourism, transport and communications, led by those latter dynamic services.

Lastly, if we compare the two groups of regions analyzed in this work, the differences are again significant (see **Table A.1**). On one hand, in the poorer regions the structural effects played an even more prominent role in the period before the crisis than sectoral internal productivity growth (0.07 vs 0.05 for a mean regional growth of 0.12 between 1990 and 2006). However, after the start of the crisis, these gains from structural changes disappeared and most of the mean growth in these regions between 2007 and 2013 (0.13) came from a productivity increase in sectors like the primary or mining and extraction, in which these regions specialized and which presented strong productivity growth via job restructuring processes. A similar situation took place within the group of richer regions, where the structural effects which accounted for half of the regional growth before the crisis (0.016 out of the total 0.032) gave over their role to sectoral internal growth after the crisis began. The difference with the other group of regions is that this sectoral internal growth is based on more dynamic activities in terms of productivity, such as some market services and manufacturing, as well as construction,

a sector in which this group of regions has become highly specialized in relative terms since the onset of the crisis.

7. Conclusions

The work developed in this paper enables us to highlight some points and conclusions which we deem interesting and which have been demonstrated through the analytical techniques introduced herein.

Within the European Union, Spain has been one of the most affected countries by the recent international economic and financial crisis, which added to some severe internal imbalances generated during the previous phase of rapid expansion of the Spanish economy (1995-2007), and which, until recently, had not been adequately corrected. Undoubtedly, one of the most notable effects of the crisis in Spain was the change in the trend of regional disparities. Measured either in terms of GDPpc or unemployment, the impact of the crisis has driven a significant process of interregional divergence which has put an end to the previous trend towards convergence. With some exceptions, the regions which, historically, have been considered richer –in terms of a GDPpc above the national average– and more dynamic, have had a much better performance than most of the poorer regions, and have also been able to deal with the crisis relatively better, as shown in section 3.

The starting point of the work is an initial research hypothesis aimed at determining the existence of significant differences in regional behavior during the period prior to the crisis and during the crisis itself (until 2013). The analysis of the data shows that, indeed, there are two main groups or clusters of regions: richer ones, including the Basque Country, Navarra, La Rioja, Aragon, Catalonia, Madrid and the Balearic Islands; and the rest, including the poorer regions and some of the intermediate. The growth rates of the former group reflect not just a good growth before the crisis, but also a better reaction after its onset, whereas, after 2007, regions in the second group have continuously been below the Spanish average.

The second hypothesis consisted in testing whether the mentioned interregional differences before and after the crisis, could be explained through the specialization patterns and changes in the productive structures towards more dynamic and productive sectors by those regions which have reacted better to the crisis.

The analysis of these productive specialization patterns has shown that the Spanish regional landscape at the beginning of the 90s was clearly dichotomous. Richer regions specialized in manufacturing activities and market services, whereas poorer regions focused on construction and, in particular, energy and extraction activities, as well as the agricultural sector. Although some of these features have been maintained after the crisis, there are others which have changed and which help to explain the process of regional divergence observed since 2006/07. Poorer regions have strengthened their specialization in services related to the public administration, whereas richer regions have carried out significant adjustments in the construction and manufacturing sectors.

The evolution of productive structures –through Florence and inequality indices analyzed in section 4– shows that the progress towards greater homogeneity which had characterized the structural changes applied in the 80s and early 90s, came to a halt during the following years and even reversed its direction, showing a trend towards interregional divergence. From the outset, the crisis entailed a significant process of job destruction in two sectors: construction and manufacturing. This loss of jobs has been more notable in poorer regions, thus contributing to explain the change observed in the sigma convergence of GDPpc. These structural effects show a significant change after the crisis, going from a centre-periphery model to a more homogeneous one, in which

regions such as Murcia, the Balearic Islands and La Rioja have stood out, and which has helped them to join the first group of regions to overcome the crisis.

Another added value of this work is the application of a multiplicative shift share model (section 5). The results show that, in general, poorer regions did not have a dynamic behavior regarding their structural (*IM*) and competitive (*RS*) regional effects. On the other hand, there are also significant differences between the two groups of regions identified. Sectors in which the richer regions had competitive advantages are precisely those in which the remaining regions have competitive disadvantages. Likewise, after the onset of the crisis, richer regions went on to suffer productive specialization problems. The addition of these two trajectories has led the richer group of regions to distance itself from the rest in terms of growth, thus helping to explain the diverging trend observed in this paper.

To conclude this work, the shift-share analysis of Spanish regional productivity shows that, although structural changes still play a role, the growth of intra-sectoral productivity has dominated, both during the overall 1990-2013 period and after the onset of the crisis. A study of the behavior of intra-sectoral productivity of Spanish regions before and after the crisis (section 6) has concluded that, in poorer regions, productivity improvements have come from sectors such as the primary, as well as mining and extraction, in which they specialized before the crisis and which registered increases in productivity via job restructuring after its onset. On the other hand, in richer regions, the key role was carried out by productivity improvements in manufacturing and certain services, as well as construction. These activities have been more dynamic in terms of internal productivity since 2007.

Nevertheless, to end these final conclusions, it is worth bearing in mind two important points. Firstly, the level of disaggregation of the data used in this work could mask some interesting aspects and conclusions within the activity branches analyzed. Secondly, the results presented herein only analyze one of the possible factors of the interregional change in trend observed in Spain in recent years, but there could be others which have not been analyzed in this work and which could have also had an influence, both on the aggregate behavior of the Spanish economy and on the internal differences and effects within each region.

References

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Annexes

Figure A–1

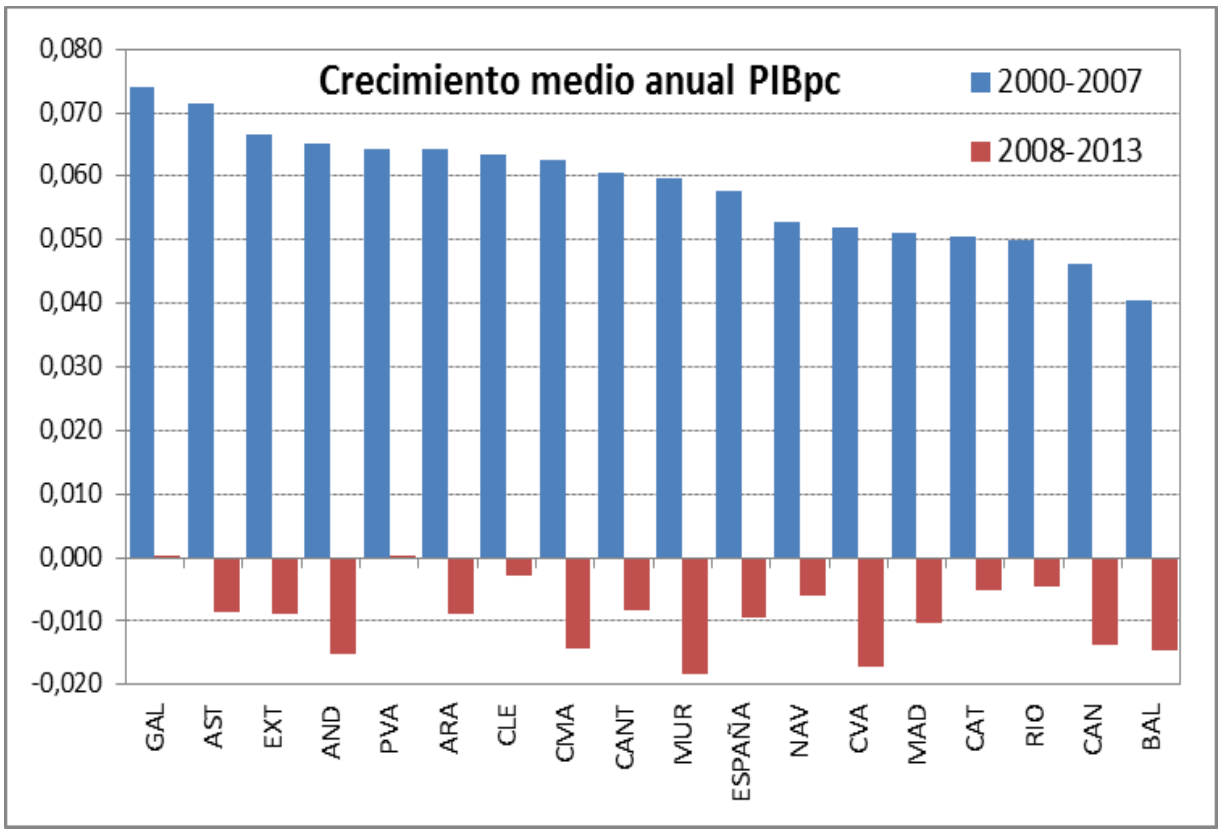

Table A.1. - **Shift share analysis of productivity growth, 1990-2013**

(average annual growth, Group 1 regions)

	Labor productivity growth	Static Structural Effect (SSE)	Dynamic Structural Effect (DSE)	Intrasectorial Effect (ISE)
1990-2013				
AVERAGE	**0.28 =**	**0.21**	**- 0.16**	**0.23**
Aragon	(0.30)	0.12	-0.10	0.28
Baleares	(-0.10)	0.11	-0.09	-0.12

Cataluña	(0.13)	0.15	-0.18	0.16
Madrid	(0.10)	0.24	-0.23	0.09
Navarra	(0.24)	0.11	-0.12	0.25
País Vasco	(0.23)	0.14	-0.19	0.28
La Rioja	(0.33)	0.11	-0.08	0.30
1990-2006 Pre-crisis				
AVERAGE	**0.13 =**	**0.19**	**- 0.11**	**0.05**
Aragon	(0.14)	0.10	-0.07	0.11
Baleares	(-0.20)	0.07	-0.06	-0.21
Cataluña	(0.01)	0.10	-0.09	0.00
Madrid	(-0.01)	0.10	-0.07	-0.04
Navarra	(0.06)	0.08	-0.08	0.06
País Vasco	(0.08)	0.08	-0.08	0.08
La Rioja	(0.15)	0.15	-0.10	0.10
2007-2013 Post-crisis				
AVERAGE	**0.13 =**	**0.03**	**- 0.04**	**0.14**
Aragon	(0.12)	0.01	-0.03	0.14
Baleares	(0.12)	0.03	-0.03	0.12
Cataluña	(0.11)	0.02	-0.04	0.13
Madrid	(0.09)	0.08	-0.09	0.10
Navarra	(0.16)	0.02	-0.04	0.18
País Vasco	(0.12)	0.01	-0.04	0.15
La Rioja	(0.13)	0.04	-0.05	0.14

Source: Based on BBVA Research (2014). Own elaboration.