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ORIGINAL ARTICLE

Au revoir Paris! Spanish regions closer to the EU average and further away from the leaders

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Abstract

This paper confirms that Spanish regions in 2015 were closer to the EU average in labour productivity than in 2000, but further away from the richest regions such as Île de France. A dynamic shift-share analysis at a 10-industry level of disaggregation shows that the main driver of convergence with the EU average is catch-up in labour productivity within the same industry, while disparities with the top regions (especially Île de France) mainly involve differences in patterns of specialization (between-industry divergence) followed by technological divergence (within-industry effect). The industry mix of the regions reveals that a new pattern of specialization is taking shape in Europe, driven by those services more likely to benefit from information and communications technologies. The location of such services in the wealthiest regions is a growing source of regional disparities that needs to be considered in the design of regional policies. Within Spain, these sources are also present in the pattern of specialization seen in the most advanced regions.

KEYWORDS
productivity disparities, spatial imbalance, unbalanced economic growth

JEL CLASSIFICATION
R10, R11, R12

1 | INTRODUCTION

Over recent years, regional inequality has taken on a new shape and become significantly more challenging, especially for the European Union (EU) and its Member States (Fratesi & Rodríguez-Pose, 2016). Globalization and EU economic integration processes, the Great Recession and a wave of technological change driven mainly by information and communications technologies (ICT) have triggered the start of a new phase of divergence between European regions (Gómez-Tello et al., 2020; Iammarino et al., 2019). While these forces have strengthened the competitive advantages of some large city-regions and revalued their local factor endowments and assets, the comparative advantages of low- and middle-income regions seem to have been eroded.

New technologies and jobs are more knowledge intensive than traditional ones (Berger & Frey, 2014). Thus, those cities and regions more abundant in high-skill workers tend to adapt better to the computer revolution than those specializing in routine task industries. The empirical evidence for the United States reveals that cities of this type are becoming new hubs of innovation (Berger & Frey, 2017), with the agglomeration of talent, capital and innovation together with the presence of knowledge-based institutions and social networks propelling economic activity and productivity growth (Glaeser & Resseger, 2010). At the same time, the presence of such factors strengthens the capability of these cities to respond to today's challenges (Glaeser et al., 2014). As a result, the agglomeration of new skill-intensive activities in some cities is considered a strong driving force behind the current increase in regional income disparities.

In Europe, there is no conclusive evidence in support of a positive relationship between city size and productivity growth. However, the upsurge in regional disparities since the 2008 crisis has been accompanied by the rise of some regions that are home to large cities (Gómez-Tello et al., 2020). Ile de France, London, Stockholm and Brussels are stretching the upper limit of regional income distribution in Europe. We believe that this pattern could have serious consequences, especially for countries such as Spain that have no region in the group of European leaders. If a Member State has no domestic region with the potential to attract new knowledge-intensive industries and services, this could pose a threat to its relative position in the EU because of its inability to match the pace of the most successful regions. This is an important fact to consider in the design of economic policies.

In this paper we will show that such a scenario is particularly worrisome for Spain, whose regions, while more or less successful in following the European average, have seen the gap between them and the wealthiest regions increase over the period 2000–2015. There are essentially two potential sources that could determine regional productivity disparities. One is the uneven territorial distribution of the production factors or assets on which economic development relies, and the other concerns the differences in the sectoral composition of regional outputs. Our aim in this paper is to analyse the role of sectors to help explain the relative position of Spanish regions in relation to European regions in terms of labour productivity, focusing particularly on the position of Spain's wealthiest regions in relation to the top European regions.

Generally speaking, the debate on regional productivity convergence in EU regions in the post-1980s period has found that changes in the composition of the industry mix has had a negligible impact on aggregate regional productivity and convergence, while improvements in productivity within specific industries have been the main drivers of regional productivity, and therefore of convergence or divergence across regions (Esteban, 2000; Ezcurra et al., 2005; Le Gallo & Kamarianakis, 2011; Villaverde & Maza, 2008). In Spain, the decreasing weight of agriculture between 1955 and 1980 contributed significantly to convergence in labour productivity across regions, but then the part played by structural change came to an end and other sources came to the fore (Cuadrado-Roura & Maroto-Sánchez, 2010). Entry into the European Economic Community (EEC) in 1986 led to a lengthy phase of economic

growth and convergence in income per capita with the other Member States. The main source of this convergence was a reduction in productivity differences in the same industries, that is, technological catch up. However, within the country's borders, the reduction of regional imbalances was barely visible (Garrido-Yserte & Mancha-Navarro, 2010).

We use Caselli and Tenreyro's (2004) dynamic shift-share analysis to break down the changes in regional productivity compared with a reference region into three components: changes in the industry mix, changes in sector-by-sector productivity gaps and changes in the pattern of specialization. This shift-share analysis is expressed dynamically to measure the contribution of these three components to the convergence/divergence of Spanish regions in relation to a hypothetical average European region and compared with the wealthiest region in Europe, Ile de France, between 2000 and 2015. The study is performed using a 10-sector level of disaggregation to drill deeper into the potential effect stemming from the development of 'tradable' services, a sector that has benefitted greatly from the ICT revolution (Freund & Weinhold, 2002).

The Spanish case is particularly appealing, as our main conclusions will reveal. Spain can be considered a country for which the European Cohesion Policy has worked relatively well to promote convergence with European regions, but a slowdown in the speed of convergence has been noticeable since 2000. This is of particular concern for two reasons; firstly, because most Spanish regions are still below the EU-13 average (EU-13 = EU-15 minus Ireland and Luxembourg), and secondly, none of them are in the group of richest European regions.

Our results provide two main conclusions. First, Spanish regions have generally narrowed the gap between themselves and the EU-13 average, but the distance between them and the top regions has increased. And second, the shift-share analysis shows that the main driver of convergence with the EU-13 average is industrial productivity, although productivity distances have increased where modern services are concerned. In this regard, our results are in line with Esteban (2000) and Ezcurra et al. (2005), for whom the within-industry effect is the main determinant of static productivity differences between European regions. However, our study also confirms that distances from the leader, Île de France, are mainly determined by this region's greater specialization in the most advanced services.

The remainder of the paper is as follows. Section 2 provides a descriptive analysis of the evolution of regional inequality between Spanish regions and their positions in relation to the EU-13 regions. In Section 3 we carry out a shift-share analysis to clarify the role played by the technology gap within industries, structural change and regional specialization in the increase of regional disparities. The final section shows our main findings and conclusions, and puts forward some economic policy recommendations.

2 | DESCRIPTIVE ANALYSIS

2.1 | The data set

The data set contains gross value added per capita and gross value added per worker for 156 NUTS-2 regions covering the EU-13 countries (Austria, Belgium, Germany, Denmark, Greece, Spain, Finland, France, Italy, the Netherlands, Portugal, Sweden and the United Kingdom) for the period 2000–2015. The two main sources used to build the data set were BD.EURS (NACE Rev. 2) (Escribá-Pérez et al., 2019) and EUROSTAT.[1]

The data on gross value added and employment are disaggregated into 10 different sectors in accordance with NACE Rev. 2: (1) agriculture, forestry and fishing; (2) extractive industries, energy and water utilities; (3) manufacturing; (4) construction; (5) wholesale and retail trade, transport and storage, hotels and restaurants; (6) information and communications technologies services; (7) financial and insurance activities; (8) real estate activities; (9) professional, scientific and technical services, administration and support activities; and (10) other services such as public administration and defence, social security, education, human health and social activities. This sectoral disaggregation enables us to carry out a more exhaustive analysis of the role played by the industry mix in explaining the increasing gap between Spanish regions and the leading European region.[2]

2.2 | Descriptive statistics

Table 1 contains several basic statistics measuring regional disparities across the 156 European regions.[3] With the exception of the interquartile range, all the indexes point to an increase in regional inequality between 2000 and 2015. The increase in the coefficient of variation (CV) and the population weighted coefficient of variation (WCV) over time reveals that, in 2015, the regions are more closely spread around the European average than they were in 2000. The Gini and Theil indexes, which compute distances between any pair of regions in the distribution, reveal more clearly an increase in inequality than the CV and the WCV, which measure dispersion to the mean. The interquartile range (P75/P25) denotes that regions in the central part of the distribution are more concentrated around the mean, while the P90/P10 range reveals that the distance between the two extremes of the distribution is greater in 2015.

The Theil index is decomposed into 'within country' and 'between country' components of regional inequality. We find that the 'within country' effect dominates the explanation of overall disparities in Europe (60%). When looking within countries (Table 2), it can be seen that there are substantial differences in the rates by which regional disparities grew in 2000–2015. According to those indexes that take into account the whole distribution (CV, WCV and Theil), regional inequality has decreased in at least 5 countries out of the 13 (Austria, Belgium, Germany, Finland and Portugal), but in 6 of them it has increased (Denmark, Greece, France, Italy, Sweden and United Kingdom) and the 2 remaining countries present mixed results (Spain and the Netherlands). It is interesting that inequality has clearly increased in those countries where the richest regions in Europe are located (London, Île de France, Stockholm and Copenhagen). In the case of Spain, we see mixed results insofar as the CV falls while the WCV and the Theil grow. When the Spanish regions are compared with the full sample of European regions, we are able to conclude that the advance of regional disparities in Spain is smaller, but a similar pattern of regional inequality is

TABLE 1 Inequality indexes for GVA per capita. NUTS-2 regions, EU-13

Year	[1] CV	[2] WCV[1]	[3] P90/P10	[4] P75/P25	[5] Gini	[6] Theil GE(0)
2000	0.314	0.315	2.246	1.511	0.177	0.048
2001	0.309	0.307	2.212	1.497	0.174	0.046
2002	0.305	0.304	2.214	1.497	0.172	0.045
2003	0.295	0.291	2.132	1.471	0.166	0.041
2004	0.295	0.292	2.126	1.481	0.166	0.041
2005	0.298	0.297	2.078	1.474	0.167	0.042
2006	0.298	0.296	2.159	1.513	0.167	0.042
2007	0.298	0.300	2.179	1.507	0.167	0.043
2008	0.301	0.295	2.184	1.467	0.168	0.041
2009	0.297	0.289	2.170	1.405	0.164	0.039
2010	0.310	0.301	2.278	1.450	0.173	0.043
2011	0.320	0.308	2.389	1.492	0.181	0.046
2012	0.329	0.319	2.497	1.474	0.188	0.049
2013	0.336	0.324	2.624	1.450	0.192	0.051
2014	0.329	0.325	2.553	1.458	0.188	0.051
2015	0.326	0.330	2.525	1.462	0.187	0.053

[1]The Williamson Index when the coefficient of variation is weighted by population.
Source: BD.EURS (NACE Rev. 2) and own elaboration.

TABLE 2 Growth rates of inequality in GVA per capita (%), 2000–2015. NUTS-2 within the EU-13 countries

	[1] CV	[2] WCV	[3] P90/P10	[4] P75/P25	[5] Gini	[6] Theil GE(0)
Austria	−1.16	−2.09	−1.34	0.61	−0.97	−3.47
Belgium	−1.43	−1.45	0.98	0,22	−0.28	−1.50
Germany	−1.09	−0.98	−0.82	−0.52	−1.06	−2.14
Denmark	1.64	1.68	0.81	0.20	1.67	3.30
Greece	0.76	1.31	−0.23	−1.03	−0.14	2.40
Spain	−0,17	0.26	0.20	−0.74	−0.28	0.27
Finland	−0.81	−0.84	−0.50	−0.17	−0.81	−1.51
France	1.41	1.38	−0.22	0.25	1.12	2.54
Italy	0.39	0.20	0.03	−0.45	0.43	0.46
Netherlands	−0.10	0.04	−0.01	−0.09	−0.05	0.06
Portugal	−1.48	−1.33	−0.72	−0.38	−1.45	−2.53
Sweden	0.36	0.28	0.31	0.16	0.76	0.75
United Kingdom	0.91	1.05	0.11	0.28	0.89	1.98
EU-13	0.25	0.31	0.78	−0.22	0.37	0.68

For any inequality indicator x, the annual growth rate is calculated as $\left[\hat{x} = (x_{2015}/x_{2000})^{1/15} - 1\right]$.
Source: BD.EURS (NACE Rev. 2) and own elaboration.

emerging. This pattern is characterized by a higher concentration of disparities in the central part of the distribution (P75/P25) and a lengthening of the distances between the extremes (P90/P10).

2.3 | Spanish regions in the European ranking

Esteban (1994) showed that differences in regional labour productivity, rather than variability in employment and participation rates across regions, are the main drivers of per capita income disparities. This situation still largely persists in Europe. Using a Theil decomposition, Gómez-Tello et al. (2020) find that between 74% and 80% of income per capita disparities in the 156 European regions are explained by differences in productivity per worker. In what follows, we will therefore explore the position of Spanish regions in relation to European regions in terms of this measure.

A more detailed approach to the question of how Spanish regions are positioned on the general map of regional dispersion in Europe is presented in Table 3, which contains information on their position in the EU-13 ranking (columns 3 and 4) according to GVA per worker and on the percentile in which they are found in the distribution of the EU-13 regions (columns 5 and 6). It can be seen that all the Spanish regions are to be found between percentiles P10 and P35 in 2000 and between P10 and P55 in 2015. Their positions have hardly changed over the period. At the last date, the leader regions in Spain (the Basque Country, Catalonia and Madrid) occupy the same positions they have occupied since at least 1860 (Martínez-Galarraga et al., 2015), and since 2000 Navarra has joined this select group. It is interesting that all the leading regions in Spain are only second-rate in the European ranking. All are below the P50 percentile in 2000 (around the median), and only the Basque Country is slightly above (P55) in 2015.[4] As late as 2000, Spain still had three regions in the P10 percentile (Extremadura, Castile-La Mancha and Galicia) and a large group of regions in P15 (Murcia, Andalusia, Valencian Community, Castile and Leon, Aragon and La Rioja). Fortunately, most of these have risen one percentile in 2015 and only two regions are found in P10 (Murcia and Extremadura). Such advances are even more noticeable when the European regions are ranked in descending order

TABLE 3 GVA per worker for the Spanish regions in the EU-13 ranking (156 regions)

	GVA per worker (2010 euros)		Rank in EU-13 (156 regions)		Percentile in EU-13 (156 regions)	
Region	**2000 [1]**	**2015 [2]**	**2000 [3]**	**2015 [4]**	**2000 [5]**	**2015 [6]**
The Basque Country	53,223	61,018	101	65	P35	P55
Madrid	54,125	58,888	97	82	P35	P45
Navarra	47,882	57,927	123	93	P20	P40
Catalonia	49,136	56,783	118	100	P25	P35
La Rioja	46,281	54,150	126	106	P15	P30
Aragon	44,981	53,771	130	109	P15	P30
Balearic Islands	50,722	52,190	110	114	P30	P25
Cantabria	47,422	51,298	125	118	P20	P20
Castile and Leon	45,551	50,941	128	119	P15	P20
Valencian Community	45,110	50,587	129	120	P15	P20
Asturias	47,816	50,355	124	121	P20	P20
Castile-La Mancha	40,508	49,630	136	124	P10	P20
Galicia	42,349	49,171	134	125	P10	P20
Canary Islands	48,985	48,518	119	127	P20	P15
Andalusia	43,947	47,819	131	131	P15	P15
Extremadura	38,351	45,714	140	136	P10	P10
Murcia	43,480	45,708	132	137	P15	P10

The regions are ranked according to the 2015 GVA per worker. *Source*: BD.EURS (NACE Rev. 2) and own elaboration.

according to their GVA per worker in 2015 (columns 3 and 4). Again we see a similar pattern to that observed in Europe (Gómez-Tello et al., 2020), in which the richest regions make the most progress in terms of productivity per worker in 2000–2015, while medium- and low-income regions hardly change. Thus, the Basque Country rises 64 places in the European ranking, Navarra 30, Madrid 15 and Catalonia 18. In the group of middle-income regions, the greatest progress is made by Aragon (+21) and La Rioja (+20), while the others remain almost immobile. Finally, some regions go down in the European ranking: Balearic Islands (−4), Canary Islands (−8) and Murcia (−5).

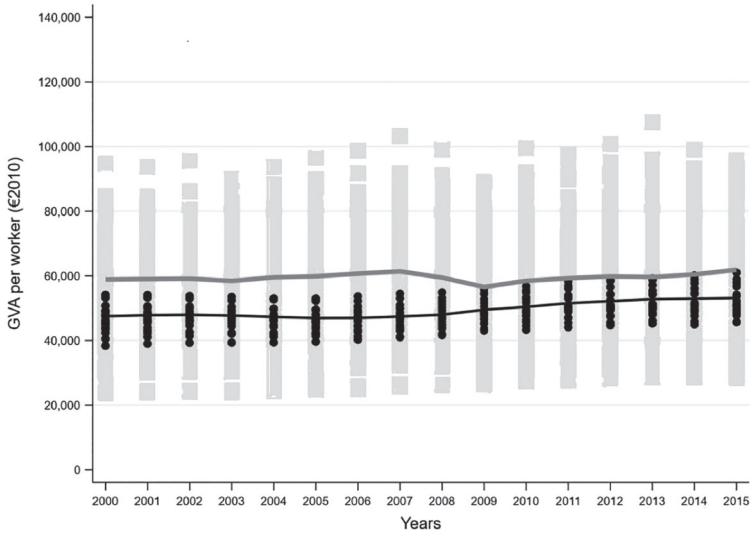
Now it would be interesting to see the differences in terms of productivity per worker between the Spanish regions and the EU-13 average and the richest regions in Europe. In Table 4, productivity per worker is expressed in terms of both the EU-13 average and the rate for Île de France. In 2015, no Spanish region reached the EU-13 average. Even the two richest regions, the Basque Country and Madrid, failed to reach this mark, with a rate of 99% and 95% respectively. Meanwhile, the second richest region in Europe, Île de France was 150% the EU-13 average. Thus, the two richest regions in Spain remain at a level less than 70% that of the Île de France, and their figures worsened between 2000 and 2015. Madrid, for instance, has gone from 70% to 63% of the Île de France rate, and the Basque Country from 69% to 66%. To put it another way, the richest regions in Spain are gaining positions in the European rankings but falling further behind the top regions.

Finally, Figures 1 and 2 graphically summarize the position of the Spanish regions in the European context. Figure 1 shows GVA per worker for the 156 European regions (grey squares) and for the Spanish regions (dark dots). The grey and black lines represent the EU-13 and Spanish averages, respectively. All Spanish regions remain under the EU-13 average, and at a distance from the top regions in Europe. However, they progressed over the period 2000–2015 and are finally positioned closer to the European average. But none of them has kept pace over the last 15 years with the most dynamic region in Europe, Île de France.

TABLE 4 GVA per worker in Spain versus the EU-13 average and Île de France

	EU-13 average		Île de France	
	2000	2015	2000	2015
Galicia	0.72	0.79	0.55	0.53
Asturias	0.81	0.81	0.62	0.54
Cantabria	0.81	0.83	0.61	0.55
The Basque Country	0.90	0.99	0.69	0.66
Navarra	0.81	0.94	0.62	0.62
La Rioja	0.79	0.87	0.60	0.58
Aragon	0.76	0.87	0.58	0.58
Madrid	0.92	0.95	0.70	0.63
Castile and Leon	0.77	0.82	0.59	0.55
Castile-La Mancha	0.69	0.80	0.53	0.53
Extremadura	0.65	0.74	0.50	0.49
Catalonia	0.83	0.92	0.64	0.61
Valencian Community	0.77	0.82	0.58	0.54
Balearic Islands	0.86	0.84	0.66	0.56
Andalusia	0.75	0.77	0.57	0.51
Murcia	0.74	0.74	0.56	0.49
Canary Islands	0.83	0.78	0.63	0.52
London	1.61	1.55	1.23	1.03
Région de Bruxelles	1.44	1.45	1.10	0.96
Île de France	1.31	1.50	1.00	1.00

Source: BD.EURS (NACE Rev. 2) and own elaboration.



Note: The grey squares represent the European regions, the back dots represent the Spanish regions, the grey line is the EU13 average, and the black line is the Spanish average.

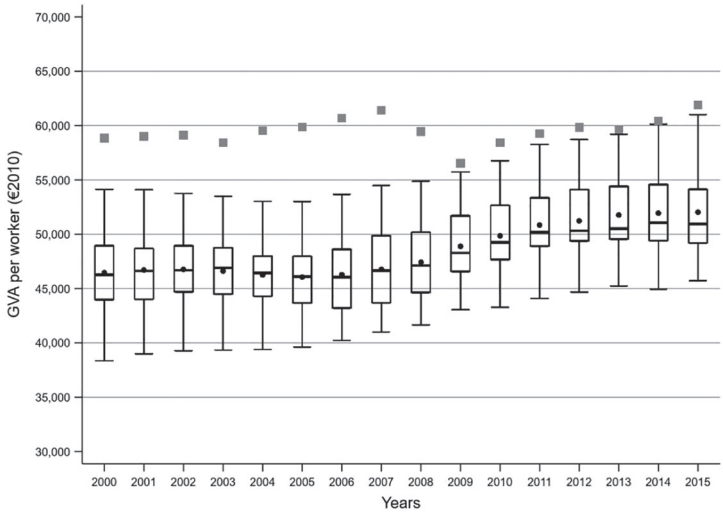
FIGURE 1 GVA per worker. EU-13 NUTS-2 regions

Figure 2 shows the evolution of the GVA per worker distribution in Spain using a box-plot graph. The rectangle represents the central part of the distribution, that is those regions between percentiles 25 and 75. The bigger the box, the bigger the dispersion in the central part of the distribution. It can be seen that the size of the box has decreased since 2007, and that the regions in the central part of the distribution are more concentrated around the average. At the same time, however, the richest regions in Spain are stretching the distribution and thus the mean has overtaken the median. The result of this is that more regions in Spain are now below the country's mean. Meanwhile, distances from the European average, represented by the grey square, have become shorter for the various parts of the distribution.

2.4 | Sigma and beta convergence

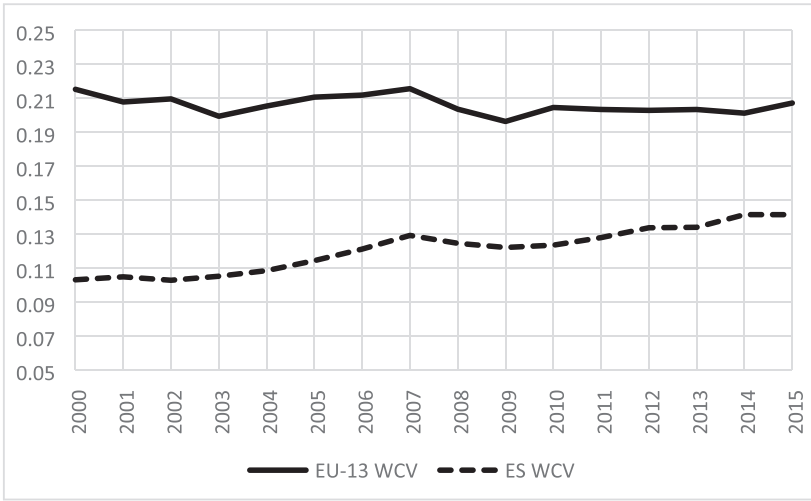
To complement the study of regional disparities in Spain compared with the EU-13 regions, we carried out a brief analysis using the traditional concepts of σ-convergence and β-convergence. Figure 3 presents one of the most widespread measures in economic growth studies, σ-convergence, to assess how inequalities among different regions evolved over the period 2000–2015. The indicator used is the coefficient of variation weighted by population (WCV), also known as the Williamson Index. We see that regional disparities among the 156 European regions are higher than among the 17 Spanish regions, but the temporal evolution is different. While the disparities between European regions remain stable throughout the period analysed, this is not the case among Spanish regions, where a small increase in dispersion is observed.

An alternative way of analysing regional convergence, complementary to σ-convergence, is β-convergence. There is β-convergence if regions with lower levels of labour productivity have a higher growth rate than those with higher levels. In other words, there will be a negative relationship between the income growth rate and the initial level of GVA per worker.[5] The two concepts of sigma and beta convergence are related. However, the existence of β-convergence is a necessary but insufficient condition for the existence of σ-convergence (Sala-i-Martin, 1994).



Note: The line within each rectangle is the median, the black circle is the Spanish average and the grey square is the EU-13 average.

FIGURE 2 GVA per worker. Spain NUTS-2 regions



Source: BD.EURS (NACE Rev. 2)

FIGURE 3 σ-convergence in GVA per worker

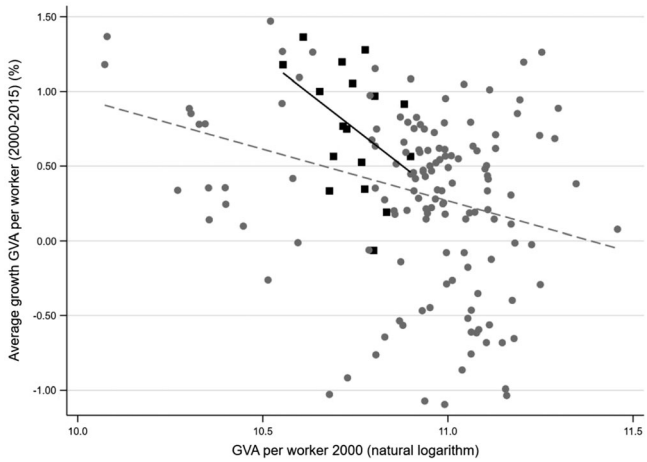


FIGURE 4 β-convergence in GVA per worker

The β-convergence is outlined in Figure 4. The dots represent the EU-13 regions and the squares the Spanish regions. We see that some of the poorest regions in 2000 tended to grow faster than the richest ones in the period 2000–2015, although some of the rich regions also had high rates of growth during that time.

To clarify whether the regions that initially had lower labour productivity values are those with higher growth rates, regression models relying on the neoclassical framework of economic growth have been estimated following Barro (1991) and Barro and Sala-i-Martin (1991). Conventional growth regressions assume that regional observations are independent, but there is a growing consensus that regional income growth rates exhibit spatial dependence (Ertur & Koch, 2007; LeSage & Fischer, 2008; Rey & Mountory, 1999).

Numerous studies such as Carrington (2003), López-Bazo et al. (2004), Ertur et al. (2005) and Le Gallo and Dall'erba (2008) analyse β-convergence in labour productivity between European regions taking into account spatial

interdependence. They argue that growth in a particular region depends not only on the characteristics of that region but also on those of the regions that make up the general area to which it belongs. Le Gallo and Dall'erba (2008) incorporate both spatial dependence and spatial differentiation between European regions and test the hypothesis of sectoral interdependence. They obtain that for the entire economy as well as for the energy, manufacturing and market services sectors, all regions converge to the same steady state. However, both central regions and peripheral regions converge to their own steady state in agriculture, construction and non-market services. Dall'erba (2005) estimates productivity convergence in NUTS-3 Spanish regions considering spatial dependence in a disaggregate analysis at a sectoral level, and his results show differences in the speed of convergence between sectors.[6]

Spatial heterogeneity in the convergence framework can be linked to the concept of convergence clubs, which are theoretically based on endogenous growth models with multiple stable equilibria or neoclassical models that allow heterogeneity (Islam, 2003). From an empirical point of view, convergence clubs can be viewed as groups of regions with homogeneous local parameters in the convergence model or as groups of regions that share a common growth path. The convergence club analysis requires the application of non-standard econometric techniques that allow the entire sample to be divided into smaller groups. For example, Andreano et al. (2017) use iterated spatially weighted regression (ISWR) to examine the convergence hypothesis in a cross-section analysis of 187 NUTS-2 regions in 12 European countries. They find that the inter-regional growth process in Europe shows the presence of convergence clubs. Specifically, they identify five clubs with different speeds of convergence. A more recent paper by Cartone et al. (2021) analyses the conditional β-convergence of 187 European NUTS-2 regions using a spatial quantile regression. Their results support the convergence hypothesis, but the magnitude of β varies across the quantiles, showing higher levels in the lower tail.

3 | RESULTS: SHIFT-SHARE ANALYSIS

In this section we aim to decompose the variation in labour productivity across Spanish regions following the shift-share methodology developed by Caselli and Tenreyro (2004). This should enable us to discover the extent to which Spanish regions have increased or decreased distances in relation to both the European average and a leading European region. It will also allow us to disentangle the roles attributable to the 'within-industry' effect (technological divergence from the reference region), the 'structural change' effect (divergence considering the industry mix of the reference region) and the 'between-industry' effect (divergence in terms of the pattern of specialization). The method involves measuring the differences in labour productivity (y) of each region i with regard to the reference region, R, between t and $t\text{-}1$:

$$\Delta\frac{y_{i,t}-y_{R,t}}{y_{R,t}}=\frac{y_{i,t}-y_{R,t}}{y_{R,t}}-\frac{y_{i,t-1}-y_{R,t-1}}{y_{R,t-1}} \tag{1}$$

Caselli and Tenreyro (2004) take a hypothetical 'average region' as a benchmark. In our analysis we take two reference regions. First, we compare the increase in labour productivity of the 17 NUTS-2 Spanish regions in relation to the EU-13 average. Second, to account for the rapid progress of a group of rich regions in Europe over the period analysed, we follow Enflo and Rosés (2015) and compare the transformation of the Spanish regions with Île de France, the second richest region in Europe behind London.[7]

The shift-share breakdown is synthesized in the following equation:

$$\Delta\frac{y_{i,t}-y_{R,t}}{y_{R,t}}=\sum_{j=1}^{J}\overline{s_{ij,t}}\Delta\left(\frac{y_{ij,t}-y_{Rj,t}}{y_{R,t}}\right)+\left[\sum_{j=1}^{J}\left(\frac{\overline{y_{ij,t}}}{y_{R,t}}\right)\Delta s_{ij,t}-\sum_{j=1}^{J}\left(\frac{\overline{y_{Rj,t}}}{y_{R,t}}\right)\Delta s_{Lj,t}\right]+\sum_{j=1}^{J}\left(\overline{s_{ij,t}}-\overline{s_{Rj,t}}\right)\Delta\frac{y_{Rj,t}}{y_{R,t}} \tag{2}$$

where j denotes the sector, i is a Spanish region (17 regions), R is the reference region (alternatively an artificial European average region or Île de France), $s_{ij,t}$ is the share of sector j in the total employment of region i, $\Delta x_{j,t}$ is the difference between t and $t\text{-}1$ $\left(\Delta x_{j,t} = x_{j,t} - x_{jt-1}\right)$ and $\overline{x_{ij,t}}$ is an average value $\left(\overline{x_{ij,t}} = \frac{x_{ij,t} + x_{ij,t-1}}{2}\right)$.[8]

The 'within-industry' component represents the labour productivity catch up or divergence of each sector j, along with its equivalent in the reference region. Each sector is weighted by the share of employment in sector j of each region i. The 'labour reallocation' term obtains the labour flows across sectors and thus convergence/divergence with respect to the production structure of the leading region. Finally, the 'between-industry' component represents the pattern of specialization. There is convergence when a region specializes in those sectors that are shown to be more productive in the leading region, whereas there is divergence when it specializes in those that are less productive in the leading region. A positive sign on the left-hand side of Equation 2 denotes convergence, a negative sign denotes divergence. The sign of each component on the right-hand side can also be interpreted as convergence or divergence in terms of the within-industry, labour reallocation or between-industry components, depending on whether their respective signs are positive or negative.

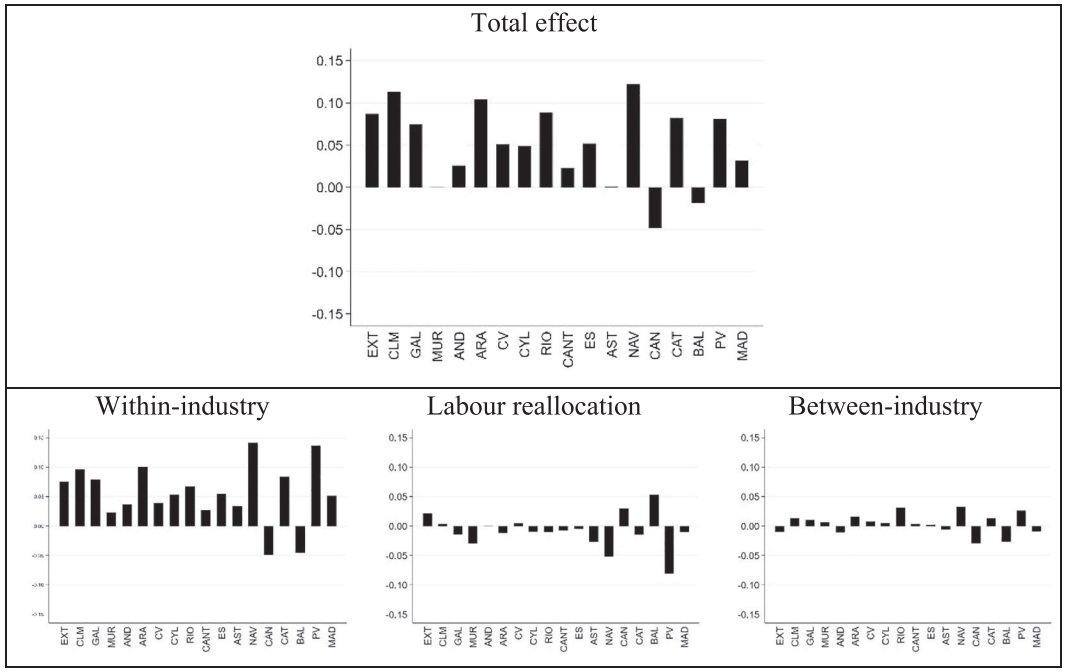
The study is carried out at a 10-sector level according to the NACE (Rev. 2) classification. We are particularly interested in extending the level of disaggregation to better observe the different impact of technological change on the different industries and regions. It has been shown that a higher level of disaggregation increases the usefulness of the shift-share (O'Leary & Webber, 2015). When the number of sectors considered is too small, the similarity of the industry mix across regions reduces the importance of the 'labour reallocation' and 'between-industry' components, which are those in the shift-share analysis most intrinsically associated with structural change. A higher level of disaggregation also allows us to delve deeper into the 'within-industry' component and identify whether it is those industries and services most directly associated with technological change, or those that are more knowledge intensive that are experiencing higher increases in productivity in the leading regions and thereby widening the gap between these regions and the others.

3.1 | Shift-share with regard to the EU-13 average region

Since the late 1950s, Spain has undergone a period of rapid convergence with Western European economies. This process sped up after Spain joined the European Union in 1986. As a result, Spanish relative per capita income in relation to the EU-13 reached its absolute maximum in 2009 (83% of EU average) and in 2015 it represented 75% of the EU-13 average. Over the same period, disparities across Spanish regions have consolidated the cluster pattern of rich and poor regions that first emerged in the 1960s (Martínez-Galarraga et al., 2015). Regions in the north-east of the peninsula (Madrid, Catalonia and the Basque Country) and on the coast presented higher per capita income levels than those located in the west and south of Spain.

The results of the shift-share analysis are summarized in Figure 5. In the period 2000–2015, the 17 Spanish regions on average converged by 5.19% with the EU-13 average in terms of labour productivity, with only three regions diverging (Murcia, Balearic Islands and Canary Islands). Convergence thus appears to be the norm when the benchmark is the 'average region', and is mainly driven by the 'within-industry' component (5.45%) and to a lesser extent by the 'between-industry' component (0.22%). We find that only the 'labour reallocation' component counterbalances the trend by reducing overall convergence by 0.50%. Hence the net effect of the two components most related to structural change (labour reallocation and between-industry) account for a negative balance of −0.28% divergence compared with the 5.19% points of convergence deriving from technological catch-up with the European average (within-industry effect).

These results are consistent with those from studies that highlight the dominance of the 'within-industry' component in explaining the persistence of productivity gaps across European regions, while confirming the negligible impact of the industry mix.[9] The relevance of the 'within-industry' component has been associated with intrinsic regional attributes that make some regions more productive than others. These involve uneven



Note: The shift-share components and labour productivity in 2000-2015 (normalized by the EU13 average). The regions are Extremadura (EXT), Castile-La Mancha (CLM), Galicia (GAL), Murcia (MUR), Andalusia (AND), Aragon (ARA), Valencian Community (CV), Castile-Leon (CYL), La Rioja (RIO), Cantabria (CANT), Asturias (AST), Navarra (NAV), Canary Islands (CAN), Catalonia (CAT), Balearic Islands (BAL), the Basque Country (PV), Madrid (MAD) and ES (Spain average region). Source: Own elaboration.

FIGURE 5 Shift-share analysis labour productivity 2000–2015

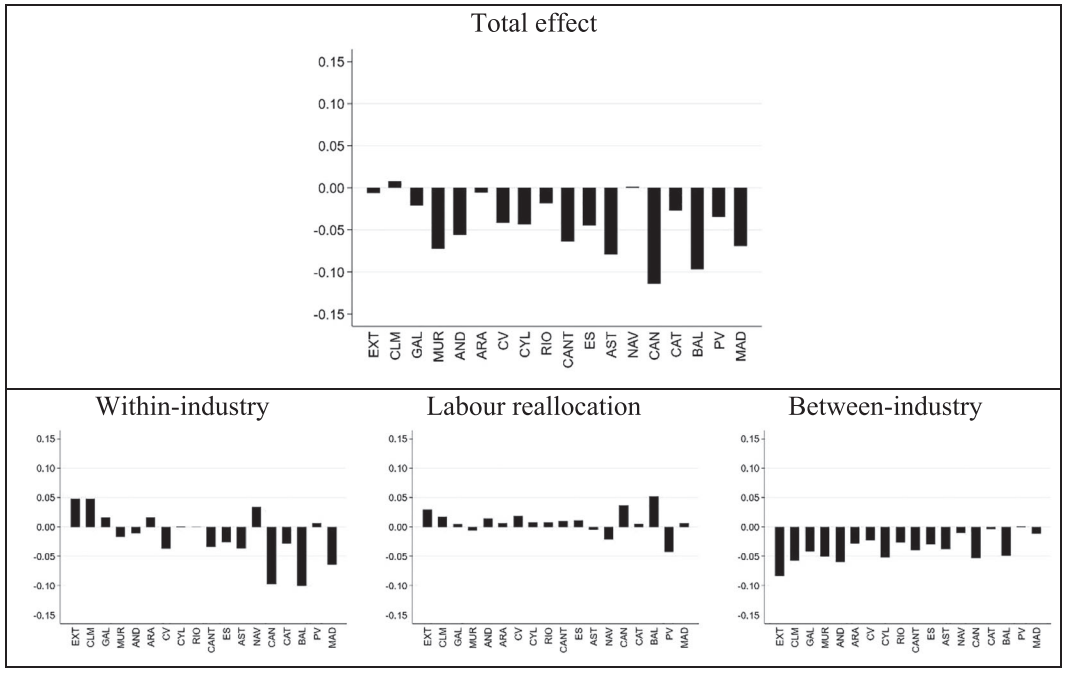
endowments of human capital, infrastructures and connectivity, investment in R&D and even institutions (Batóg & Batóg, 2007; Esteban, 2000; Ezcurra et al., 2005; Le Gallo et al., 2003; Le Gallo & Kamarianakis, 2011). If disparities in labour productivity are mainly associated with the within-industry component, it is likely that technological catch up will be the main force acting to bring the levels of productivity per worker of the Spanish regions closer to the European average. For several decades, the EU's deep concern regarding the high level of regional inequality has made the European Structural and Cohesion Funds the main instruments of its regional policy. Since 1989, Spain has benefitted enormously from successive aid programmes. These have contributed significantly to increasing income levels in Spanish regions and favouring convergence with the most advanced countries and regions in Europe (De la Fuente, 2003; Sosvilla-Rivero & Herce, 2009). Most of the resources allocated have been invested in correcting disparities in regional factor endowments: infrastructures, human capital, technological capital, connectivity and even institutional frameworks. All in all, these structural aid packages have had a positive impact on Spanish regions, although the relative returns of each kind of investment have been questioned (Rodríguez-Pose & Fratesi, 2004). European funds have boosted the Spanish regions' capitalization rates, but total factor productivity and labour productivity have not kept equal pace (Escribá-Pérez & Murgui-García, 2010), and the resources devoted to human capital and technological capital seem to have yielded better returns in terms of convergence with European regions than those invested in infrastructures (López-Bazo & Moreno, 2008; Pastor et al., 2010).

Nevertheless, beneath the overall convergence of the within-industry effect (see Table A.1.1 in Appendix 1) we find divergence in two branches of the service sector – trade services (WRTAF) and professional services (PROF) –

and in information and communications technology (ICT) services in nine Spanish regions. Similarly, there is divergence in terms of the 'between industry' effect in two branches, financial (FIN) and ICT services. Between-industry divergence means that the Spanish regions are less specialized than the average region in those branches in which labour productivity is growing by more than the average in that region. Some of these diverging activities can be considered ICT-intense because they are more likely to benefit greatly from the incorporation of ICT. The net divergence in productivity growth in these activities between the Spanish regions and the European average, along with the lower share of some of these services in Spanish regions compared with the reference region, proves that the Spanish regions' response to ICT has been lower than that observed in Europe, as other studies with national level data have previously revealed (Mas & Quesada, 2006; van Ark et al., 2009). All in all, the prominent net positive balance in favour of convergence deriving from the within-industry effect could be considered as being partially masked by the productivity divergence found within the most ICT-intensive services.

3.2 | Shift-share with Île de France

We now focus our attention on the pattern of divergence of the Spanish regions in relation to Île de France (Figure 6). In this case, the results are quite different to those observed in the comparison with the European average. There are two reasons for this. First, we see divergence rather than convergence, and second, a new shift-share component – the between-industry effect – comes to the fore in the explanation of divergence, slightly exceeding the within-industry effect. Average labour productivity in the 17 Spanish regions has diverged by 4.47% in relation to Île de France (FR10). The decomposition assigns −2.60% to the within-industry effect and −2.98% to the



Source: BD.EURS (NACE Rev. 2) and own elaboration.

FIGURE 6 Shift-share analysis labour productivity 2000–2015 Reference region: Île de France

'between-industry' component. Labour reallocation, on the other hand, accounts for 1.11% in favour of convergence.[10] In dynamic terms, the negative sign of the within-industry component denotes that in the period analysed, Île de France increased the technology gap separating it from the Spanish regions in most sectors (manufacturing, trade services, ICT services, finance, real estate and professional services). Table A.2.2 in the Appendix, details the magnitude of the 'within-industry' component by sector. As noted above, many of these activities are precisely those most sensitive to the implementation of ICT.

In our opinion, the predominance of a negative sign emerging jointly from the between-industry and within-industry effects reveals an interesting result that serves as evidence in favour of the idea put forward by Barrios and Strobl (2009) that Europe could be at the start of a new phase of regional disparities driven by the current wave of technological change. In this phase, those regions best endowed with knowledge-intensive skills and factors become centres of attraction for the most dynamic industries and services, thereby increasing the gap between them and the medium-sized and less-developed regions. When this happens, the structural change component recovers some of the importance it had in the past, at the beginning of the industrialisation process (Williamson, 1965). The case we are studying here enables us to confirm that the within-industry component is not a unique source of divergence (as it has been since the 1960s) but goes hand in hand with the between-industry component. The situation today is that, not only does Île de France present a greater increase in productivity than the Spanish regions because of its endowments of ICT-related skills and capital, it is also moving towards greater specialization in those activities in which productivity is increasing the most.

Despite the fact that the uneven impact of technological change across sectors is at the heart of the new pattern of regional disparities in Europe, and that the richest regions in Europe (such as Île de France) are better prepared to attract new technologies and become new engines of economic growth, it would be interesting to have a clearer breakdown of the composition of such activities and to judge whether the richest regions in Spain are ready to take on a leadership role within Spain, similar to that of Île de France in France or in Europe.

So far the level of disaggregation in our study has not enabled us to observe relevant changes within the manufacturing sector. To this end we have used additional data gathered from the national statistics offices of France and Spain to obtain a higher level of disaggregation within manufacturing. The INSEE (2010, France's statistics office) publishes yearly data at NUTS-2 level for five manufacturing activities, while the BD.MORES provides annual data for nine manufacturing activities in the Spanish regions.[11] After establishing correspondence between the two classifications, we have calculated a specialization or location index (LQ) for regions within the two countries, Spain and France.[12] We find that neither Île de France nor Madrid are specialized in high-tech manufacturing.[13] This allows us to discard the relevance of high-tech manufacturing in the pattern of specialization of the richest regions and focus our attention exclusively on the composition of the services sector. Now the specialization of a region *i* in a sector *j* is calculated taking as reference the total GVA of the EU-13 regions.[14] Thus the specialization index for the Spanish regions and Île de France are fully comparable. We have chosen the three branches of the services sector most closely associated with the implementation of new technologies – ICT services, financial services and professional services – and their LQ are presented in Table 5.

We see that Madrid, the Spanish region with the highest LQ values in the three types of services considered, presents lower figures than Île de France in 2000. In that year, the location indexes in Île de France are 1.83 for ICT services, 1.85 for professional services and 1.25 for financial services, while the corresponding figures for Madrid are 1.35, 0.88 and 0.88. In other words, Madrid is not specialized in professional services or financial services, the location quotients for which are below 1. However, the situation changed over the course of the following 15 years. In 2015, Île de France had increased its specialization in ICT services (2.05) and financial services (1.46) but decreased in professional services (1.65). Meanwhile, Madrid had increased its specialization in ICT services (2.37), overtaking Île de France, and professional services (1.27), but it continues to be non-specialized in financial services at a European level (0.92). Finally, none of the remaining top regions in Spain (Catalonia, the Basque Country and Navarra) reached an LQ index in 2000–2015 close to 1.

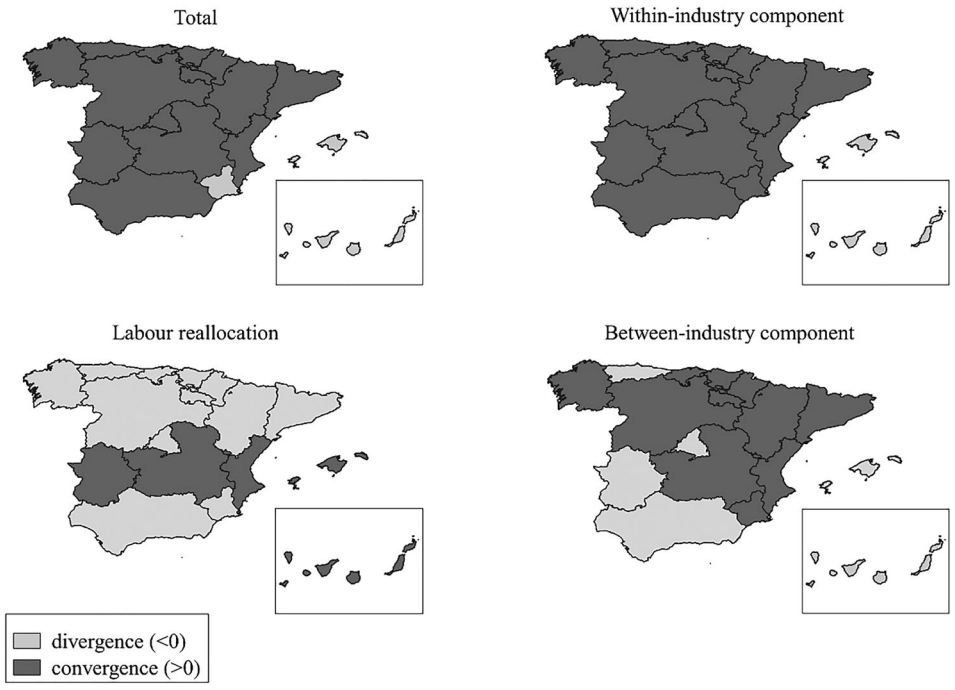
TABLE 5 Specialization indices for the Spanish regions and Île de France

	ICT services		Financial services		Professional services	
	*LQ*_2000	*LQ*_2015	*LQ*_2000	*LQ*_2015	*LQ*_2000	*LQ*_2015
Galicia	0.783	0.544	0.539	0.569	0.571	0.560
Asturias	0.793	0.656	0.512	0.574	0.627	0.572
Cantabria	0.746	0.558	0.514	0.560	0.688	0.520
The Basque Country	0.842	0.707	0.560	0.550	0.556	0.711
Navarra	0.866	0.468	0.501	0.496	0.494	0.534
La Rioja	0.640	0.425	0.615	0.593	0.570	0.437
Aragon	0.849	0.602	0.620	0.610	0.527	0.459
Madrid	1.350	2.372	0.881	0.919	0.883	1.270
Castile and Leon	0.715	0.439	0.541	0.635	0.592	0.479
Castile-la Mancha	0.656	0.433	0.579	0.573	0.473	0.352
Extremadura	0.595	0.418	0.640	0.619	0.477	0.395
Catalonia	1.037	0.890	0.607	0.629	0.707	0.813
Valencian C.	0.886	0.541	0.536	0.605	0.659	0.556
Balearic Islands	0.942	0.535	0.505	0.543	0.691	0.730
Andalusia	0.827	0.537	0.507	0.569	0.694	0.530
Murcia	0.769	0.427	0.505	0.543	0.624	0.470
Canary Islands	1.000	0.613	0.416	0.474	0.713	0.658
Île de France	1.834	2.047	1.251	1.458	1.849	1.646

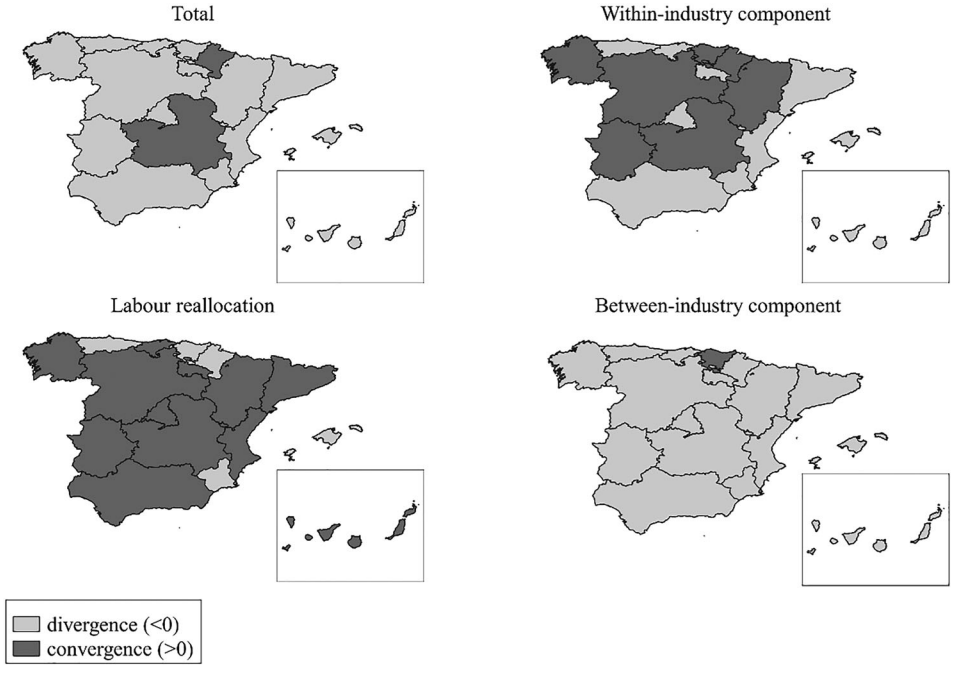
Source: BD.EURS (NACE Rev. 2) and own elaboration.

The comparison between the two leading regions, Madrid and Île de France (IDF), leads to some interesting conclusions. First, the specialization in modern activities in these regions is occurring mainly within the services sector, while we see no particular specialization in ICT manufacturing in these regions. Second, the leading region in Spain is lagging behind the levels of specialization in the leading region in Europe in some of the most advanced services. Third, the data indicate that Madrid is following the steps of the Île de France and becoming progressively specialized in some of the ICT-related services. As mentioned above, it has increased its specialization in ICT and professional services, overtaking Île de France in ICT services, but it is still non-specialized in financial services at a European level. Perhaps this pattern of specialization is foreshadowing the start of a pattern of regional disparities in Spain similar to that observed in Europe.

Finally, Maps 1 and 2 show the spatial distribution of the total 'shift-share' effect and its three components (within-industry, labour reallocation and between-industry) across Spanish regions, enabling us to identify specific patterns in connection with the regions' spatial locations. Map 1 represents the results in connection with the EU-13 average, while Map 2 shows those in connection with Île de France. The divergent regions are coloured light grey and the convergent regions dark grey. The positive sign (convergence) predominates on Map 1, where the territorial distribution of the positive sign is almost totally explained by the territorial distribution of the within-industry effect. Thus almost all regions in Spain are converging with the European average because they are all bringing productivity per worker within industries closer to the European average. Map 2 is dominated by labour productivity divergence in relation to Île de France, but in this case the total effect is dominated by the 'between-industry' component rather than the within-industry component. This means that Île de France is becoming more specialized in high-productivity services compared with the Spanish regions.



MAP 1 Shift-share analysis of labour productivity (2000–2015)Reference: EU-13 average region



MAP 2 Shift-share analysis labour productivity 2000–2015 Reference: Île de France (FR10)

4 | CONCLUSIONS

This paper presents quantitative evidence of a weak convergence of Spanish regions in relation to the EU-13 average from 2000 to 2015, and an increasing divergence with the wealthiest regions of Europe, with specific reference to Île de France. The dynamic shift-share analysis at a 10-industry level of disaggregation enabled us to discover the main drivers of these changes in the relative positions of the Spanish regions in the European context. In particular, we investigated in greater detail the effect attributable to the uneven territorial endowment of production factors and that attributable to differences in the sectoral composition of regional output to explain convergence or divergence across regions.

We find that the within-industry component is the main driver of convergence with the EU-13 average, confirming that Spanish regions are continuing along the path of convergence with European regions that they have been following since entry into the EEC in 1986, regardless of the 2008 financial crisis, the new scenario deriving from the uneven spread of ICT in Europe and globalization. On average, technological catch up within industries is the most prominent factor in favour of convergence. Nevertheless, the fact that productivity per worker in all Spanish regions is still below the European average suggests that public policies aimed at improving factor endowments such as human capital and R&D should not be abandoned because they still have the potential to aid convergence.

At the same time, however, Spanish regions have been affected by a new pattern of divergence that has been observed in the rest of Europe. According to this pattern, a small group of regions have increased the gap between themselves and the European average since 2000. Generally speaking, this divergence stems from their specialization in those services most closely associated with the incorporation of ICT. Thus the concentration of such services in the wealthiest regions, such as Île de France, is a growing source of regional disparities in Europe and a factor to consider in the design of regional policies.

These results paint a picture that has important implications not only for the future of regional imbalances within Spain and with regard to Europe, but also for the future development of countries such as Spain that have no regions in the upper levels of European productivity. The fact that a Member State is home to no region with a high potential to attract or develop new knowledge-intensive industries and services – which at the same time operate at a global level – could prevent it from keeping pace with its neighbours and maintaining its relative position in the ranking of EU countries. We find that in the period analysed, the most advanced regions in Spain (Madrid, the Basque Country, Catalonia and Navarra) have risen in the European ranking, but conversely, they have all found themselves at a greater distance from Île de France. Of these regions, only Madrid has achieved a certain level of specialization within Europe in two of the ICT-related services. If the agglomeration of these types of activity in a region can act as a driver of economic growth in neighbouring regions or even the whole national economy because of their forward or backward linkages, this should be taken into account when designing regional policies in Spain. Together with the cohesion policies mentioned earlier that are aimed at increasing productivity levels in low- and middle-income regions, other policies should be tailored to strengthen the potential of Spain's leading regions to attract modern industries and services.

The Seventh Cohesion Report (European Commission, 2017) highlighted key aspects that still need to be taken into account to reduce regional disparities. Apart from the need to continue the efforts made to invest in innovation and skills among other things, the report insists that priority must be given to less-developed regions. Thus a new regional eligibility map 2021–2027 is defined, in which more Spanish regions are considered to be less developed (Extremadura, Andalusia and Castile-La Mancha). However, the weak presence in Spain's leading regions of the most advanced industries and services, and the absence of these regions from the group of those with the highest productivity in Europe, is a central question to consider in the design of the future agenda for regional economic policy in Spain.

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ENDNOTES

[1] See Gómez-Tello et al. (2020) for a more detailed description of the construction of the data set. We have removed two countries from the EU-15 sample because of their small size (Ireland and Luxembourg). Moreover, Ireland has the lowest rate of corporation tax of the advanced countries, thereby becoming a centre of attraction for multinational companies. We consider that both these aspects could bias any comparison of productivity and income levels across European regions (OECD, 2016).

[2] We are aware of the limitation of considering manufacturing as only one sector but, unlike for services, the official statistics do not provide information disaggregated by manufacturing sector.

[3] It should be noted that we have calculated traditional inequality indexes that do not detect the presence of spatial autocorrelation. Thus the geographical characteristics of the regions are not considered when measuring regional inequality, a problem identified in the literature as the anonymity principle (Arbia, 2001). We would like to thank an anonymous referee for raising this point. There is a set of indicators that are geographically referenced, such as the decomposition of the Gini coefficient proposed by Rey and Smith (2013) and the Theil decomposition by Márquez et al. (2019). The latter authors outline the importance of local area characteristics in explaining the evolution of regional inequalities in Europe. They find that geographical components are responsible for 80.16% of income inequality for a sample of NUTS-3 European regions in 28 EU Member States for the period 2007–2014.

[4] Madrid is the richest region in per capita income and is found in the 65th percentile of the distribution of EU-13 regions in 2015.

[5] The concept of β-convergence (both absolute and conditional) has been strongly criticized from both theoretical and methodological standpoints. These criticisms include: (i) Galton's fallacy of regression towards the mean shown by β-convergence tests (Quah, 1993); (ii) problems of measurement and problems of heterogeneity and endogeneity (Durlauf & Quah, 1999); and (iii) problems caused by omitting the spatial dimension of regional data (LeSage & Fischer, 2008).

[6] β-convergence estimated on the aggregate for labour productivity for the period 1980–1996 is 2.7%, but whereas in agriculture the convergence speed is 1.7%, in the services sector it is faster (4.1%).

[7] We do not take London as a benchmark region because the depreciation of sterling against the euro since 2000 introduces a monetary bias in the shift-share analysis that distorts the results in real terms (Gómez-Tello et al., 2020). We have also made the comparison with the average for the top 5 income regions (Île de France, Stockholm, Bruxelles, Hovedstaden and Groningen) and the results are similar to those obtained for Île de France in sign, but lower in magnitude.

[8] The shift-share analysis has been reformulated in the literature to incorporate the spatial dimension in the study of productivity change, splitting the components of the shift-share at regional and neighbourhood levels (Constantino et al., 2020; Le Gallo & Kamarianakis, 2011).

[9] The determining role of the within-industry component to explain productivity disparities between EU regions has been highlighted by various authors (Esteban, 2000; Ezcurra et al., 2005; Le Gallo & Kamarianakis, 2011; Villaverde & Maza, 2008), while others have confirmed the insignificant role of labour reallocation (Cuadrado-Roura et al., 1999; Le Gallo & Dall'erba, 2008).

[10] When we take the average of the top 5 regions (Île-de-France, Stockholm, Bruxelles-Capital, Hovedstaden and Groningen) as reference, the Spanish regions diverge by 2.94%. The decomposition assigns −3.39% to the 'within-industry' effect, −0.86% to 'between-industry' and 1.31% to 'labour reallocation'. Thus the results do not change significantly with regard to those obtained for Île de France.

[11] The Spanish regional database BD.MORES (Base 2010), see De Bustos et al. (2008) is constructed by the Budget General Directorate of the Spanish Ministry of Finance and available at: https://www.sepg.pap.hacienda.gob.es/sitios/sepg/es-ES/Presupuestos/DocumentacionEstadisticas/Documentacion/paginas/basesdatosestudiosregionales.aspx

[12] The index is computed as follows: $LQ_{ij} = \frac{GVA_{ij}/GVA_i}{GVA_{rj}/GVA_r} = \frac{GVA_{ij}/\sum_{j=1}^{J} GVA_{ij}}{\sum_{i=1}^{N} GVA_{ij}/\sum_{i=1}^{J}\sum_{i=1}^{N} GVA_{ij}}$

where LQ_{ij} is the location quotient in industry j for region i, GVA_{ij} is the level of gross value added in industry j for region i, and GVA_i is the total gross value added for region i. The reference (r) is Spain or France when comparing the

composition of manufacturing because there is no detailed data on manufacturing for the whole set of EU-13 regions. Location quotients above 1 indicate the concentration of industry in that region. In this case, the coefficients obtained for France and Spain are not strictly comparable because they are constructed using different quotients.

[13] High-tech manufacturing includes the manufacture of computer, electronic and optical products, the manufacture of electrical material and equipment and the manufacture of machinery and equipment.

[14] Now the $LQ_{i,j}$ for services is computed taking as reference (r) the total EU-13. In this case, the $LQ_{i,j}$ for the various services are comparable between Île de France and Madrid because they refer to the same quotient.

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APPENDIX A

TABLE A.1.1 Shift-share components, 2000–2015. Reference: European average region

		WHITHIN INDUSTRY										
	TOTAL	AGR	EXT_ENE	MANUF	CON	WRTAF	IC	FIN	RESTATE	PROF	NMS	TOTAL
Galicia	**0.0748**	0.0149	0.0012	0.0057	0.0171	0.0006	−0.0026	0.0028	0.0224	−0.0104	0.0273	0.0790
Asturias	**0.0011**	−0.0036	−0.0034	−0.0112	0.0163	−0.0037	−0.0041	0.0000	0.0290	−0.0135	0.0282	0.0338
Cantabria	**0.0230**	−0.0047	−0.0154	0.0124	0.0223	−0.0324	0.0078	0.0001	0.0313	−0.0297	0.0351	0.0268
The Basque Country	**0.0815**	−0.0007	0.0116	0.0323	0.0215	−0.0032	−0.0023	0.0046	0.0635	0.0031	0.0060	0.1364
Navarra	**0.1223**	0.0117	0.0014	0.0507	0.0308	−0.0110	0.0027	0.0043	0.0370	−0.0012	0.0149	0.1414
La Rioja	**0.0885**	0.0104	0.0154	0.0325	0.0131	−0.0187	0.0035	0.0073	0.0023	−0.0116	0.0134	0.0676
Aragon	**0.1044**	0.0075	0.0032	0.0249	0.0268	−0.0053	0.0005	0.0030	0.0225	−0.0081	0.0255	0.1007
Madrid	**0.0317**	−0.0002	0.0106	0.0090	0.0048	−0.0136	0.0004	0.0028	−0.0035	0.0160	0.0251	0.0513
Castile and Leon	**0.0490**	−0.0032	−0.0028	0.0100	0.0178	−0.0067	−0.0017	0.0028	0.0245	−0.0242	0.0371	0.0537
Castile-la Mancha	**0.1135**	0.0221	0.0139	0.0032	0.0235	−0.0151	−0.0020	0.0009	0.0246	−0.0104	0.0353	0.0960
Extremadura	**0.0869**	0.0032	−0.0026	−0.0062	0.0148	−0.0121	0.0014	−0.0006	0.0370	−0.0095	0.0501	0.0753
Catalonia	**0.0825**	0.0015	0.0065	0.0373	0.0133	−0.0060	−0.0022	0.0066	0.0123	0.0013	0.0133	0.0839
Valencian Community	**0.0508**	0.0023	0.0141	0.0087	0.0273	−0.0324	−0.0024	0.0045	0.0079	−0.0192	0.0284	0.0390
Balearic Islands	**−0.0186**	−0.0025	0.0150	−0.0119	0.0089	−0.0564	−0.0039	0.0021	0.0065	−0.0161	0.0130	−0.0455
Andalusia	**0.0259**	0.0036	0.0073	−0.0009	0.0167	−0.0170	−0.0015	0.0017	0.0235	−0.0214	0.0252	0.0372
Murcia	**−0.0003**	−0.0210	0.0148	0.0023	0.0172	−0.0339	0.0004	0.0029	0.0259	−0.0212	0.0359	0.0232
Canary Islands	**−0.0485**	−0.0034	0.0109	−0.0074	0.0171	−0.0557	0.0089	0.0021	−0.0105	−0.0235	0.0124	−0.0490
SPAIN (average region)	**0.0519**	**0.0018**	**0.0075**	**0.0120**	**0.0162**	**−0.0164**	**−0.0011**	**0.0034**	**0.0151**	**−0.0073**	**0.0234**	**0.0545**

	LABOUR REALLOCATION	BETWEEN INDUSTRY										
		AGR	EXT_ENE	MANUF	CON	WRTAF	IC	FIN	RESTATE	PROF	NMS	TOTAL
Galicia	−0.0144	0.0039	0.0006	0.0027	−0.0020	−0.0001	−0.0068	−0.0015	0.0044	0.0072	0.0018	0.01026
Asturias	−0.0271	0.0005	−0.0064	−0.0020	−0.0019	−0.0003	−0.0049	−0.0015	0.0032	0.0062	0.0014	−0.0056
Cantabria	−0.0078	0.0016	0.0012	0.0018	−0.0026	−0.0002	−0.0075	−0.0016	0.0037	0.0061	0.0012	0.00397

TABLE A.1.1 (Continued)

	LABOUR REALLOCATION	BETWEEN INDUSTRY										
		AGR	EXT_ENE	MANUF	CON	WRTAF	IC	FIN	RESTATE	PROF	NMS	TOTAL
The Basque Country	−0.0812	−0.0011	0.0015	0.0202	0.0000	0.0000	−0.0037	−0.0014	0.0045	0.0049	0.0014	0.02626
Navarra	−0.0519	0.0014	0.0019	0.0254	−0.0011	0.0001	−0.0072	−0.0017	0.0048	0.0075	0.0017	0.03284
La Rioja	−0.0101	0.0052	0.0020	0.0206	−0.0015	0.0001	−0.0082	−0.0013	0.0024	0.0081	0.0036	0.03097
Aragon	−0.0120	0.0030	−0.0002	0.0101	−0.0011	0.0000	−0.0060	−0.0013	0.0028	0.0067	0.0018	0.01573
Madrid	−0.0103	−0.0024	0.0017	−0.0132	−0.0006	−0.0001	0.0107	0.0004	−0.0016	−0.0039	−0.0003	−0.0093
Castile and Leon	−0.0095	0.0048	−0.0013	−0.0004	−0.0019	0.0000	−0.0078	−0.0015	0.0053	0.0074	0.0004	0.00485
Castile-la Mancha	0.0040	0.0075	0.0001	0.0019	−0.0021	0.0000	−0.0087	−0.0015	0.0054	0.0096	0.0013	0.0135
Extremadura	0.0212	0.0081	−0.0003	−0.0175	−0.0027	0.0000	−0.0093	−0.0012	0.0060	0.0090	−0.0016	−0.0096
Catalonia	−0.0148	−0.0009	0.0009	0.0112	−0.0008	−0.0002	−0.0012	−0.0010	−0.0008	0.0022	0.0041	0.01344
Valencian Community	0.0045	0.0003	−0.0009	0.0071	−0.0018	−0.0003	−0.0060	−0.0014	0.0011	0.0060	0.0033	0.00733
Balearic Islands	0.0532	−0.0014	0.0001	−0.0222	−0.0039	−0.0008	−0.0057	−0.0016	0.0001	0.0056	0.0032	−0.0263
Andalusia	−0.0005	0.0046	0.0005	−0.0145	−0.0016	−0.0002	−0.0068	−0.0015	0.0026	0.0063	−0.0002	−0.0108
Murcia	−0.0295	0.0058	−0.0007	−0.0010	−0.0013	−0.0001	−0.0079	−0.0017	0.0040	0.0068	0.0023	0.00604
Canary Islands	0.0296	−0.0004	0.0004	−0.0244	−0.0023	−0.0007	−0.0067	−0.0020	0.0006	0.0055	0.0008	−0.0291
SPAIN (average region)	**−0.0050**	**0.0013**	**0.0004**	**−0.0013**	**−0.0014**	**−0.0002**	**−0.0027**	**−0.0011**	**0.0016**	**0.0040**	**0.0016**	**0.0022**

Source: own elaboration.

TABLE A.1.2 Shift-share components, 2000–2015. Reference: Île de France

		WHITHIN INDUSTRY										
	TOTAL	AGR	EXT_ENE	MANUF	CON	WRTAF	IC	FIN	RESTATE	PROF	NMS	TOTAL
Galicia	**−0.0208**	0.0312	−0.0025	−0.0153	0.0318	−0.0248	−0.0090	−0.0004	0.0058	−0.0140	0.0136	0.0162
Asturias	**−0.0790**	0.0078	−0.0074	−0.0276	0.0302	−0.0301	−0.0119	−0.0025	0.0081	−0.0170	0.0139	−0.0365
Cantabria	**−0.0638**	0.0107	−0.0137	−0.0136	0.0369	−0.0498	−0.0014	−0.0024	0.0094	−0.0289	0.0189	−0.0339
The Basque Country	**−0.0345**	0.0044	0.0054	−0.0122	0.0275	−0.0298	−0.0121	0.0003	0.0334	−0.0065	−0.0038	0.0067
Navarra	**0.0015**	0.0207	−0.0014	−0.0006	0.0386	−0.0318	−0.0053	0.0006	0.0166	−0.0075	0.0038	0.0337
La Rioja	**−0.0183**	0.0304	0.0091	−0.0094	0.0282	−0.0357	−0.0035	0.0023	−0.0109	−0.0145	0.0039	−0.0002
Aragon	**−0.0055**	0.0227	−0.0012	−0.0078	0.0364	−0.0287	−0.0078	−0.0007	0.0039	−0.0121	0.0117	0.0164
Madrid	**−0.0691**	0.0007	0.0051	−0.0075	0.0184	−0.0408	−0.0250	−0.0028	−0.0212	−0.0030	0.0115	−0.0644
Castile and Leon	**−0.0433**	0.0209	−0.0059	−0.0129	0.0327	−0.0285	−0.0075	−0.0007	0.0076	−0.0240	0.0189	0.0007
Castile-la Mancha	**0.0080**	0.0466	0.0072	−0.0178	0.0373	−0.0325	−0.0068	−0.0018	0.0087	−0.0122	0.0190	0.0476
Extremadura	**−0.0061**	0.0360	−0.0055	−0.0128	0.0332	−0.0297	−0.0038	−0.0029	0.0180	−0.0117	0.0274	0.0483
Catalonia	**−0.0271**	0.0065	0.0025	−0.0013	0.0259	−0.0348	−0.0143	0.0016	−0.0089	−0.0090	0.0037	−0.0280
Valencian Community	**−0.0414**	0.0107	0.0080	−0.0162	0.0386	−0.0525	−0.0097	0.0006	−0.0097	−0.0212	0.0144	−0.0370
Balearic Islands	**−0.0969**	0.0023	0.0083	−0.0147	0.0328	−0.0865	−0.0113	−0.0011	−0.0133	−0.0203	0.0038	−0.1000
Andalusia	**−0.0561**	0.0251	0.0030	−0.0121	0.0304	−0.0392	−0.0083	−0.0011	0.0030	−0.0224	0.0109	−0.0108
Murcia	**−0.0727**	0.0124	0.0082	−0.0167	0.0306	−0.0502	−0.0059	−0.0002	0.0074	−0.0216	0.0195	−0.0166
Canary Islands	**−0.1139**	0.0051	0.0057	−0.0112	0.0334	−0.0805	−0.0018	−0.0005	−0.0240	−0.0251	0.0013	−0.0977
SPAIN (average region)	**−0.0447**	**0.0138**	**0.0028**	**−0.0110**	**0.0294**	**−0.0406**	**−0.0122**	**−0.0006**	**−0.0037**	**−00141**	**0.0102**	**−0.0260**

	LABOUR REALLOCATION	BETWEEN INDUSTRY										
		AGR	EXT_ENE	MANUF	CON	WRTAF	IC	FIN	RESTATE	PROF	NMS	TOTAL
Galicia	0.0044	−0.0194	−0.0004	0.0199	−0.0156	0.0010	−0.0346	−0.0031	−0.0019	0.0094	0.0032	−0.0415
Asturias	−0.0052	−0.0091	−0.0054	0.0157	−0.0152	0.0020	−0.0319	−0.0031	−0.0017	0.0088	0.0026	−0.0373
Cantabria	0.0098	−0.0125	0.0001	0.0192	−0.0184	0.0013	−0.0355	−0.0032	−0.0018	0.0088	0.0025	−0.0397
The Basque Country	−0.0425	−0.0043	0.0002	0.0358	−0.0068	0.0006	−0.0301	−0.0030	−0.0019	0.0081	0.0027	0.0013

TABLE A.1.2 (Continued)

	LABOUR REALLOCATION	BETWEEN INDUSTRY										
		AGR	EXT_ENE	MANUF	CON	WRTAF	IC	FIN	RESTATE	PROF	NMS	TOTAL
Navarra	−0.0217	−0.0119	0.0006	0.0405	−0.0116	−0.0003	−0.0352	−0.0033	−0.0019	0.0095	0.0031	−0.0106
La Rioja	0.0080	−0.0232	0.0006	0.0361	−0.0137	−0.0005	−0.0365	−0.0029	−0.0015	0.0099	0.0055	−0.0262
Aragon	0.0063	−0.0167	−0.0010	0.0267	−0.0120	0.0004	−0.0334	−0.0030	−0.0016	0.0091	0.0032	−0.0283
Madrid	0.0067	−0.0003	0.0004	0.0055	−0.0096	0.0009	−0.0097	−0.0016	−0.0009	0.0033	0.0005	−0.0114
Castile and Leon	0.0079	−0.0219	−0.0018	0.0172	−0.0155	0.0005	−0.0360	−0.0031	−0.0020	0.0094	0.0013	−0.0520
Castile-la Mancha	0.0176	−0.0303	−0.0007	0.0192	−0.0162	0.0001	−0.0374	−0.0031	−0.0020	0.0106	0.0025	−0.0573
Extremadura	0.0293	−0.0320	−0.0010	0.0016	−0.0189	0.0006	−0.0382	−0.0029	−0.0021	0.0103	−0.0012	−0.0838
Catalonia	0.0048	−0.0048	−0.0002	0.0276	−0.0105	0.0015	−0.0266	−0.0027	−0.0010	0.0066	0.0062	−0.0038
Valencian Community	0.0185	−0.0083	−0.0014	0.0239	−0.0151	0.0020	−0.0335	−0.0030	−0.0013	0.0087	0.0052	−0.0229
Balearic Islands	0.0522	−0.0034	−0.0007	−0.0026	−0.0239	0.0053	−0.0330	−0.0032	−0.0012	0.0085	0.0050	−0.0491
Andalusia	0.0141	−0.0214	−0.0004	0.0044	−0.0138	0.0018	−0.0346	−0.0031	−0.0016	0.0088	0.0006	−0.0594
Murcia	−0.0062	−0.0251	−0.0013	0.0166	−0.0128	0.0011	−0.0362	−0.0033	−0.0018	0.0091	0.0038	−0.0499
Canary Islands	0.0363	−0.0064	−0.0005	−0.0046	−0.0170	0.0049	−0.0344	−0.0035	−0.0013	0.0084	0.0019	−0.0525
SPAIN (average region)	**0.0111**	**−0.0116**	**−0.0005**	**0.0163**	**−0.0130**	**0.0014**	**−0.0288**	**−0.0028**	**−0.0014**	**0.0076**	**0.0029**	**−0.0298**

Source: own elaboration.