

**ORIGINAL ARTICLE**

Transnational economic clusters: The case of the Iberian Peninsula

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Abstract

Spain and Portugal are two neighbouring countries, sharing regions with specific socio-economic challenges. These challenges arise now as promising sources of regional co-operation, namely in supporting the design of more tailored regional policies. In this context, the main aim of this paper is to discuss how neighbouring spaces within the Iberian Peninsula can be identified as sources for positive economic effects on the surrounding area. For this purpose, we will use Eurostat regional data, taking advantage of spatial autocorrelation analysis. Based on the developments related to Verdoorn's law, we explored the spatial approach for studying the latent correlations between the Iberian regions, in terms of local production. The results show that there are several Iberian contexts of economic success that can be considered as benchmarks for other regions. We also posit that policies' frameworks between neighbouring regions should be enhanced. These findings are relevant outputs to be considered by public institutions in the design of regional policies that promote more regional co-operation and support spreading effects from poles of development to neighbouring regions (reduction asymmetries).

**KEYWORDS**

panel data, polarization processes, policies design and implementation, scale economies

JEL CLASSIFICATION

C23; E12; R11; R12

1 | INTRODUCTION

The regional development analysis is a complex process, as it involves several dimensions and different approaches, mainly on the dynamics of each region and on each group of regions. Earlier theoretical approaches defended persistent processes of regional divergence (Thirlwall, 2019) while others considered that there might be a tendency for the regional convergence between close or neighbouring spaces (Barro & Furman, 2018).

The rationale for the divergence theories is based on the assumption that economically advanced regions tend to increase their performance through cumulative processes (Hirschman, 1958; Myrdal, 1957). In general, these regions have higher output and this induces higher productivity. Consequently, there are reductions in domestic prices, with improvements in competitiveness. These contexts lead to increases in demand and supply. In this stage, the processes are self-reinforced (Thirlwall, 2019). In practice there is evidence of regional asymmetries within the European Union regions, because they are structurally different and exposed to diverse impacts (Banco de Portugal, 2009). In general, for the divergence theory, the regional public policies are needed so as to reduce asymmetries and to support the regions with less competitive advantages.

From the insights related to convergence theory, the main focus is that the regions have a tendency to converge socio-economically for a same steady state unconditionally (namely when all regions converge for a same point independently of their specific characteristics) or conditionally (when only the regions with similar characteristics converge for a same steady state, within a framework where there are clubs of convergence) (Barro & Furman, 2018). The idea of "clubs of convergence" was previously explored for the European Union countries and regions (Pelle, London, & Kuruczleki, 2019), as well as, the influence of specific regional characteristics (Pietrzykowski, 2019). Specifically for the Iberian regions, the idea of regional convergence was, also explored considering, for example, the usual concepts for these approaches, such as the notions of sigma and beta convergence (Lopes & Araújo, 2016).

In general, the socio-economic evolution of the Portuguese and Spanish contexts motivated several researches and debates. Some studies accentuate, for example, housing prices (Lourenço & Rodrigues, 2014), while others the 2008 crisis (Puig & Sánchez, 2018). However, a debate has recently emerged bearing serious implications for the design of European regional policy, especially cross-border regional policy (i.e., involving investment or employment promotion programmes in neighbouring regions but in different countries, such as, for example, Trás-os-Montes, in Portugal, and Castilla-Leon, in Spain). In reality, this debate divides opinions. On the one hand, as a result of globalization movements, there are those who argue that such cross-border policies are ineffective, as the regional economic dynamics are mainly dependent on the economic dynamics of each country. However, in the same debate, the voices of those who defend the existence of positive covalent effects, that is, of spill-over, arise through which effects of regional economic growth (or regional unemployment problems) are shared.

In this framework, the main objective of this study is to contribute to this debate and to explore the regional economic performance in the Iberian contexts, considering the always controversial debate concerning regional convergence/divergence, and to identify insights that support the design of more appropriate public regional policies. For this reason, the Keynesian theory of regional divergence, namely the developments related with Verdoorn's law (Verdoorn, 1949) (where the productivity growth is endogenous and dependent on the output



growth) (Thirlwall, 2019), and the spatial econometric approaches were considered. For spatial analysis, the proposed procedures intended to perceive the spatial autocorrelation observed in each Iberian production, which enabled us to test the existence of positive influences from neighbouring areas, even if they are from different countries. The developments from the Keynesian theory—besides the vast debate in the macroeconomics field—allow us to identify sectors and regions with competitive advantages and disadvantages and the consequent needs for public intervention to promote a balanced regional development. The spatial analysis supports the identification of Iberian regions having similar patterns and similar needs for public intervention. To avoid spurious correlation, this analysis considered Kaldor's version of Verdoorn's law (the employment growth is endogenous and dependent on the output growth; Thirlwall, 2019).

To simplify understanding, the several methodologies adopted will be explained further in the respective sections where they were implemented.

After this introduction, the remaining parts of this study include the literature review (Section 2), data analysis (Section 3), spatial autocorrelation analysis (Section 4), estimation results and the main insights and outcomes obtained (Section 5). Section 6 provides a conclusion.

2 | LITERATURE REVIEW

The financial support from the structural funds received by Portugal from the European Union since its adhesion in 1986 was intended to promote structural convergence to the European standard level until the financial/economic crisis of around 2008. In addition, this convergence process in the cohesion-support countries was different if verified in other European countries (Ramajo, Marquez, Hewings, & Salinas, 2008).

Furthermore, there is relevant evidence of divergence across the Portuguese regions (Badoiu, 2017). Similar insights were found, for example, by Martinho (2015, 2016, 2019). The labour costs' growth in Portugal and Spain since 1999 may be excessive and may endanger the European convergence process (Dullien & Fritsche, 2009). The performance of the European banking sector is another serious problem for economic growth in the European Union (Lazarides & Drimpetas, 2016). In addition, the regional divergence in Portugal and Spain has been found to be pro-cyclical; this regional divergence has also been found as being responsible for generating vulnerable regions in these countries (Rodriguez-Pose & Fratesi, 2007).

In any case, the admission of Portugal and Spain to the European Union brought about interesting outcomes for the lowering of the border's barriers between these two countries (Barrios & de Lucio, 2003). However, there are specific cases such as that of the Spanish–Portuguese border of Castilla y Leon where the European integration promoted asymmetries in the quality of life and in the traditional economic sectors. In turn, this integration promoted tourism and the preservation of the heritage (Jimenez & Minguez, 2017).

Other important questions for these regional development processes are the real and current differences in the economic structure among the European regions and countries (Damianakos, 1997), as well as, in the social dimensions (Fernandez-Carro & Vlachantoni, 2019) and in the several policy instruments (La Spina, 2017). The perspective for the future will be a continuous trend for regional divergence in Europe between the Eastern, Southern (Portugal, Spain and Italy) and other countries (Fiaschi, Gianmoena, & Parenti, 2018).

Nonetheless, there is no unanimity among the researchers concerning the European countries that belong to different groups (Eastern, Southern, etc.) of analysis (Pascariu & Frunza, 2011) and about the samples considered to address these issues within the European framework (Deleidi, Meloni, & Stirati, 2019; Guisan & Exposito, 2017). The same occurs regarding the role of the several sectors in regional development (Rubalcaba & Gago, 2001).

A search in the Web of Science All Databases (Web of Science, 2019) and Scopus (Scopus, 2019) databases reveals that the Kaldor law is considered in several regional analysis, however a limited number of references were found for Portugal and Spain. Around the world, the Kaldor developments have been considered, for instance, for



the Sub-Saharan African countries (Ssozi & Bbaale, 2019), Italy (Davanzati, Patalano, & Traficante, 2019), Mexico (Reyes, 2019), Portugal (Martinho, 2019), Asian and Latin American countries (Di Meglio, Gallego, Maroto, & Savona, 2018), Saudi Arabia (Almosabbeh & Almoree, 2018), Brazil (Nassif, Feijo, & Araujo, 2018) and China (McCombie, Spreafico, & Xu, 2018).

Finally, it should be highlighted that the regional development of Portugal and Spain has deserved diverse readings, especially over the past few decades (Pintado & Barrenechea, 1974; Puig & Sánchez, 2018). In general, there is a perception of a development that is characterized by the following dimensions: uneven growth in the various indicators observed for the various regions; very centralized growth in certain centres/metropolitan areas; and upward trend in the density of economic agents and associated flows, such as income and added value flows in these centres.

However, if the various studies on the realities within each border are detailed, works that analyse the Iberian Peninsula as a whole are scarce, observing the dynamics of proximity between regions, regardless of whether they are Portuguese or Spanish regions (Pintado & Barrenechea, 1974).

Indeed, the movements of opening up to the outside felt in the Portuguese and Spanish economies, especially since 1986 (simultaneous entry into the European community) have made both countries become vital reciprocal partners, with Spain, for example, being the main trading partner of Portugal. Likewise, Portuguese and Spanish regions have reduced the weight of administrative and economic borders between one another.

To better explore the potential border effects between Portugal and Spain, as referred to before, this work will also test the effect of spatial autocorrelation in the Iberian Peninsula considering two structural indicators—gross value added and employment. These variables were analysed considering the developments from the Keynesian theory. For example, to capture scale economies and learning by-doing effects the output growth is considered for the whole region and not *per capita*. We will especially observe the period after 2000, which coincides with the reinforcement of the bilateral trade between the two Iberian states also conditioned by the Euro as becoming the common currency.

Considering the literature review, two clear questions arise with current pertinence:

1. Are the Portuguese and Spanish public regional policies adjusted for the Iberian real context?
2. What could be the main proposals for an Iberian strategic framework to improve regional development?

The literature review highlights that there are not many studies covering the Iberian context in a socio-economic perspective and less so considering the approaches presented here. In fact, a brief search in the Web of Science and Scopus platforms, for the keywords “Spanish,” “Portuguese,” “Regions” shows that, in general, the studies address, namely, the aspects related with the following domains: history; identity; diversity; territory; border; integration; European Union; contexts; water; agriculture; research activities; medicine aspects; opportunities from Latin America; role of women in regional development; dynamics in the Iberian context; and implications from language differences. This bibliometric analysis was supported by the VOSviewer (2019) software. The context is even more dramatic if the expression “spatial autocorrelation” is included in this search. It seems that there are some gaps in the literature that this study intends to address.

3 | DATA ANALYSIS

The data analysis was performed considering the statistical information available in Eurostat (2019) supported with the QGIS (2019) software. Statistical information for the Spanish and Portuguese NUTS 3 regions and for the output (gross valued added, deflated with the Harmonized Index of Consumer Prices, 2015 = 100, obtained from the Eurostat) and employment from the several economic sectors, across the period 2000–2016 were all considered.

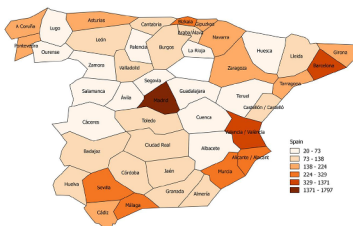


3.1 | Spanish context

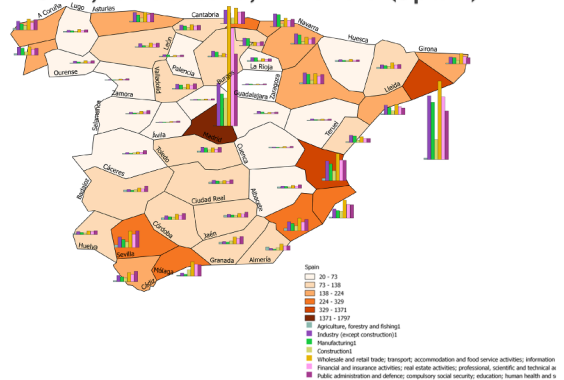
Figure 1, obtained with the QGIS software for the gross value added (GVA) in levels and in growth rates, shows the trend for the polarization processes, in the regional contexts, explained by researchers such as Thirlwall (2019) from the Keynesian theory. In fact, as described above, the polarization processes are phenomena in the regional growth contexts, where there is a tendency for regional divergence with the economic activities being concentrated in few poles of development (Hirschman, 1958; Myrdal, 1957; Thirlwall, 2019). These processes for the Keynesian theory are self-reinforced and are promoted by the output growth that promotes productivity growth. In these contexts, the output and employment growth have special importance.

In fact, the gross value added in levels for the total economy presents higher values in two main poles (Madrid and Barcelona). The disaggregated statistical information for each one of the economic sectors confirms the polarization processes described above and shows the relevance for the economy of sectors such as services (wholesale and retail trade; transport; accommodation and food service activities; information and communication), financial sector (financial and insurance activities; real estate activities; professional, scientific and technical activities; administrative and support service activities) and public sector (Public administration and defence; compulsory social security; education; human health and social work activities; arts, entertainment and recreation, repair of household goods and other services). Industry also has its importance, but, in general, not as high as the activities from the tertiary sectors. Compared to other sectors, industry has a higher relative importance in regions such as, for example,

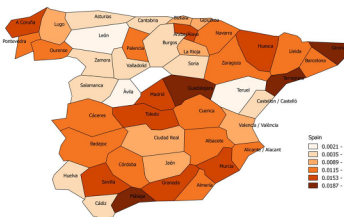
GVA, total sectors, in levels (Spain)



GVA, all sectors, in levels (Spain)



GVA, total sectors, growth rates (Spain)



GVA, all sectors, growth rates (Spain)

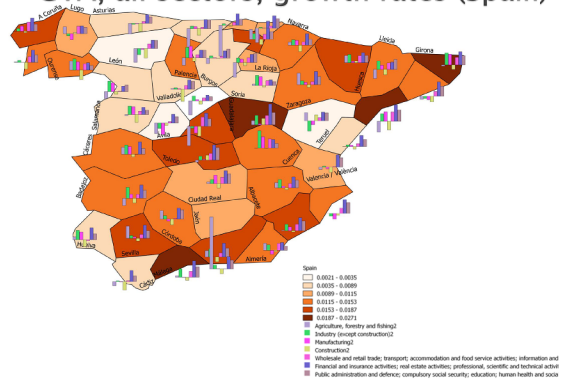


FIGURE 1 Spanish gross value added (at basic prices, million euro, deflated - 2015 = 100) for the NUTS 3 and economic sectors, on average for the period 2000–2016



Araba/Álava, Burgos, Gipuzkoa, Navarra, Guadalajara, Palencia, Castellón/Castelló and La Rioja (in general, regions from the north of Spain). Agriculture (agriculture, forestry and fishing) assumes special importance (higher values), namely, in the southern regions (for example, Almería, Sevilla and Murcia). On the other hand, agriculture has a higher relative relevance (compared to other economic sectors) in regions such as, for example, Cuenca, Huesca and Lugo (regions with lower economic dynamics).

The data on gross value added in growth rates, for the total sectors (whole economy) show that there are spread effects from the two great regional poles (Madrid and Barcelona) to the neighbouring regions. In fact, the regions around Madrid (Guadalajara, for example) and Barcelona (Girona and Tarragona, for instance) present high growth rates in output. It should also be noted that there are great growth rates for the GVA in Málaga, A Coruña and their surrounding areas. The data, for the GVA in growth rates, disaggregated for each one of the economic sectors reveals that the higher values appear, respectively, in the following regions: Jaén, Sevilla, Zaragoza, Araba/Álava, Ourense and Córdoba, for example, for agriculture; Cuenca, Girona, Ourense and Badajoz for industry; Tarragona, A Coruña, Madrid, Guadalajara, Cuenca and Girona for services; Guadalajara, Araba/Álava, Tarragona, Málaga, Toledo and Barcelona for the financial sector; and Toledo, Guadalajara, Tarragona, Alicante/Alacant and Málaga, for instance, for the public sector. It should be highlighted that in the regions with higher GVA growth rates, for the whole economy, are the activities from the tertiary sector that have greater performance. Indeed, the financial sector (around 4.4%, on average), the public sector and services (together with manufacturing) are the activities with higher GVA growth rates in Tarragona. They are the financial sector (around 3.5%) and industry in Girona; the financial

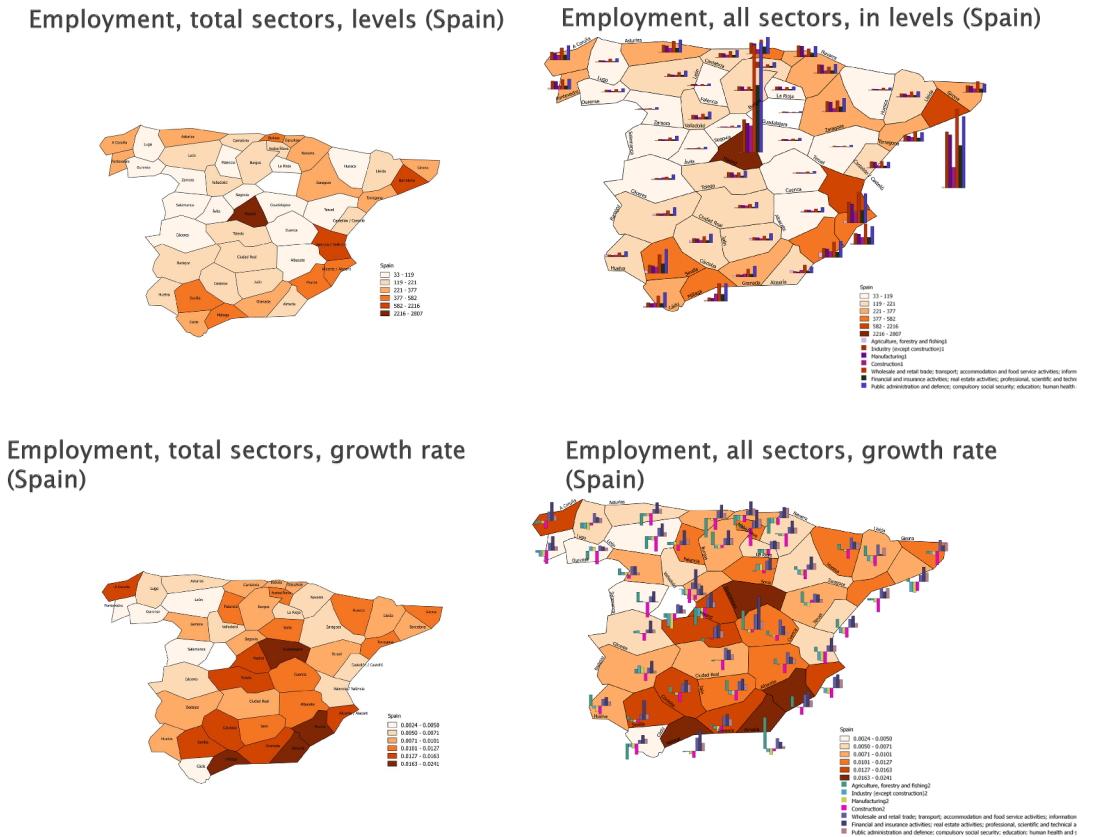


FIGURE 2 Spanish employment (thousand persons) for the NUTS 3 and economic sectors, on average for the period 2000–2016



sector (5.5%) and the public sector in Guadalajara; the financial sector (4.3%), public sector and industry in Málaga; and the financial sector (3.5%), services and public sector in A Coruña.

In general, the data presented in Figure 2 for employment follows, in general, the trends described for the gross value added. However, the cases of Almería and Murcia which show higher growth rates for employment, contributed by, namely, the agricultural sector.

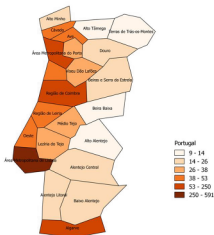
3.2 | Portuguese framework

As described above for the Spanish context, Figures 3 and 4 confirm, for the Portuguese framework, the existence of two regional poles, one around Lisbon and another around Oporto. It is also worth noting the agglomeration of the economic activity in the littoral region of the country and the absence of economic dynamics in the interior along the border with Spain.

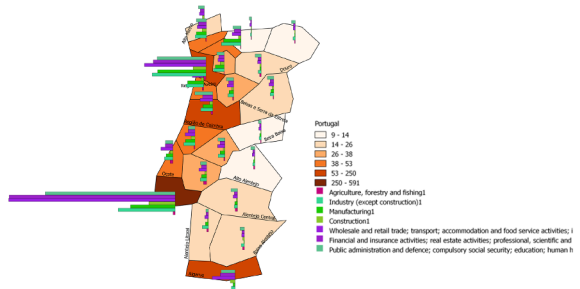
In Lisbon, the economic activity is more concentrated in the tertiary sector and in Oporto the distribution across the several economic sectors (exception for the agriculture) is more balanced.

Moreover, the values for the gross value added and employment growth rates show that there are relevant improvements in the socio-economic performance, namely in the interior north and in the south (Alentejo regions), typical regions with lower economic dynamics.

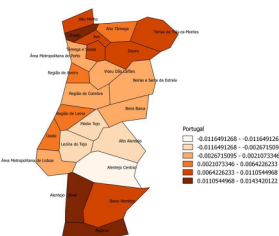
GVA, total sectors, in levels (Portugal)



GVA, all sectors, in levels (Portugal)



GVA, total sectors, growth rates (Portugal)



GVA, all sectors, growth rates (Portugal)

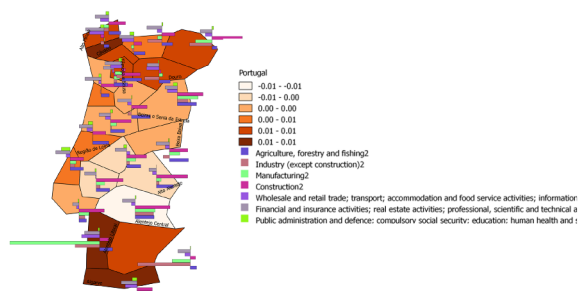
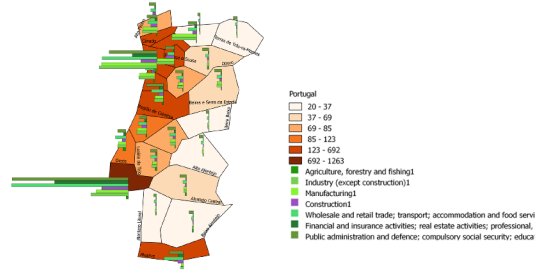
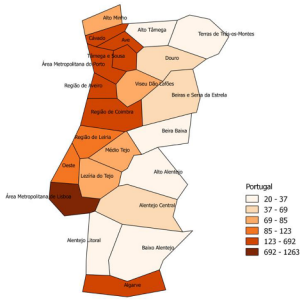


FIGURE 3 Portuguese gross value added (at basic prices, million euro, deflated - 2015 = 100) for the NUTS 3 and economic sectors, on average for the period 2000–2016



Employment, total sectors, levels (Portugal)

Employment, all sectors, in levels (Portugal)



Employment, total sectors, growth rate (Portugal)

Employment, all sectors, growth rate (Portugal)

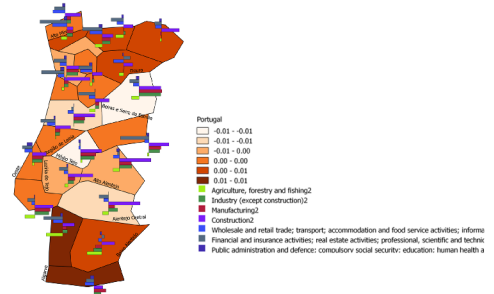
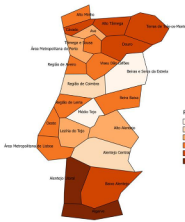


FIGURE 4 Portuguese employment (thousand persons) for the NUTS 3 and economic sectors, on average for the period 2000–2016

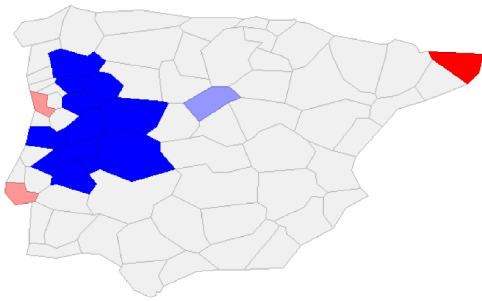
The greater economic dynamics in the region of Alentejo Litoral is due to the growth of GVA in the manufacturing sector (around 16%, on average); in the Baixo Alentejo it is due to the industry growth (around 10%, on average); in the Douro it is due to industry, services and financial sector (all around 2% of growth rates); and in Terras de Trás-os-Montes, primarily, due to industry growth (around 4%, on average). Concerning employment, the higher growth rates in the Alentejo Litoral come from the financial sector and agriculture (around 4%, on average); in Baixo Alentejo from agriculture (around 3%); Douro from services (2%); and Terras de Trás-os-Montes from the financial sector (around 1.5%, on average).

4 | SPATIAL ANALYSIS

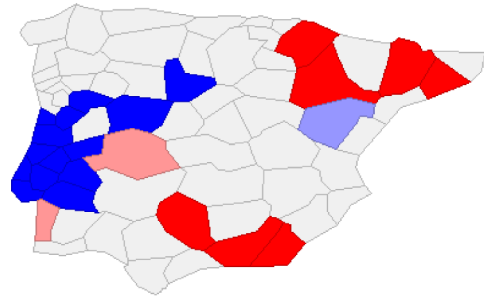
The results presented in Figure 5, for the GVA of the several economic sectors (in levels and growth rates) were obtained following the GeoDa (2019) procedures and considering the work of Anselin (1995) and Anselin, Syabri, and Kho (2006).

The local Moran index (IM) provides a measure of spatial autocorrelation intensity for the observed variable to determine if the studied pattern was grouped, dispersed or if it was completely random in terms of spatial location.

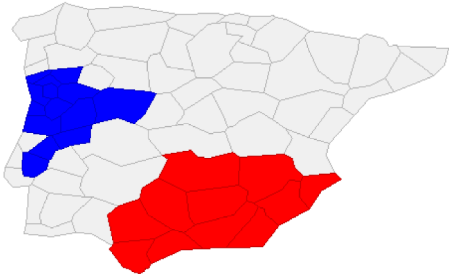
This index varies between the values of -1 and 1, where the closer the absolute value is to 1, the higher the level of spatial autocorrelation is. The sign is determined by the spatial distribution of the data, that is, $IM > 0$ represents an aggregation of data points, while $IM < 0$ means dispersion. In addition, the Moran index needs a contiguity criterion between territorial entities.



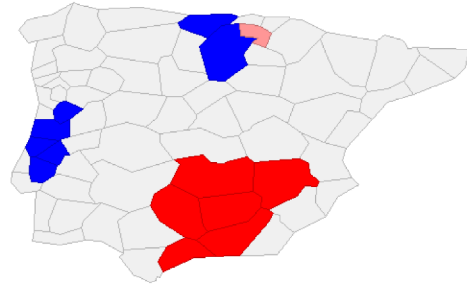
Total sectors, levels, GVA



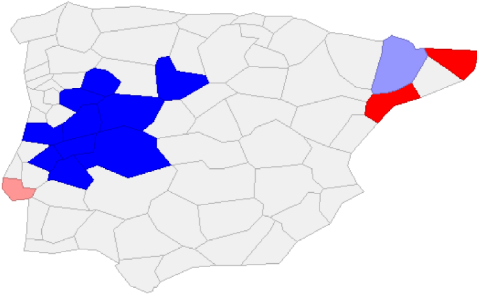
Total sectors, rates, GVA



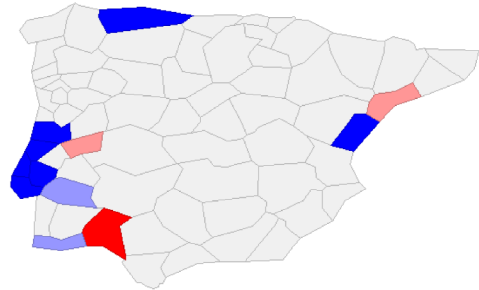
Agriculture, levels, GVA



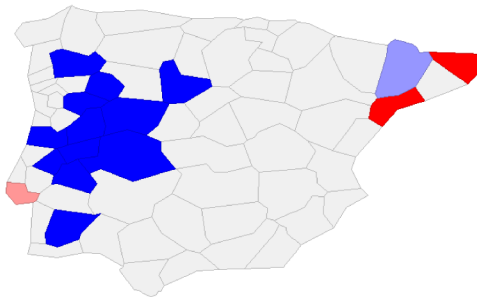
Agriculture, rates, GVA



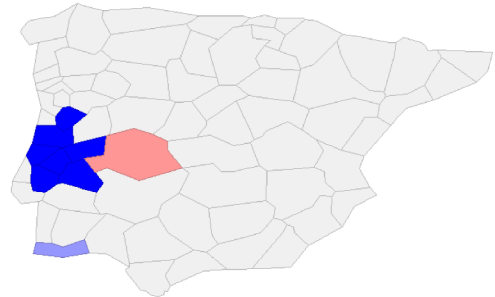
Industry, levels, GVA



Industry, rates, GVA



Manufacturing, levels, GVA



Manufacturing, rates, GVA

FIGURE 5 Iberian spatial analysis for the gross value added (NUTS 3 and economic sectors)



The local IM is defined as follows:

$$I_i = \frac{z_i}{\sum_i z_i^2 / N} \sum_{j \in Z_i} w_{ij} z_j, i \neq j,$$

where z_i corresponds to the value of region i of the normalized variable, Z_i to the set of neighbouring regions of i , w_{ij} to the weight of the matrix W for all $i \neq j$, and the term $w_{ij} z_j$ to the spatial lag of Z . Furthermore, the index is represented graphically with a Moran scatter diagram.

The derived popular diagram—the Moran scatterplot—shows the relationship between a specific variable and its spatial lag and classifies this statistically significant relationship into one of four possible quadrants.

These results, considering the local Moran's I statistics (Moran, 1950), are relative to the positive spatial autocorrelation (when the values of one variable associated with one region are influenced by similar values from the neighbouring regions) for high values of the variables (high-high) and low values (low-low). They are also relative to the negative (when the values of one variable associated with one region are influenced by different values from the neighbouring regions) spatial autocorrelation (high-low and low-high). These latter cases are especially relevant as they can be associated to “islands,” that is, territories characterized by high values observed in one variable surrounded by spaces with low values in the same variable (the case of high-low).

In general, for the Iberian regions, there is, mainly, positive spatial autocorrelation for low values (low-low) between the Portuguese regions located on the border with Spain (namely, from the north and centre of Portugal) and the neighbouring Spanish regions. It seems that the economic problems in these Iberian regions are similar. These claims for an Iberian strategy to improve the socio-economic development of these areas, namely due to economic activities are spatially autocorrelated. In turn, maybe the border effects here have their importance.

5 | REGRESSIONS RESULTS

The outcomes presented in the following Tables 1 and 2 were obtained following the Stata (2019a) procedures namely those available in Stata (2019b) and based on the Kaldor model (Kaldor, 1966, 1967, 1968), where the employment growth depends on the output growth. These models capture scale economies (economic dynamics and learning by doing effects) that are greater when coefficient of regression, of this model, is closer to zero (Thirlwall, 2019). It may be interesting to take into account time effects in the considered models and this could be done with the inclusion of dummies, however we suggest considering this approach in future studies in order to deal with multicollinearity problems.

Following Mourao and Vilela (2018), we could suggest another class of models such as those proposed by Haining's work (1987a), as stressed, for instance, by Griffith et al. (2013), as it was one of the first studies to analyse income flows between contiguous areas. Haining's (1987a) model was inspired by Beckmann (1971), but in another study, Haining (1987b) also referred to Keynesian developments.

The results shown in Table 1 (for the Spanish context) reveal that the scale economies are greater in industry and manufacturing (coefficients of 0.278 and 0.272, respectively), as expected, considering the developments from the economic theory, where industry, namely manufacturing, is described as the economic engine. This means that in the Spanish regions where industry has a great weight, polarization processes are expected around these regions. In these cases, it is important to design public policies to support spreading effects for the neighbouring regions. The values of the coefficient for the agricultural sector are less expected, due to large scale economies in agriculture which are not anticipated according to Keynesian theory. For the Keynesian theory, constant returns of scale are expected from the agricultural sector. The coefficients obtained for the construction and tertiary sectors are expected (the financial sector is that with lower scale economies), because these sectors do not traditionally produce tradable goods. The spatial effects from the lagged independent variable (with the contiguity matrix) are, in general,



TABLE 1 Panel data estimation results based on the Kaldor model for the economic sectors, over the period 2000–2016 and across the Spanish NUTS 3

Countries Model	Total sectors		Agriculture		Industry		Manufacturing	
	Fixed effects	Random effects	Fixed effects	Random effects	Fixed effects	Random effects	Fixed effects	Random effects
Constant		–0.000 (–0.350)		0.001 (0.620)		–0.006* (–4.840)		–0.006* (–4.440)
Output growth	0.708* (21.850)	0.702* (23.360)	0.318* (10.760)	0.321* (11.270)	0.262* (11.080)	0.278* (11.940)	0.255* (11.360)	0.272* (12.110)
Lagged independent variable (Output growth)	–0.566* (–12.770)	–0.552* (–12.980)	–0.168* (–3.120)	–0.165* (–3.230)	0.025 (0.490)	0.043 (0.820)	0.032 (0.620)	0.058 (1.070)
Lagged dependent variable (Employment growth)	0.851* (31.470)	0.842* (30.380)	0.505* (4.440)	0.494* (4.840)	0.715* (14.600)	0.677* (12.620)	0.700* (13.740)	0.647* (10.760)
Lagged error term	–0.792* (–8.700)	–0.757* (–8.380)	–0.472* (–2.780)	–0.462* (–3.070)	–0.518* (–4.790)	–0.442* (–3.930)	–0.505* (–4.610)	–0.402* (–3.370)
Hausman test	0.600		0.730		0.900		4.410	

Note:

* , statistically significant at 5%; the variables were lagged with a contiguity matrix.



TABLE 1 Continued

Countries Model	Construction		Services		Finance		Public services	
	Fixed effects	Random effects	Fixed effects	Random effects	Fixed effects	Random effects	Fixed effects	Random effects
Constant		-0.003* (-2.290)		0.003* (3.640)		0.000 (0.040)		0.001* (2.860)
Output growth	0.963* (27.660)	0.971* (28.790)	0.745* (20.770)	0.756* (21.640)	1.077* (24.890)	1.092* (25.700)	0.835* (29.620)	0.834* (31.550)
Lagged independent variable (Output growth)	-0.862* (-20.260)	-0.862* (-20.450)	-0.582* (-11.470)	-0.555* (-10.130)	0.542* (3.800)	0.453* (3.370)	-0.728* (-19.310)	-0.722* (-19.750)
Lagged dependent variable (Employment growth)	0.886* (41.860)	0.877* (40.000)	0.853* (32.100)	0.815* (24.100)	-0.661* (-7.440)	-0.602* (-6.750)	0.737* (15.670)	0.729* (15.540)
Lagged error term	-0.800* (-9.410)	-0.761* (-9.010)	-0.735* (-7.920)	-0.621* (-5.900)	0.892* (42.950)	0.886* (40.830)	-0.738* (-6.890)	-0.705* (-6.690)
Hausman test	0.310		1.190		21.570*		0.180	

Note:

* , statistically significant at 5%; the variables were lagged with a contiguity matrix.



TABLE 2 Panel data estimation results based on the Kaldor model for the economic sectors, over the period 2000–2016 and across the Portuguese NUTS 3

Countries Model	Total sectors		Agriculture		Industry		Manufacturing	
	Fixed effects	Random effects	Fixed effects	Random effects	Fixed effects	Random effects	Fixed effects	Random effects
Constant		0.000 (0.360)		0.005* (2.590)		-0.006* (-2.470)		-0.006* (-2.370)
Output growth	0.203* (7.360)	0.215* (8.030)	-0.026 (-0.650)	-0.021 (-0.540)	0.047* (2.780)	0.058* (3.410)	0.063* (4.800)	0.067* (5.180)
Lagged independent variable (Output growth)	0.279* (3.400)	0.292* (3.620)	0.091 (1.780)	0.097 (1.910)	0.037 (1.210)	0.039 (1.150)	0.009 (0.360)	0.013 (0.490)
Lagged dependent variable (Employment growth)	-0.064 (-0.350)	-0.098 (-0.590)	0.722* (10.690)	0.688* (9.090)	0.686* (9.180)	0.622* (6.010)	0.682* (9.010)	0.635* (6.870)
Lagged error term	0.730* (9.090)	0.742* (10.490)	-0.450* (-2.820)	-0.363* (-2.220)	-0.370* (-2.180)	-0.252 (-1.220)	-0.400* (-2.370)	-0.322 (-1.700)
Hausman test	2.090		0.660		14.930*		0.020	

Note:

* , statistically significant at 5%; the variables were lagged with a contiguity matrix.



TABLE 2 Continued

Countries Model	Construction		Services		Finance		Public services	
	Fixed effects	Random effects	Fixed effects	Random effects	Fixed effects	Random effects	Fixed effects	Random effects
Constant		-0.002 (-1.740)		0.002* (2.230)		0.011 (1.620)		0.001* (2.030)
Output growth	0.452* (15.820)	0.465* (17.110)	0.190* (5.840)	0.220* (6.670)	0.815* (6.810)	0.852* (7.180)	0.336* (11.960)	0.346* (12.790)
Lagged independent variable (Output growth)	-0.338* (-7.880)	-0.348* (-8.280)	-0.106* (-2.310)	-0.129* (-2.650)	0.089 (0.330)	0.014 (0.060)	-0.294* (-8.600)	-0.297* (-7.830)
Lagged dependent variable (Employment growth)	0.854* (26.720)	0.845* (25.540)	0.852* (24.800)	0.822* (17.940)	-0.378 (-1.920)	-0.350 (-1.940)	0.679* (7.330)	0.616* (4.370)
Lagged error term	-0.562* (-4.39)	-0.534* (-4.210)	-0.295* (-2.140)	-0.198 (-1.240)	0.605* (5.660)	0.584* (5.660)	-0.209 (-1.060)	-0.104 (-0.400)
Hausman test	1.340		30.530*		0.650		2.050	

Note:

*, statistically significant at 5%; the variables were lagged with a contiguity matrix.



negatives, with the exception of the following sectors: industry and manufacturing (where they have no statistical significance); and the financial sector. These negative values mean that the output growth in each region is negatively influenced by this variable in the neighbouring regions. The lagged dependent variable has, in general, positive spatial effects, with the exception of the financial sector. The random spatial effects (from the lagged error term) are, in general, negative, with the exception of the financial sector. The negative values for the spatial effects from the independent variable and from the random effects reveal signs of regional asymmetric development and show the need for public intervention.

For Portugal (Table 2) the coefficients are, in general, lower, showing higher scale economies, compared to Spain, maybe because of the difference in dimension of the two countries. In any case, the public regional policies here have a greater, more important role to promote balanced regional development. Again, industry and manufacturing present higher scale economies (lower coefficient of regression) and the financial sector shows lower economies of scale. The lagged independent variable does not have, in general, statistical significance, with the exception of the total of sectors (positive effect), construction, services and public services (negative effects in all these sectors). The lagged dependent variable has positive and statistically significant effects on all sectors, with the exception of the total of sectors and the financial sector. The lagged error term has, in general, negative effects, with the exception of the total of sectors and the financial sector.

6 | CONCLUSIONS AND IMPLICATIONS

This research intends to analyse the Iberian regional development and the socio-economic performance for the several sectors that develop their activities in the Portuguese and Spanish regions. In addition, the aim was to conclude about the regional policies adjustment and to identify new regional public policy instruments that support the public institutions in the design of new strategies. For that purpose, disaggregated data from the Eurostat at regional (NUTS 3) and sector level were considered. These data were explored through panel data and spatial autocorrelation approaches, based on the Verdoon/Kaldor laws (these laws capture dynamics of scale economies and learning-by-doing), where the productivity/employment growth is endogenous and dependent on the output growth.

The data analysis reveals tendencies of polarization around Barcelona and Madrid, in Spain, and around Lisbon and Oporto, in Portugal. In turn, there are relevant signs of spillover effects from these poles of development to the neighbouring regions, as highlighted in Section 3 for the data analysis. In any case, clearly, the signs of regional divergence are relevant. More effective public regional policies are recommended to promote more spreading effects from the development poles to the neighbouring regions. Here several funds from the European Union budget may provide interesting support, with some adjustments. For example, promoting more industrial parks and promoting better dynamics in existing ones, in the less competitive regions this could prove an interesting strategy. The creation of strategically located innovation centres, entrepreneurship offices and business incubators, should be considered by the several stakeholders. In turn, the tertiary sectors assume more importance than the other socio-economic sectors. Industry, considered as one of the most important sectors for economic growth and development, assumes special relative (compared to other sectors) importance in Spain, in terms of output levels, in regions from the north and agriculture in regions such as Cuenca, Huesca and Lugo. In any case, the higher values for agriculture appear in the Spanish regions from the south. The analyses in growth rates confirm the tendency for the increased relevance of the tertiary sectors in the Spanish framework. These contexts deserve special attention from the several stakeholders considering the relevance of sectors such as manufacturing for economic growth. Again, more effective and efficient regional policies to promote manufacturing are important to stimulate a more balanced development. The Portuguese context is not so different, however, highlighting the progress in socio-economic dynamics, in the interior north and in the south (Alentejo regions) that also comes from industry growth, which is good news for these regions.



The spatial autocorrelation analysis shows that there are positive correlations between the outputs of the several socio-economic sectors from the Iberian regions, although it is mostly for the lower values. The bad news is that, maybe here the border effect has its relevance and the good news is that there is potential to be exploited together with great possibilities of interventions in parts of these regions spreading to others.

The results from the estimations with panel data confirm the tendencies for the existence of polarization processes of development, considering the existence of increasing returns to scale for the Portuguese and Spanish aggregated and disaggregated socio-economic contexts, which promote self-reinforced circular and cumulative processes (that call for public intervention). These economies of scale are greater in the Portuguese regions than in the Spanish ones. In addition, the results also confirm the importance of the industrial sector for socio-economic development, considering the dynamics of scale economies found for this sector in the Iberian context.

In terms of practical implications and policy recommendation, the creation of a deeper framework of Iberian public policies is suggested, with the support of European Union funds, to promote the design of new industrial poles allowing for growth in the manufacturing sector, but in a more balanced way across the several regions, promoting in that way a more balanced development. It could be interesting to further explore the concepts of Euroregion between Portugal and Spain, namely in order to mitigate the border effects.

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