Investigaciones Regionales – Journal of Regional Research
https://doi.org/10.38191/iirr-jorr.25.005

Accepted Article

Convergence in the Spanish and Portuguese NUTS 3 regions: an analysis of the period 2000-2019

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Received: 12 April 2024
Accepted: 13 February 2025

Abstract:

The objective of this paper is to examine the convergence of economic activity between the various NUTS 3 regions of the Iberian Peninsula over the period 2000-2019. An analysis of the GDP (PPS) per capita of Spanish and Portuguese provinces was conducted with the help of different usual statistical and econometric methods of σ, β and γ. This was done to confirm the existence or non-existence of economic convergence in the period under analysis. The results revealed the existence of economic convergence between the Portuguese and Spanish provinces. In addition, they showed that more than half of the territory analysed was characterised by a scenario of poverty.

Keywords: Economic convergence; GDP; Spain; Portugal.
JEL Classification: O18; R11; R13.

Convergencia en las regiones NUTS 3 de España y Portugal: un análisis del periodo 2000-2019

Resumen:

El objetivo del presente trabajo es explorar la convergencia de la actividad económica entre las distintas regiones NUTS 3 de la Península Ibérica durante el periodo 2000-2019, a partir de un análisis del PIB (PPS) per cápita de provincias españolas y portuguesas, con ayuda de los diferentes métodos estadísticos y econométricos habituales de σ, β y γ. Para así poder confirmar la existencia o no de convergencia económica en el periodo analizado. Los resultados nos revelan la existencia de convergencia económica entre las provincias portuguesas y españolas. Además de mostrarnos un escenario de pobreza en más de la mitad del territorio analizado.

Palabras clave: Convergencia económica; PIB; España; Portugal.
Clasificación JEL: O18; R11; R13.

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1. Introduction

There is significant discussion about inequalities between countries, between rich and poor countries. These inequalities are said to be the result of globalisation and the free market economy. However, some studies show that this is a mirage. Analyses of lower-income countries' economies show that differences between countries and income inequalities are decreasing over time. The process of economic growth has affected the countries with the poorest citizens in the world, the differences between rich and poor have significantly decreased in recent years (Pinkovskiy *et al*., 2024; Sala-i-Martin, 2012). This is known as economic convergence, when a poor economy grows faster than a rich economy and can catch up in terms of per capita income (Barro and Sala-i-Martin, 2009).

Nevertheless, the theories of rich and poor individuals are still valid today. The economic gap exists if we focus on analysing the difference in per capita income of individuals in the same country, that is, the difference in income between citizens indicates the presence of both rich and less rich individuals within the same territory (Sala-i-Martin, 2012). Based on the above, we can discuss the coexistence of prosperous and depressed areas within the same geographical regions. According to these ideas, it has been verified that there are differences in economic growth between various regions in Europe (Villaverde and Pérez, 1996).

It is important to acknowledge that the elimination of cross-border barriers within the European Union (EU) has exposed substantial economic, social, and territorial disparities among member states. It was therefore, expected that the opening of borders would lead to convergence, thereby helping to reduce these economic inequalities. Consequently, some authors claim that cohesion between regions is achieved through economic convergence, which is one of the main objectives of EU policies (López-Villuendas and del Campo, 2022; Pires and Nunes, 2018). The EU promotes relations and cooperation between cross-border territories, which is why these areas are considered "laboratories of European integration" (European Commission, 2021; López-Villuendas and del Campo, 2022).

In this context, the aim of this paper is to examine economic convergence in the Iberian Peninsula and in the so-called Iberian south-west corridor over the period 2000-2019. This objective is achieved through an analysis of GDP (PPS) per capita in Spanish and Portuguese NUTS 3 regions, using different methods to calculate the convergence of economic activity.

As a justification for this research, it is important to note that the study of growth theories and problems related to economic growth and development is currently reflected in numerous research papers. These studies attempt to explain the causes of economic growth between countries or regions through the analysis of convergence (León, 2013). However, our analysis focuses on the NUTS 3 regions of Spain and Portugal, as these countries share a border and joined the EU in the same year. Despite their structural differences, they have managed to achieve the objectives of the European and Monetary Union (Viegas and Antunes, 2013).

Furthermore, in the case of Spain and Portugal, there are not many empirical analyses that analyse the existence of convergence between these two neighbouring countries. Moreover, the analyses that have been carried out refer to earlier periods, between 1955 and 2008. The results of economic convergence between Spain and Portugal differ depending on the period analysed, despite the economic growth of both areas, the existence of economic convergence in these territories should be the aim to be achieved in the future (López Martínez, 2001; López-Villuendas and del Campo, 2022).

An interesting and recent study for Spain and Portugal is that of Villuendas and Del Campo (2022). They analyse the convergence between the Galicia-Northern Portugal Euroregion over the period 1980-2019 and determine the absolute convergence between the two territories. However, no study has been carried out for the south-western territories of the Iberian Peninsula, which is why we consider it interesting to do so in this work. In addition, we carry out the analysis of the Iberian southwest with and without capitals, in order to eliminate the synergy of the most developed regions.

Through our empirical analysis, it has been observed that, over the period 2000-2019, the economies of the NUTS 3 regions of the Iberian Peninsula have undergone a gradual process of improvement in the

degree of sigma convergence, in terms of GDP (PPS) per capita. However, as far as γ convergence is concerned, a different behaviour can be observed, with neither absolute stability nor complete destabilisation of the ranking variation. Thus, important internal asymmetries persist and need to be addressed in order to achieve more equitable and sustainable convergence.

This research work serves to confirm the existence of economic convergence in the Iberian Peninsula and the Iberian Southwest Corridor during a period characterised by the advent of the 21st century and the concomitant experience of diverse economic scenarios encompassing crises and recoveries. Considering the evidence presented, it can be concluded that the hypothesis of economic convergence between the Spanish and Portuguese provinces is accepted. However, it is notable that there is a significant disparity in per capita income levels across the Peninsula, with persistent differences in income levels between regions.

The rest of the article is structured by headings as follows. Following this introduction, point (2) presents the theoretical framework. Point (3) describes the methodology used based on the available data. In point (4), the results are presented and discussed. Finally, in point (5), we present the conclusions.

2. Theoretical framework

Since the 1930s, the effects of economic growth have been studied, leading to the emergence of the term "economic convergence". Researchers have been interested in explaining the factors that influence economic development in various territories (León, 2013). Studies by Solow and Swan (1956), Baumol (1986), Baumol and Wolf (1988), and Barro and Sala-i-Martín (1990, 1991, 1992) are considered the most influential in the analysis of economic convergence at the international level.

In the last decade of the twentieth century, Sala-i-Martín (1990) was the first to use the convergence techniques that have become the most widely used by regional analysts: beta convergence (β) and sigma convergence (σ) (Villaverde, 2004).

σ-Convergence analyses the evolution over time of the dispersion observed in the reference variable. The two basic measures of dispersion are the standard deviation of the logarithms and the coefficient of variation.

β-Convergence compares the change between the starting point of the period and the current situation. This process is called unconditional or absolute convergence, and beta convergence occurs when this relationship is negative. In terms of economic growth, the beta convergence hypothesis suggests that regions that start with a lower per capita income experience higher growth rates. This technique involves estimating the relationship between the growth of a variable in each period and the value of that variable at the starting point.

It should be noted that while σ convergence is a sufficient condition for beta convergence, it is not a necessary one. Boyle and McCarthy (1997, 1999) proposed a new concept of convergence to be used together with sigma to test for the existence of beta, called gamma convergence (ɣ). The rationale behind this proposal is based on the premise that approximation or convergence is a more comprehensive concept than the previous definitions. It is therefore evident that the measures must be based on the reduction of dispersion (σ) or the increase of smaller observations (β) and must also account for movements in the distribution that alter the ranking over time (γ). This factor has not been considered in the two measures previously presented.

In the specific case of Spain and Portugal, we find some studies analyzing the convergence of these countries. Rodríguez (1999), through the analysis of GDP per capita in the Spanish regions during the period 1955-1996, shows that the causes of regional convergence were, on the one hand, the movements produced in the productive factors. Specifically, they highlight the population and, on the other hand, the convergence of productive sectoral structures, which contributed to the growth of average regional productivity equality. Nevertheless, this positive evolution of regional equality has slowed down since 1979 due to population migration caused by increasing unemployment rates in different regions. Additionally, the disparities between regions are due to differences in productivity and employment rates. For this reason,

we proceed to the factorial decomposition of GDP (PPS) per capita into its two components (productivity and an approximation of the employment rate) for further analysis.

On the other hand, Peres (2004) analyses labour productivity at the sectoral level in the NUTS 3 regions of continental Portugal during the 1990s. Again, the author finds that labour mobility favours regional convergence in productivity. However, capital accumulation does not contribute to regional convergence.

In addition, Villaverde (2004) states that it is necessary to carry out a study of economic convergence at the provincial level, since the existing studies in Spain take the Autonomous Community as the unit of analysis. This author tries to overcome the problem of what Sala-i-Martín (1996) calls the "classical approach to convergence", which considers spatial units as if they were independent of each other. This work shows the convergence observed in Spain during the period 1985-2002. By analysing the variable of the productivity of the labour factor, he concludes that there is convergence β and σ, observing that there is a concentration of GDP and employment in the most efficient provinces. There is more intensity in the employment variable than in GDP.

Other studies show that during the period 1985-1999 there was no economic convergence between the different EU countries, due to the different situations in each country, so there was no reduction in inequality in the EU during this period. Focusing on Spain, at the beginning of the period (1985) the ranking of the Autonomous Communities was led by Madrid and the Balearic Islands with a higher GDP pc. This was not the case for the Autonomous Communities of Extremadura and Andalusia, which were at the bottom of the list with the lowest GDP pc in Spain (below the average). This situation changed by the end of the period (1999), when Catalonia joined Madrid at the top of the list. By this time, the autonomous communities of Extremadura, the two Castilian communities and Galicia had improved their situation and were above the average.

Viegas and Antunes (2013) contribute to the study of the economic convergence in the Spanish and Portuguese NUTS 3. The authors conclude that these two areas have experienced economic growth during the period 1985-2008 and converged towards European per capita income levels. However, the analysis does not show economic convergence between the poorer regions and concludes the existence of economic clusters.

A further study that analyses β and σ convergence, this time for the regions of Galicia (Spain) and Northern Portugal, is by López-Villuendas and Del Campo (2022). They analyse whether cooperation between the two cross-border regions contributes to economic convergence in both areas during the period 1980-2019. Their results indicate the existence of economic convergence throughout the period, in addition to the existence of absolute convergence. Thus, it is shown that cooperation between these regions has led to a process of cohesion.

Turning now to the south-west Iberian corridor, it is worth noting the scarcity of studies on this subject. According to López-Villuendas and Del Campo (2022), the results of their analysis of economic convergence between Galicia and northern Portugal can be extrapolated to other EU Euroregions to explain existing disparities and understand the process of convergence between cross-border regions.

In this line, we define the Iberian Southwest Corridor as the new axis of European development (García and Mora, 2022). Through their work, García and Mora (2022) aim to highlight an instrument that, in their opinion, will be able to define a new scenario in the European and Iberian context. This south-western Iberian corridor does not currently exist because there is no infrastructure to connect it. It is evident that the project has the potential to serve as a conduit for articulating the Iberian Peninsula, connecting the two capital cities, Madrid and Lisbon, and the regions between them. This is what these authors call "terra ignota", which today, in the 21st century, can be understood as ignored land. Ignored land, without infrastructure, condemned to a vicious cycle of poverty. These are territories that belong to a prosperous Europe, yet do not achieve the development towards progress and well-being (López-Villuendas and del Campo, 2022).

The Iberian southwest can be understood as the area that coincides with the basins of the Tajo and Guadiana rivers as they flow towards the Atlantic. This area, which connects the centre of the Iberian

Peninsula with the Atlantic coast, was known as Lusitania before the Roman era. In the 13th century, these territories were divided, and the oldest border in Europe appeared, dividing the Iberian Peninsula into two territories that had been at odds for years. The establishment of the border and the lack of communication infrastructure contributed to the creation of two isolated territories, which are undoubtedly the origin of the economic and social conditions in the regions of Alentejo in Portugal and Extremadura in Spain. This isolation and lack of communication have been the cause of the culture of survival observed in the Raya (the border between the two territories) over the centuries (García, 2022).

3. Methods

3.1. Data description

The indicator used to observe the economic differences between the different provinces and to analyse economic convergence is the GDP (PPS) per capita, taken from the database of the National Institute of Statistics of Spain and Portugal for the period 2000-2019, for which we found the most recent data available. The choice of this interval is due to its lower limit being the beginning of the century and its upper limit being the year before the Covid pandemic. The sample consists of 84 provinces of the Iberian Peninsula, including the islands and the autonomous cities of Ceuta and Melilla.

First, a descriptive analysis of GDP per capita per capita is conducted using the average of the Iberian Peninsula and the Iberian Southwest. Secondly, based on the factorial decomposition of GDP (PPS) p.c. into its two components, GDP per person employed (productivity) and employment in the population (an approximation of the employment rate), the analysis of the cumulative annual average rates of change (hereafter CAAR) is conducted for the variables GDP per capita, employment, and productivity of the Iberian Peninsula and the Iberian Southwest, with and without capitals (Madrid and Lisbon). To do this, we analyse the changes that have taken place over the period analysed, bearing in mind that more developed regions, such as Madrid or Lisbon, may have different development patterns compared to less developed areas.

Regarding the period analysed, 2000-2019, it has been divided into three sub-periods based on recent historical and economic events in the world and in the Iberian Peninsula, in order to observe the evolution of GDP (PPS) per capita. For this purpose, we take as a reference the beginning of the century (2000-2007), the great international economic and financial depression of 2008 (2008-2014) and the beginning of the recovery until one year before the generalisation of the Covid pandemic (2015-2019).

To analyse the data, we have selected the NUTS 3 regions that make up the Iberian Peninsula (Spain and Portugal) and the NUTS 3 regions that make up the Southwest Iberian Corridor (Tables 1 y 2). As a justification for the use of NUTS 3, the European Union has made the NUTS 3 nomenclature available to researchers to facilitate the collection and transmission of harmonized regional statistics, due to the need for comparable data. The use of NUTS 3 analysis is justified by the need to ensure the comparability of the regions of Spain and Portugal. The NUTS 3 nomenclature makes it possible to compare the geographical units in terms of population, political, administrative and institutional reality. In addition, this nomenclature reflects economic, social, historical, cultural, geographical, and environmental factors (Gouardères 2024).

On the order hand, as justification for the sample of the Southwest Iberian Corridor, it must be noted that the EU single market requires the elimination of all physical and geographical barriers to facilitate the exchange of people and goods throughout the European territory (Fernandez, 2022). The "terra ignota", as the territories of the Iberian southwest are known, are territories belonging to developed Europe. Yet, they are territories that do not achieve the development and welfare of the rest of Europe today; in addition, they are considered territories condemned to poverty (López-Villuendas and del Campo, 2022). Therefore, it is interesting to observe whether these territories, isolated by the border and the lack of communication infrastructures, have evolved throughout the period analyzed due to the effect of economic convergence. In this way, it will be possible to attract the attention of the authorities and

secure the necessary support to promote the recovery of the two nations (López-Villuendas and del Campo, 2022).

Table 1.
Variables, sources and descriptives

Variable	GDP PPS
Definition	Gross Domestic Product (GDP) is a measure of the total output of goods and services produced by an economy. It is calculated by subtracting intermediate consumption and adding net taxes on products and imports. The GDP per capita is derived by dividing the GDP by the average population for a given year. Purchasing Power Parities (PPPs) serve as a common currency that neutralises price level differences across countries, facilitating meaningful comparisons of GDP volumes.
Sources	National Institute of Statistics of Spain and Portugal
Iberian NUTS 3 Average	20.445,96€
Iberian NUTS 3 Standard desviation	4.766,61€
Southwest area Average	19.924,17€
Southwest area Standard desviation	5.155,76€
Southwest area Average without capital	17.951,00€
Southwest area Standard desviation without capital	3.541,58€
Variable	**EMPLOYMENT (thousands of people)**
Definition	The employed population is defined as all persons of working age who are engaged in paid employment.
Sources	National Institute of Statistics of Spain and Portugal
Iberian NUTS 3 Average	287,75
Iberian NUTS 3 Standard desviation	461,18
Southwest area Average	477,61
Southwest area Standard desviation	882,01
Southwest area Average without capital	121,04
Southwest area Standard desviation without capital	71,24

TABLE 1. CONT.
Variables, sources and descriptives

Variable	POPULATION (thousands of people)
Definition	Population is defined as the set of people who habitually reside in a given territory.
Sources	National Institute of Statistics of Spain and Portugal
Iberian NUTS 3 Average	659,83
Iberian NUTS 3 Standard desviation	953,54
Southwest area Average	1.010,52
Southwest area Standard desviation	**1.707,86**
Southwest area Average without capital	319,30
Southwest area Standard desviation without capital	213,94

Source: Own elaboration using data from the National Institute of Statistics (INE) in Spain and Portugal.

TABLE 2.
NUTS 3 regions of the Iberian Peninsula (NUTS 2024 classification)

Code	Region	Code	Region
ES111	A Coruña	**ES612**	Cádiz
ES112	Lugo	**ES613**	Córdoba
ES113	Ourense	**ES614**	Granada
ES114	Pontevedra	**ES615**	Huelva
ES120	Asturias	**ES616**	Jaén
ES130	Cantabria	**ES617**	Málaga
ES211	Álava	**ES618**	Sevilla
ES212	Gipuzkoa	**ES620**	Murcia
ES213	Vizcaya	**ES630**	Ceuta
ES220	Navarra	**ES640**	Melilla
ES230	La Rioja	**ES703**	El Hierro
ES241	Huesca	**ES704**	Fuerteventura
ES242	Teruel	**ES705**	Gran Canaria
ES243	Zaragoza	**ES706**	La Gomera
ES300	Madrid	**ES707**	La Palma
ES411	Ávila	**ES708**	Lanzarote
ES412	Burgos	**ES709**	Tenerife
ES413	León	**PT111**	Alto Minho
ES414	Palencia	**PT112**	Cávado
ES415	Salamanca	**PT119**	Ave

TABLE 2. CONT.
NUTS 3 regions of the Iberian Peninsula (NUTS 2024 classification)

Code	Region	Code	Region
ES416	Segovia	**PT11A**	Á.M.do Porto
ES417	Soria	**PT11B**	Alto Tâmega
ES418	Valladolid	**PT11C**	Tâmega e Sousa
ES419	Zamora	**PT11D**	Douro
ES421	Albacete	**PT11E**	T. de T. Montes
ES422	Ciudad Real	**PT150**	Algarve
ES423	Cuenca	**PT1D1**	Oeste
ES424	Guadalajara	**PT191**	Região de Aveiro
ES425	Toledo	**PT192**	Região de Coimbra
ES431	Badajoz	**PT193**	Região de Leiria
ES432	Cáceres	**PT194**	Viseu Dão Lafões
ES511	Barcelona	**PT195**	Beira Baixa
ES512	Girona	**PT1D2**	Médio Tejo
ES513	Lleida	**PT196**	B. e S. da Estrela
ES514	Tarragona	**PT1A0**	Á. M. de Lisboa
ES521	Alicante	**PT1C1**	Alentejo Litoral
ES522	Castellón	**PT1C2**	Baixo Alentejo
ES523	Valencia	**PT1D3**	Lezíria do Tejo
ES531	Ibiza	**PT1C3**	Alto Alentejo
ES532	Mallorca	**PT1C4**	Alentejo Central
ES533	Menorca	**PT200**	R. A. dos Açores
ES611	Almería	**PT300**	R. A. da Madeira

Source: Own elaboration using data from Eurostat.

TABLE 3.
NUTS 3 Regions of the Iberian Southwest

Code	Region
ES300	Madrid
ES425	Toledo
ES432	Cáceres
ES431	Badajoz
ES422	Ciudad Real
PT195	Beira Baixa
PT1D2	Medio Tajo
PT1D3	Leziria do Tajo
PT1C3	Alto Alentejo
PT1C4	Alentejo Central
PT1C1	Alentejo Litoral
PT1A0	A.M. Lisboa

Source: Own elaboration using data from Eurostat.

3.2. Convergence

The objective of this study is to examine the economic convergence between the various provincial NUTS 3 spatial demarcations in Spain and Portugal. A second convergence analysis will be conducted using a sample of the provinces that define the Iberian Southwest corridor (García Salas and Mora Aliseda, 2022).

This analysis will employ a spatial demarcation based on Spanish and Portuguese NUTS 3 provincial units. The convergence of economic activity will be calculated using various common statistical and econometric techniques, including those based on σ, β, and γ.

The use of σ convergence entails the examination of the standard deviation of the logarithm of per capita income within a group of countries or regions. This is done to ascertain whether the dispersion diminishes over time, thereby indicating convergence. The standard deviation of the logarithms of GPD per capita has been calculated using Equation 1:

Equation 1.

$$\sigma = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{N}}$$

Sigma convergence, denoted by 'σ', is calculated as the standard deviation of GDP per capita. The logarithms of GDP per capita have been considered for each of the NUTS 3 regions in each year of the period analysed. Moreover, $\bar{x}$ represents the average of the logarithms of GDP per capita for the entire period from 2000 to 2019. Finally, N denotes the total number of NUTS 3 regions analysed.

Conversely, if the objective is to determine whether a less affluent economy tends to exhibit greater growth than a more prosperous one, β convergence is employed. This phenomenon is evidenced by a negative correlation between GDP per capita growth and the initial per capita income level. In other words, beta-convergence entails estimating the relationship between the growth of a variable over a given period and the value of that variable at the outset of the period in question (Sala-i-Martín, 1990).

The calculation of Beta convergence is achieved by means of the equation 2:

Equation 2.

$$y = log2019 - log2000$$

Beta convergence, denoted by 'y', is calculated as the difference between the logarithm of GPD per capita in the year 2019 and the logarithm of GPD per capita in the year 2000.

The hierarchical relationship between these two concepts, σ and β, is expressed as follows:

- The phenomenon of β convergence is defined as the tendency of economies with lower initial GDP per capita to exhibit higher rates of growth in comparison to those with higher initial GDP per capita.
- Conversely, σ convergence signifies the diminution in the dispersion in GDP per capita levels between economies over time.

Ultimately, to ascertain the presence of beta-convergence, a gamma-convergence analysis is conducted to determine whether shifts in the distribution within the specified period have influenced the ranking over time. The convergence γ has been calculated using Spearman's Rho for the GDP per capita variable. Equation 3 quantifies the Spearman rank correlation coefficient, also referred to as Spearman's Rho (ρ). This coefficient is used to analyse the monotonic relationship between two ordinal or continuous variables.

EQUATION 3.

$$r = 1 - (6 * \sum D^2 / n(n^2 - 1)$$

The Spearman correlation coefficient, denoted by r, is used to quantify the strength of the linear relationship between two variables. The term 'D' represents the difference between the ranks assigned to each pair of observations of the two variables. The term 'n' denotes the total number of data pairs in the sample, while '$\sum D^2$' signifies the sum of the squares of the differences in ranks.

The calculation of this coefficient is performed in the following manner:

1. First, the values of each variable are ordered separately.
2. Second, the values are assigned ranks, with 1 assigned to the lowest value, 2 assigned to the next lowest value, and so on.
3. Third, the differences (D) between the ranks for each pair of observations are calculated. These differences are squared and then summed.
4. Finally, the formula indicated in Equation 3 is applied.

The value of r will range between -1 and +1, where r = +1 indicates a perfect positive correlation, r = -1 indicates a perfect negative correlation, and r = 0 indicates no monotonic correlation between the variables

4. RESULTS AND DISCUSSION

4.1. GDP (PPS) PC

The following section presents a descriptive analysis of GDP (PPS) per capita, with the sample classified according to economic level. To this end, the sample of provinces has been divided into four groups based on their level of GDP per capita. Subsequently, the mean values of GDP per capita have been calculated for the period 2000-2019 and for each of the sub-periods into which the sample has been divided. Thus, it can be observed that, in general, GDP per capita has increased between the sub-periods considered within this extensive time frame for both the Iberian Peninsula and the Iberian Southwest (see tables 3 and 4). The mean value of GDP (PPS) per capita for the period 2000-2019 is €22,883.19 per inhabitant.

As previously stated, the provinces have been classified into four levels, delineated by the lowest and highest average values observed in the sample. Four intervals have been formed, comprising two above and two below the average value. This allows us to distinguish between provinces with low-incomes (€11,570-€17,227), provinces with lower middle-incomes (€17,227-€22,883), and provinces with upper-middle-incomes (€22,883- The final category comprises provinces with high-incomes (€28,816-€34,750), according to a classification system used by the World Bank to categorise countries according to income levels (Hamadeh et al., 2023).

In the sample analysed, there are eighteen low-income provinces, forty-four lower-middle-income provinces, eighteen upper-middle-income provinces and only four high-income provinces. This study will present a discussion of the most significant findings, with particular attention paid to the intervals whose values exceed the average (the third and fourth levels).

The analysis of the sample revealed the existence of eighteen provinces with low-incomes, forty-four provinces with low average incomes, eighteen provinces with high average incomes and, finally, only four provinces with high-incomes. The results of the provincies classified in each interval are presented in the following section.

The majority of provinces with low-incomes are located in Portugal, with the exceptions of Algarve, Leiria, Aveiro, Madeira, and the Porto Metropolitan Area, which are situated within the second interval

due to their low middle incomes. Furthermore, the first interval comprises the provinces of Cáceres, Badajoz, Granada, Córdoba, and Jaén. This classification is in accordance with the findings of Viegas and Antunez (2013) in their analysis of the NUTS 3 regions of Spain and Portugal for the period 1995-2008. The authors in question initiated their analysis with a minimum income of €7,435.12 and a maximum of €27,624.59. It is evident that the sample employed in our analysis commences with a minimum income of €11,570, which would be above the first interval utilised by the authors.

In the second interval, in addition to the Portuguese provinces already mentioned, the Spanish provinces with the lowest average incomes are: A Coruña, Lugo, Ourense, Pontevedra, Ávila, Burgos, León, Salamanca, Segovia, Zamora, Albacete, Ciudad Real, Cuenca, Guadalajara, Toledo, Alicante, Valencia, Cantabria, Asturias, Murcia, the autonomous cities of Ceuta and Melilla, Mallorca, Menorca, Huelva, Seville, Cádiz, Málaga, Almería, El Hierro, Fuerteventura, Gran Canaria, La Gomera, La Palma, and Tenerife. Viegas and Antunes (2013) proposed that their third and fourth levels should encompass the aforementioned provinces (excluding the islands and the autonomous cities of Ceuta and Melilla), with the proviso that differing income levels should be taken into account. The authors situate these provinces within the third level, delineating upper and lower limits of €13,938.61 and €17,836.91, respectively. However, our analysis indicates that income levels in these NUTS 3 regions are higher.

In the third interval, the provinces are ranked according to two distinct criteria. The first criterion is the ranking of the provinces with the highest GDP per capita on an individual basis. The second criterion is the ranking of the provinces with a high GDP per capita due to their low population density. The initial classification comprises Vizcaya, Barcelona, La Rioja, and Lisbon. In accordance with the aforementioned criteria, the following provinces are characterised by low population density: Huesca, Teruel, Zaragoza, Burgos, Palencia, Soria, Valladolid, Girona, Lleida, Tarragona, Castellón, Ibiza and Formentera and Lanzarote. Additionally, the Portuguese provinces of Lisbon and the Alentejo Litoral are included in this classification. It should be noted that the minimum income considered in this interval is €22,883. Viegas and Antunes (2013) classify these NUTS 3 (except for Barcelona, Girona, Lleida, and Tarragona) in their fourth interval. This interval encompasses incomes between €17,836.92 and €22,128.46, which is comparable to the average income observed in the sample under analysis. This allows for the examination of the growth in GDP per capita over the 2000-2019 period.

In conclusion, the provinces with the highest income levels are Álava, Madrid, Guipúzcoa, and Navarra, as determined in the fourth interval. The outcome is not unexpected, given Madrid's status as the capital of Spain and the fact that three of the provinces in question are situated in close proximity to France and benefit from special and highly advantageous regimes within the Spanish state. This classification is consistent with the NUTS 3 classification included in the fifth interval of Viegas and Antunes (2013), with incomes between €22,128.47 and €27,624.59, which are considerably lower than the values observed in our fourth level of the provincial classification.

Nevertheless, an examination of the Iberian Southwest sample reveals that Madrid is situated within the fourth interval, exhibiting the highest levels of GDP per capita. Lisbon and coastal Alentejo are positioned within the third interval, although their relatively low population density may contribute to this classification. However, most of the Iberian Southwest falls within intervals one and two, which correspond to the lowest levels of GDP per capita. Therefore, the counties of Beira Baixa, Cáceres, Médio Tajo, Badajoz, and Alto Alentejo are situated within the first interval, which encompasses the lowest levels of GDP per capita. The second interval comprises of Ciudad Real, Toledo, Central Alentejo and Leziria do Tajo, which exhibit low average levels of GDP per capita. These findings illustrate the economic fragility of the Iberian Southwest, apart from the capital cities of Madrid and Lisbon, as well as the port of Sines in coastal Alentejo (see table 4).

Table 4.
The average GDP (PPS) pc of the Iberian Peninsula. 2000-2019

NUTS 3	2000-2019	2000-2007	2008-2014	2015-2019
A Coruña	21345,00	18112,50	22485,71	24920,00
Lugo	20310,00	16800,00	21171,43	24720,00
Ourense	18935,00	15875,00	19585,71	22920,00
Pontevedra	20050,00	17512,50	20642,86	23280,00
Asturias	20980,00	18625,00	21814,29	23580,00
Cantabria	22095,00	20112,50	22585,71	24580,00
Álava	34750,00	30912,50	36485,71	38460,00
Gipuzkoa	30455,00	27112,50	31085,71	34920,00
Vizcaya	28595,00	24812,50	29571,43	33280,00
Navarra	29230,00	26675,00	29685,71	32680,00
La Rioja	25635,00	23287,50	26085,71	28760,00
Huesca	25810,00	22425,00	27171,43	29320,00
Teruel	24460,00	22225,00	25528,57	26540,00
Zaragoza	25705,00	23025,00	26142,86	29380,00
Madrid	32000,00	28437,50	32714,29	36700,00
Ávila	18535,00	16325,00	19200,00	21140,00
Burgos	26460,00	23462,50	27028,57	30460,00
León	19990,00	17837,50	20785,71	22320,00
Palencia	24040,00	20825,00	24742,86	28200,00
Salamanca	19290,00	17512,50	19485,71	21860,00
Segovia	22150,00	20987,50	22342,86	23740,00
Soria	23795,00	20937,50	24057,14	28000,00
Valladolid	24055,00	21500,00	24414,29	27640,00
Zamora	18310,00	15587,50	19471,43	21040,00
Albacete	18625,00	16225,00	19100,00	21800,00
Ciudad Real	19370,00	17225,00	19900,00	22060,00
Cuenca	19665,00	16700,00	20357,14	23440,00
Guadalajara	19575,00	18587,50	19785,71	20860,00
Toledo	18040,00	17100,00	18142,86	19400,00
Badajoz	16290,00	14050,00	16957,14	18940,00
Cáceres	16645,00	14112,50	16985,71	20220,00
Barcelona	28130,00	25450,00	28300,00	32180,00
Girona	27640,00	26137,50	27671,43	30000,00
Lleida	28195,00	25762,50	29100,00	30820,00
Tarragona	28405,00	26537,50	27857,14	32160,00
Alicante	18855,00	18312,50	18342,86	20440,00
Castellón	24620,00	23025,00	23585,71	28620,00
Valencia	22235,00	20412,50	22642,86	24580,00
Ibiza	22885,00	21075,00	22157,14	26800,00

TABLE 4. CONT.
The average GDP (PPS) pc of the Iberian Peninsula. 2000-2019

NUTS 3	2000-2019	2000-2007	2008-2014	2015-2019
Mallorca	20860,50	17359,99	21719,26	25259,05
Menorca	21260,00	21300,00	20514,29	22240,00
Almería	19785,00	19487,50	19142,86	21160,00
Cádiz	17345,00	16312,50	17514,29	18760,00
Córdoba	16695,00	14837,50	17171,43	19000,00
Granada	16860,00	14950,00	17300,00	19300,00
Huelva	18180,00	16862,50	18100,00	20400,00
Jaén	16370,00	14450,00	16728,57	18940,00
Málaga	17730,00	16450,00	17942,86	19480,00
Sevilla	19045,00	17200,00	19614,29	21200,00
Murcia	19745,00	18012,50	19971,43	22200,00
Ceuta	19860,00	18575,00	20242,86	21380,00
Melilla	18745,00	18175,00	18771,43	19620,00
El Hierro	17370,00	15237,50	19100,00	18360,00
Fuerteventura	22570,00	24200,00	20857,14	22360,00
Gran Canaria	19890,00	19325,00	19742,86	21000,00
La Gomera	18645,00	16762,50	19985,71	19780,00
La Palma	17865,00	15537,50	19214,29	19700,00
Lanzarote	23775,00	24225,00	22385,71	25000,00
Tenerife	21235,00	20412,50	21300,00	22460,00
Alto Minho	14150,00	11562,50	14714,29	17500,00
Cávado	15555,00	13187,50	15714,29	19120,00
Ave	15225,00	12975,00	15128,57	18960,00
Á. M. do Porto	18820,00	16862,50	18900,00	21840,00
Alto Tâmega	12140,00	9800,00	13100,00	14540,00
Tâmega e Sousa	11570,00	9700,00	11985,71	13980,00
Douro	13175,00	10487,50	13885,71	16480,00
T. de T. Montes	14475,00	11812,50	15428,57	17400,00
Algarve	20915,00	18825,00	20500,00	24840,00
Oeste	16315,00	15012,50	16185,71	18580,00
Região de Aveiro	19060,00	17150,00	18857,14	22400,00
Região de Coimbra	17965,00	15837,50	18300,00	20900,00
Região de Leiria	19550,00	17450,00	19742,86	22640,00
Viseu Dão Lafões	14680,00	12750,00	15100,00	17180,00
Beira Baixa	17150,00	14200,00	18071,43	20580,00
Médio Tejo	16400,00	14812,50	16628,57	18620,00
B. e S. da Estrela	12500,00	10400,00	12728,57	15540,00
Á.M. de Lisboa	27580,00	25475,00	28285,71	29960,00
Alentejo Litoral	24970,00	21825,00	24771,43	30280,00

Table 4. cont.
The average GDP (PPS) pc of the Iberian Peninsula. 2000-2019

NUTS 3	2000-2019	2000-2007	2008-2014	2015-2019
Baixo Alentejo	17805,00	14225,00	18871,43	22040,00
Lezíria do Tejo	17720,00	16650,00	17614,29	19580,00
Alto Alentejo	15150,00	13575,00	15100,00	17740,00
Alentejo Central	17775,00	16412,50	17542,86	20280,00
R. A. dos Açores	17535,00	15200,00	18228,57	20300,00
R. A. da Madeira	19295,00	17000,00	19814,29	22240,00
Total	**22883,19**	**20578,70**	**23277,39**	**26018,49**

Source: Own elaboration using data from the National Institute of Statistics (INE) in Spain and Portugal.

Table 5.
Average GDP (PPS) pc of the Southwest Iberian Peninsula. 2000-2019

NUTS 3	2000-2019	2000-2007	2008-2014	2015-2019
Madrid	32000,00	28437,50	32714,29	36700,00
Toledo	18040,00	17100,00	18142,86	19400,00
Cáceres	16645,00	14112,50	16985,71	20220,00
Badajoz	16290,00	14050,00	16957,14	18940,00
Ciudad Real	19370,00	17225,00	19900,00	22060,00
Beira Baixa	17150,00	14200,00	18071,43	20580,00
Medio Tajo	16400,00	14812,50	16628,57	18620,00
Leziria do Tajo	17720,00	16650,00	17614,29	19580,00
Alto Alentejo	15150,00	13575,00	15100,00	17740,00
Alentejo Central	17775,00	16412,50	17542,86	20280,00
Alentejo Litoral	24970,00	21825,00	24771,43	30280,00
A.M. Lisboa	27580,00	25475,00	28285,71	29960,00
Totals	**27212,98**	24325,49	27827,06	30973,25
Without capitals	**17607,84**	15757,92	17928,50	20118,80

Source: Own elaboration using data from the National Institute of Statistics (INE) in Spain and Portugal.

4.2. Dynamic variation and factorial decomposition of GDP (PPS) pc

A factorial decomposition of GDP (PPS) per capita has been conducted into its two constituent components. The utilisation of Gross Domestic Product (GDP) per employee (productivity) and employment per population (an approximation of the employment rate) as an analytical tool facilitates comprehension of the underlying factors that explicate the disparities in living standards between countries or regions. Furthermore, the cumulative average annual variation rates (CAAVR) for the three variables have been calculated for the subperiods of analysis, as well as for the entire period. The results are presented in condensed form for both the Iberian Peninsula and its NUTS 3 spatial units, and for the Iberian Southwest corridor, with and without the inclusion of capitals (see tables 6, 7, and 8).

Table 6 illustrates the categorisation of the various provinces in terms of their productivity and employment rates in 2019, representing the final year of the period under examination. The provinces have been classified according to both the productivity rate (vertical) and the employment rate (horizontal). In order to classify the productivity rate of the provinces, the value of each province has been taken and distributed into intervals in a homogeneous manner. The results led to the esta The results led to the

establishment of three intervals, namely low, medium, and high productivity, with twenty-eight units in each stratum. Moreover, the distribution of the employment/population ratio has resulted in the stratification of values into five categories: very low (0.03-0.28); low (0.28-0.42); medium (0.42-0.56); high (0.56-0.96); and very high (0.96-14.81).

It is evident that most provinces classified within the low productivity range are situated within the Southwestern Iberian Corridor. Nevertheless, their employment/population rates are distributed between the high and very high value ranges. Madrid is the sole province with high productivity, despite exhibiting low employment and population rates. Badajoz, Cáceres, and Ciudad Real are situated at an intermediate level of productivity yet display low employment and population values. It is evident that provinces with a very high employment rate also exhibit high productivity rates, with all Spanish provinces falling into this category. Conversely, provinces with low and very low employment rates are characterised by low productivity rates (see table 6).

TABLE 6.
GDP factorial decomposition (PPS): productivity/employment. 2000-2019

Employment/ Productivity	Very high	High	Medium	Low	Very low
Low		Albacete Cuenca Toledo Tarragona Castellón Menorca Almería	Málaga El Hierro Fuerteventura Gran Canaria A. Tâmega Douro Oeste R. Coimbra	R. de Leiria V.Lafões Beira Baixa Médio Tejo B.e S.Estrela	Á. M. Lisboa Alent. Litoral Baixo Alentejo Lezíria do Tejo Alto Alentejo Alent. Central R. A. Açores R. A. Madeira
Medium		Burgos Palencia Segovia Soria Valladolid Zamora Ciudad Real Guadalajara Badajoz Cáceres Barcelona Gerona Lérida Alicante Valencia Ibiza Mallorca	Córdoba Granada Jaén Ceuta Melilla La Palma Tenerife Alto Minho Cávado Ave T. e Sousa		

TABLE 6. CONT.
GDP factorial decomposition (PPS): productivity/employment. 2000-2019

Employment/ Productivity	Very high	High	Medium	Low	Very low
High	La Coruña Lugo Orense Pontevedra Asturias Cantabria Álava Gipuzkoa Vizcaya Navarra La Rioja Huesca Teruel Zaragoza Madrid	Ávila León Salamanca Cádiz	Huelva Sevilla Murcia La Gomera Lanzarote AM.Porto T. Montes Algarve R. de Aveiro		

Source: Own elaboration using data from the National Institute of Statistics (INE) in Spain and Portugal.

In examining the data presented in Table 7, it becomes evident that the primary driver of the cumulative average variations in GDP (PPS) per capita is productivity (GDP per employee). While this factor plays a significant role, the approximation to the employment rate (employment per population) also exerts a notable influence. Previous studies have indicated that disparities between regions are due to differences in productivity and employment rates (Rodríguez, 1999).

Moreover, it is noteworthy that during the period of economic crisis (2007-2014), the rates of variation in productivity remained positive, with figures of 1.78% for the Iberian Peninsula and 1.45% for the Iberian Southwest. In the absence of capital cities, the employment rate exhibits a contrasting trend, with negative values (-2.44 for the Iberian Peninsula and -2.67 and -1.88 for the Iberian Southwest with and without capitals, respectively). This result is consistent with the economic consequences of the global financial crisis (GFC) that began in 2008 and continued until 2012. During this period, Spain experienced a significant loss of employment, with more than 7 million jobs lost (Rocha & Aragón, 2012). Rocha and Aragón (2012) observed that the unemployment rate rose to over 8 million, resulting in a total of over 24 million unemployed individuals in Spain.

Furthermore, in the analysis of productivity, the average growth in the Iberian Peninsula has been 2.11%. For the sample of provinces in the South-West of the Iberian Peninsula with capitals, it has been 3.56%. In contrast, for the South-West of the Iberian Peninsula without capitals, it has been 1.95% for the entire period (see Table 7). Some authors posit that the evolution of productivity is the key to achieving convergence in Spain and Portugal (López Martínez, 2001).

Regarding the employment/population ratio, an approximation of the employment rate reveals that it has grown by a mere 0.18% over the entire period in the Iberian Peninsula. Conversely, it has decreased slightly in the South-West of the Iberian Peninsula without capitals (-0.05%) and has increased in the South-West of the Iberian Peninsula with capitals (0.30%) (see Table 7).

TABLE 7.
CAAVR (%) of GDP PPS pc: productivity/employment. 2000-2019

CAAVR PIB PPSpc				
	2000-2007	2007-2014	2014-2019	2000-2019
Iberian Peninsula	5,07	-0,7	3,44	2,48
Southwest Iberia with capitals	4,83	-0,46	3,35	2,46
Southwest Iberia without capitals	5,17	-0,94	3,78	2,52
CAAVR Productivity				
	2000-2007	2007-2014	2014-2019	2000-2019
Iberian Peninsula	3,62	1,78	0,5	2,11
Southwest Iberia with capitals	3,61	1,45	0,35	1,95
Southwest Iberia without capitals	4,12	1,8	1,5	2,57
CAAVR Employment				
	2000-2007	2007-2014	2014-2019	2000-2019
Iberian Peninsula	1,4	-2,44	2,21	0,18
Southwest Iberia with capitals	1,18	-1,88	2,17	0,3
Southwest Iberia without capitals	1,01	-2,69	2,25	-0,05

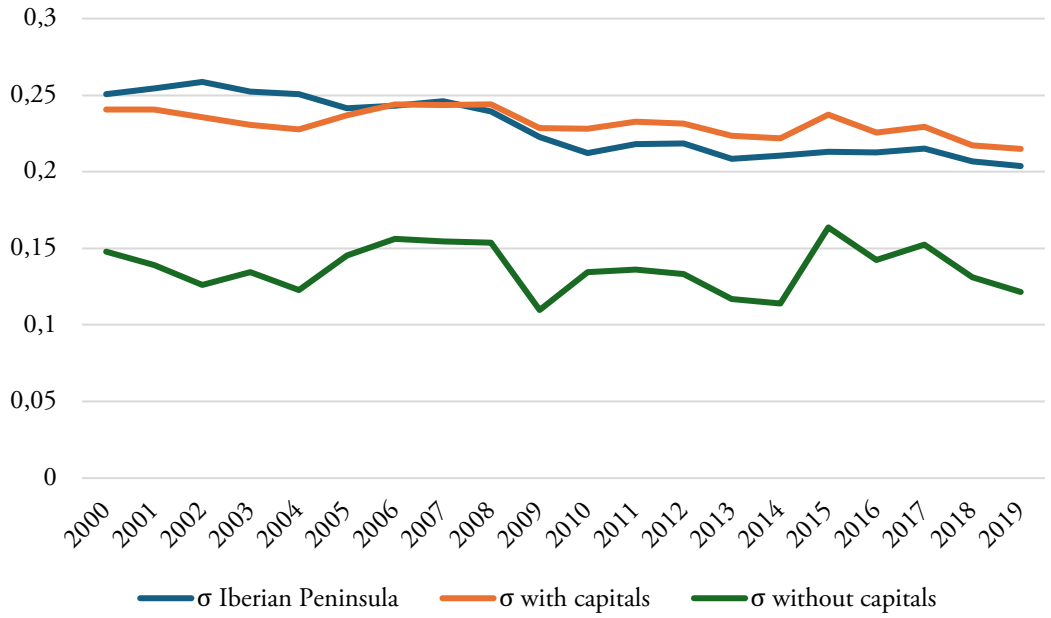
Source: Own elaboration using data from the National Institute of Statistics (INE) in Spain and Portugal.

4.3. σ CONVERGENCE

The evolution of σ convergence is illustrated in figure 1, which depicts both the Iberian Peninsula and the Iberian southwest corridor with and without capitals. The analysis of the period in question reveals a slight reduction in dispersion in both the Iberian Peninsula and in the Iberian Southwest Sorridor. With respect to the Iberian Peninsula, it can be observed that throughout the period from 2007 to 2010, a decrease in dispersion is evident, indicating the existence of economic convergence. From 2010 onwards, the trend line demonstrates fluctuations, yet economic convergence is evident throughout the analysed period.

However, in the case of the Iberian Southwest, excluding capital cities, dispersion analysis reveals a pattern of alternating convergence and divergence. Nevertheless, a slight convergence can be observed in the Iberian Peninsula from 2000 to 2019.

FIGURE 1.
σ Convergence of GDP (PPS) pc 2000-2019



Source: Own elaboration using data from the National Institute of Statistics (INE) in Spain and Portugal.

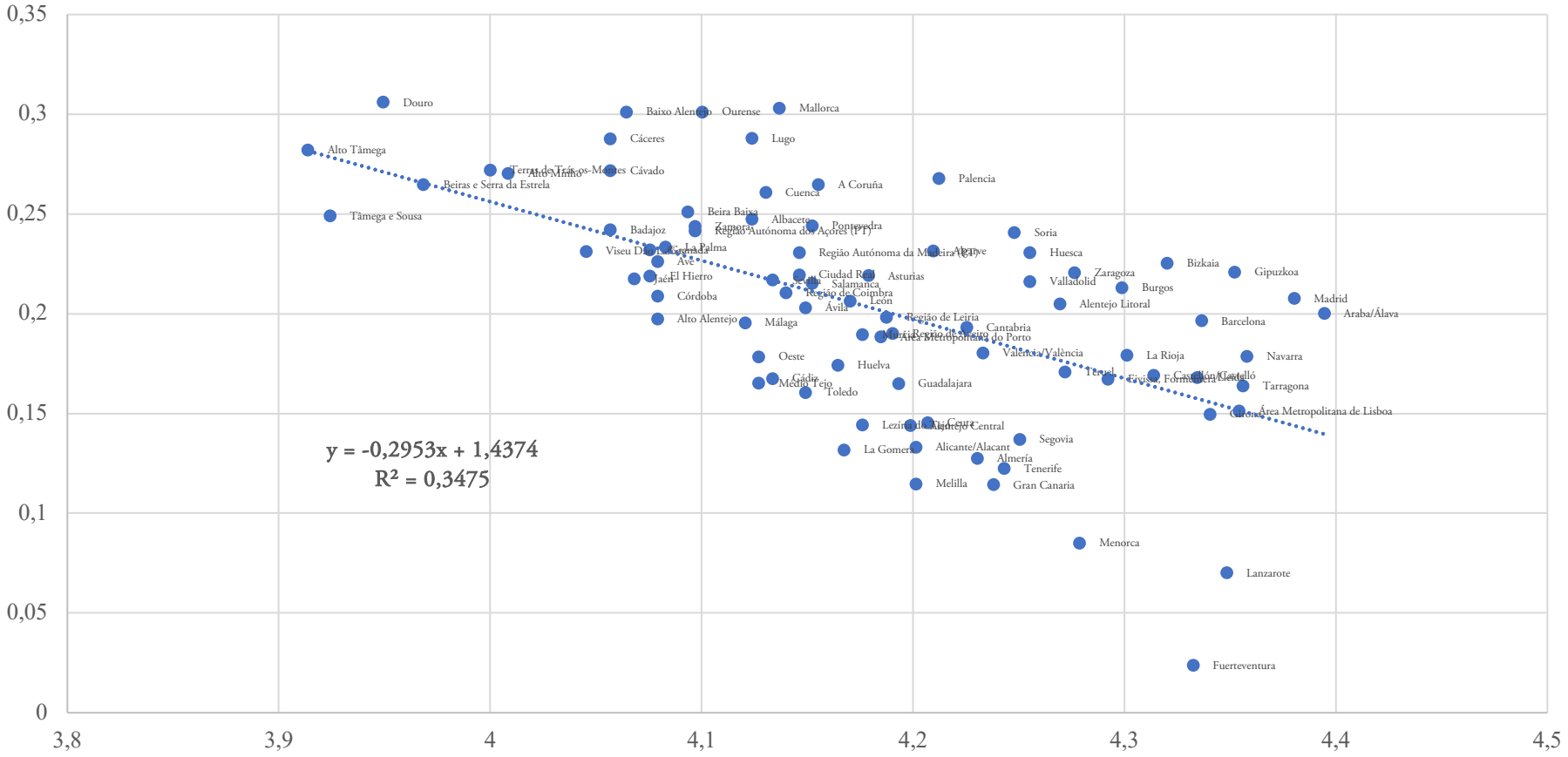
4.4. CONDITIONAL β CONVERGENCE

Sala-i-Martín (1994) posits that β convergence is a necessary, though not sufficient, condition for σ convergence. Nevertheless, the calculation of β convergence is of interest as a complement to this convergence. Figure 2 illustrates the variation in terms of growth of the logarithm of GDP (PPS) pc compared to its situation in the starting year for the period 2000-2019.

The second chart presents the results of the beta-convergence analysis. The x-axis depicts the gross domestic product (GDP) per capita at the outset of the period, while the y-axis illustrates the growth rate of the provinces at the conclusion of the period. The regression line displays a negative trend, thereby substantiating the existence of beta-convergence. Furthermore, it is evident that the provinces which exhibited a higher GDP per capita at the outset of the period subsequently experienced the lowest growth. Conversely, the provinces that commenced the period with a lower GDP per capita demonstrated higher growth rates.

The Canary Islands commenced the period under examination with a relatively high GDP per capita yet exhibited a lower growth rate. Conversely, the provinces exhibiting the highest growth rates are predominantly Portuguese, representing regions with initially lower income levels, along with a few Spanish provinces, including Cáceres, Badajoz, Lugo, and Mallorca. Nevertheless, despite experiencing this growth, they remain included in the low or medium-low levels of GDP per capita. In his analysis of Spanish regions from 1985 to 1999, López (2001) identifies Madrid, the Balearic Islands and Catalonia as the leading performers, followed by Extremadura, and Andalucía. Our analysis reveals that the ranking of the regions has remained largely unchanged. The Islands, including the Canary Islands, Madrid, Lisbon, Navarre, and Álava, continue to lead the list, as do the two provinces that constitute Extremadura (Cáceres and Badajoz), along with certain Portuguese provinces.

FIGURE 2.
Conditional β convergence of the Iberian Peninsula. 2000-2019



Source: Own elaboration using data from the National Institute of Statistics (INE) in Spain and Portugal.

4.5. γ Convergence

The γ convergence has been calculated from the the Spearman's Rho γ rank concordance indicator for the GDP (PPS) per capita variable (see table 8). To establish whether there is convergence, we must examine the correlation result. If the correlation is positive and close to 1, it means that provinces that were relatively richer or poorer in 2000 remain in the same position. If, on the other hand, the correlation is low or negative, it suggests that the poorer provinces have grown faster, indicating the existence of convergence.

The results indicate that for the Iberian Peninsula (0.05965), the correlation is very low, indicating economic convergence between the provinces. That is, the provinces with the lowest GDP per capita in 2000 have grown faster than the high-income provinces.

On the other hand, for the analysis of the gamma-convergence of the provinces that make up the Iberian Southwest, we can say that, for the analysis with capitals, the ratio is low (0.293). Therefore, a low level of convergence can be observed. This is not the case for the analysis of the sample without capitals, where the result indicates that there is no convergence, as the relationship between the variables is moderate (0.515). This indicates that the provinces remain in the same position as in the year 2000.

Table 8.
γ Convergence of GDP (PPS). 2000-2019

Sample	Rho Spearman
Iberian Peninsula	0,059653741
Southwest Iberia with capitals	0,293706294
Southwest Iberia without capitals	0,515151515

Source: Own elaboration using data from the National Institute of Statistics (INE) in Spain and Portugal.

5. Conclusions

The principal aim of this paper is to examine the economic convergence between the various NUTS 3 regions of the Iberian Peninsula over the period 2000-2019. In order to determine whether economic convergence has been achieved in the Iberian Peninsula and the region known as the Iberian Southwest Corridor during this period, this study pursues the objective set by EU policy of removing cross-border barriers.

The analysis revealed that, in general, GDP (PPS) per capita has increased between the sub-periods under consideration, within the specified broad time frame, in both the Iberian Peninsula and the Iberian Southwest. In conclusion, it can be stated that the Iberian Peninsula is characterised by a high prevalence of income poverty, with 44 provinces exhibiting a below-average income level compared to the rest of the sample. The same provinces consistently rank among the poorest, namely Cáceres, Badajoz, Granada, Córdoba, and Jaén, which are located in the south and southwest of Spain. Conversely, the provinces with the highest income are Madrid and those situated in the north of Spain, which also exhibit the highest industrial activity. Furthermore, the economic weakness of the Iberian Southwest is evident, apart from the capitals, Madrid and Lisbon.

In general, the Spanish NUTS 3 regions have exhibited an upward trend throughout the period under analysis, not only in terms of GDP, but also in terms of population. In contrast, the Portuguese NUTS 3 regions have demonstrated a positive variation throughout the period under analysis in terms of income, but not in terms of population. This discrepancy is related to the serious internal demographic desertification affecting the country.

Considering the factorial decomposition of GDP per capita, it can be concluded that productivity and employment are fundamental variables for economic growth. It thus follows that the governments of

Spain and Portugal, including the autonomous governments, must base their public policies on the promotion of employment and the provision of support to companies to increase productivity.

The results of the convergence analysis indicate that economic convergence occurred in the Iberian Peninsula between 2000 and 2019. It is possible that this convergence is not a result of the increase in GDP per capita of the Spanish provinces, but rather a consequence of the economic crisis of 2008. At that time, the average income of the Iberian Peninsula was almost identical to the average income of the Iberian Southwest Corridor, suggesting that the Portuguese provinces were in a state of economic convergence with the Spanish provinces at that particular time. This leads to the conclusion that economic convergence exists.

Conversely, an analysis of beta-convergence also permits the conclusion that there is economic convergence. Although not the subject of our analysis, we identified the presence of clusters comprising spatial units with values that are more closely aligned. From the outset, we observed disparate areas exhibiting comparable growth rates and levels of GDP per capita.

The growth and convergence witnessed in Portugal and Spain towards the EU average are well documented. However, significant internal asymmetries persist, necessitating attention to achieve a more equitable and sustainable convergence.

As principal limitations, we propose the incorporation of supplementary variables to enhance this study, including an investigation of convergence in terms of wages, working conditions, and cross-border mobility. Additionally, we suggest the implementation of exploratory analyses that consider sectoral and territorial discrepancies between the various spatial units under examination. Conversely, the evident disparity in rates of variation, both in employment and productivity, is apparent both in space and time. This justifies the analysis of socioeconomic patterns to gain a deeper understanding of the underlying dynamics and to make more informed decisions.

In terms of future research, it is notable that, at the joint level of Spain and Portugal, there is a prevalence of independent axes of economic growth. The consolidation, definition, and optimisation of new axes of Iberian socioeconomic growth will provide greater articulation, harmonisation, and meaning to the joint progress of the Iberian Peninsula. Another future line of research aims to assess the impact of European policies (mainly EU structural and cohesion funds) on the process of economic convergence between Spain and Portugal. This will enable the identification of necessary adjustments to improve their effectiveness.

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