Regional incomes in Portugal: industrialization, integration and inequality, 1890-1980[1]

Marc Badia-Miró,
Departament d'Història i Institucions Econòmiques, Facultat d'Economia i Empresa, Universitat de Barcelona.
Centre d´Estudis 'Antoni de Capmany' d´Economia i Història Econòmica.
Xarxa de Referència d'R+D+I en Economia i Polítiques Públiques.
Av. Diagonal, 690, Torre 2, Planta 4, 08034, Barcelona, Spain. mbadia@ub.edu

Guilera, Jordi
Departament d'Història i Institucions Econòmiques, Facultat d'Economia i Empresa, Universitat de Barcelona.
Centre d´Estudis 'Antoni de Capmany' d´Economia i Història Econòmica.
Xarxa de Referència d'R+D+I en Economia i Polítiques Públiques.
Av. Diagonal, 690, 08034, Barcelona, Spain. jguilera@ub.edu

Lains, Pedro
Instituto de Ciências Sociais, Universidade de Lisboa and Católica Lisbon School of Business and Economics.
Av. Aníbal Bettencourt, 9, 1600-189 Lisboa, Portugal. pedro.lains@ics.ul.pt

Resumen

El análisis de la evolución de la localización de la actividad económica en Portugal, entre 1890 y 1980, nos muestra un fuerte proceso de concentración de la producción en las zonas costeras, coincidiendo con el proceso de decadencia de las provincias agrícolas del interior. A su vez, la evolución de la desigualdad espacial sigue una curva U-invertida, en la línea de lo observado en otras regiones de Europa, pero con el punto máxima desigualdad hacia 1970, mucho más tarde que esas regiones. Las razones de ese comportamiento estarían en las dificultades que tuvo el país para modernizar la economía

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en aquellas regiones más atrasadas, sobretodo la industria, y las ventajas que generaron las economías de aglomeración en las regiones más desarrolladas.

Palabras Clave: Convergencia regional, industrialización, Portugal, Integración de mercados.

JEL: N9, R1

Abstract

The analysis of the evolution of the localization of the economic activity in Portugal, among 1890 and 1980, shows a strong process of concentration of the economic activity in the coastal zones, coinciding with the process of decline of the agriculture in the inner provinces. At the same time, the evolution of spatial inequality follows a U-inverted curve, in line with that observed in other regions of Europe, with the unequal peak around 1970, much later than those regions. The reasons for this behavior would be found in the difficulties experienced by the country in their effort to modernize the industry in the lagged regions, and the benefits generated by the agglomeration economies in the more developed regions.

Keywords: regional convergence, industrialization, Portugal, market integration.

JEL: N9, R1

Regional incomes in Portugal: industrialization, integration and inequality, 1890-1980

1. Introduction

In the century from 1890 to 1980, the transformation of the Portuguese economy was considerable, as it started as highly protected and predominantly rural and become relatively open and industrialized. Such transformations are well documented in the literature, in terms of the main macroeconomic variables, but one field has remained largely unexploited, namely, the evolution of regional income distribution[2]. That lacuna is particularly relevant, given the qualitative evidence regarding the displacement of economic activity to the urban regions on the coast, and the decline of the interior regions. This paper is a first attempt to measure the evolution of regional income levels across the twentieth century and, at the same time, an effort to go deeper into the study of the Portuguese case, an example of small country with a later process of market integration. To do that, we provide decennial estimates of Portuguese regional GDP per capita from 1890 to 1960, using the methodology proposed by Geary and Stark (2002), based on data on wages and prices for the 18 administrative districts, which are then linked to the existent official data from 1966 to 1980. Our estimates show that regional inequality had been increasing throughout the period here analyzed to 1970, as economic activity tended to concentrate in the coastal regions and especially around Lisbon, whereas the inner regions, particularly in the Northeast, lost ground. Then, spatial inequality began to decrease due to the economic expansion of the poorer regions.

The U-shaped pattern observed while the country was developing fits with the predictions of Williamson (1965), but also fits with the predictions of Krugman (1991) and the so-

[2] See Lopes (1996) and Lains (2003a).

called “new economic geography”, where the existence of scale economies, the decrease in transport cost and openness to international markets, favored a rise and then a fall in regional inequality, due to the presence of agglomeration economies at the beginning and the congestion costs at the end. Additionally, as Barro and Sala-i-Martín (1991) note, the Solow model predicts that comparative advantages determined economic location and regions tended to converge in terms of factor prices.[3]

But, comparing the Portuguese case with other countries with a big market, one question arises: which are the reasons behind his late peak? Our hypothesis suggests that in small countries home market effect is strongly related to trade openness, whereas in those countries with a big market, home market effect is closely associated to the home market integration. If this were so, the internationalization of the Portuguese economy would be behind the increase in spatial inequality until 1970. In that sense, we expect the analysis of the level of regional specialization to shed some light on it.

Unlike the previous period, from 1995 onwards the study of the economic geography has been broadly studied in the literature. Soukiazis and Antunes (2011) worked in our same direction. They are interested in checking the impact of openness into regional growth, which found that was important, especially for the litoral regions. Other works were focused in other drivers as European funds in Soukiazis and Antunes (2006), tourism in Soukiazis and Proença (2008) and education in and Fidalgo et al. (2010). Vieira et al. (2006) found that differences in regional wages were related to education. Pereira and Galego (2011) are also focused in wages. Both of them found that most of male wages differences among regions were explained by regional endowments as well as more skilled workers, better occupational structure and large firms.[4]

[3] Fujita et al. (1999) and Combes et al. (2008) provides a useful background in economic geography.
[4] They work is not exactly comparable to our work because they consider NUTS-II division,

The paper proceeds as follows. Section two presents an overview of Portuguese economic growth across 1890-1980. Section three provides a summary of the reconstruction of the regional GDP. Section four analyses the evolution of the regional GDP in the long run, considering the impact of the structural change and the economic openness in the location of the economic activity. Section five concludes.

2. Economic growth, openness and structural change, 1890 – 1980

During the twentieth century, Portugal entered the convergence club and its level of income per capita caught-up, albeit only partially, to the levels of the more advanced European nations. Contrastingly, the previous century was marked by divergence of Portugal's productivity and income levels as, despite a fair rate of industrialization, GDP per capita expanded at an annual rate below 1%[5]. Portugal's recovery in the twentieth century, however, occurred with different degrees of intensity. During the interwar period, convergence was relatively slower, whereas after World War II, economic growth gained momentum and the rate of convergence was considerably faster. That pattern was common to other peripheral European countries, such as Spain and Greece. After the 1973 oil shock, the European economy entered a period of slower growth and divergence of the less developed economies on the continent returned. Table 1 shows that catching-up occurred from the late 1920s to the Second World War, that is, in a context of restricted international economic openness. After the War the pace of catching-up steeped up, this time in a context of increasing openness, declining thereafter to 1980, to resume briefly following the accession to the European Communities that occurred in that year.

Table 1 - Growth of Real Income per capita (1870-1986)

	Portugal	European core

[5] See Maddison (2010) and Lains (2003b; 2007).

1870-1890	0.66	1.07
1890-1913	0.40	1.32
1913-1929	1.35	1.39
1929-1938	1.28	1.16
1938-1950	1.56	1.00
1950-1973	5.47	3.55
1973-1986	1.52	2.01

European core: Belgium, Denmark, France, Germany (West Germany to 1991), Italy, Netherlands, Norway, Sweden and United Kingdom.
Source: Lains (2007) and Pereira and Lains (2011).

Source: Pereira and Lains (2011)

The evolution of the Portuguese economy over the twentieth century shows no clear relationship between convergence and phases of international economic integration. In fact, economic growth was fastest during the interwar years, which was a period of high trade barriers and autarky, and during the golden age of European growth, from 1950-1973, a period of greater openness. However, the integration of the European economies, particularly within the European Union increased after 1973 and convergence did not follow suit. Structural change was a major source of convergence in the period covering the first half of the twentieth century, and the golden age, as factors moved from agriculture to industry and, within each sector, from less to higher productivity industries. After 1973, the scope for structural change was substantially reduced[6].

The transformation of the Portuguese economy throughout the period covered had a strong regional impact. Rapid industrialization and the growth of the service sector were made possible by the shift of resources and particularly labour out of agriculture. The growing sectors were concentrated in the main coastal cities, particularly in Lisbon and

[6] See Lains (2003a).

Porto, and the inland regions loss a substantial share of its population. That effect was further reinforced by emigration which originated mainly in the interior rural regions. These regional shifts in economic activity continued across the twentieth century and by 1981 about close to 3.5 million people, out of a population of 10 million, leaved in one of the largest urban areas in Europe, that stretch 400 kilometres along the coast from Viana do Castelo in the the north to Setubal, south of Lisbon[7]. The main driver of these internal migrations were however different, with more concentration of manufacturing activities in the north and of commerce and the service and sector in the south, particularly in Lisbon.

3. Regional GDP, 1890 – 1980

Following Geary and Stark (2002), to estimate regional GDP per capita (in current prices and at factor costs) we start by estimating regional gross value added (GVA) for a number of sectors, which are then aggregated by using their shares on total output.[8] For the period from 1890 to 1920, we provide estimates of regional sectorial GVA for agriculture, industry and services; from 1920 to 1950, we add estimates for mining, construction and electricity; from 1930 to 1950 we also add data on electricity and gas production; finally, from 1960 onwards we use official data on sectorial production at the regional level. Official attempts to obtain data of regional GDP estimations of Portugal start at a very early year. Abreu (1969), an official publication from INE, provides data for the historical division for 1953 and 1963 for three sectors (agriculture, industry and services). For 1970, da Conceição (1975) also an INE publication, provides data for the historical division for 8 sectors. For 1980 we use data provided by INE (1991).

[7] Valério ed. (2001), pp. 142-145.
[8] For further details see Badia-Miró et al. (2012). Other works considering the same approximation are Crafts and Mulatu (2005); Wolf (2005); Buyst (2010); Rosés et al. (2010); Henning et al. (2011); Combes et al. (2011) and Felice (2011).

Thus, total sectorial regional GDP per capita is given by,

$$GDP_{it} = GVAA_{it} + GVAM_{it} + GVAI_{it} + GVAC_{it} + GVAE_{it} + GVAS_{it} \quad (1)$$

where *GVA* is gross value added and *A, M, I, C, E* and *S* are agriculture, mining, industry, construction, electricity and services, respectively. Total GDP is distributed between the different regions, and is defined as:

$$GDP = \sum_i GDP_i \quad (2)$$

where GDP_i is the GDP of region i. In that sense, the GDP_i is defined as

$$GDP_i = \sum_j gdp_{ij} \cdot L_{ij} \quad (3)$$

where gdp_{ij} is the average value-added per worker in region *i* in sector *j* and L_{ij} is the corresponding number of workers. If we consider that the differences in regional *GDP* are related with the differences between the productivity of an economic sector among the regions and, at the same time, this is captured by the differences in nominal wages, we can transform (3) as:

$$GDP_i = \sum \left[gdp_j \cdot \beta_j \cdot \left(\frac{w_{ij}}{w_j} \right) \right] \cdot L_{ij} \quad (4)$$

where w_{ij} is the wage paid in region i in sector j and w_j is the national average wage in that sector and β is a scalar which preserves the relative regional differences but scales the absolute levels. As a result, the addition of *GDP* estimates for each sector at the regional level is equal to the sector estimates at the national level.

Our estimates for regional GDP per capita are presented in Table 2 and Map 1. As we may see there, the top three regions remained unchanged throughout the period, namely, Lisbon, Porto and Setúbal. On the other hand, at the tail of the rank, the mobility is higher although Viseu, Guarda and Castelo Branco have remained at the bottom. Some regions got worst off, such as Bragança and Vila Real, as they were among the richest in 1890 and ended up being at the bottom by 1980. On the other hand Leiria and Aveiro improved significantly their position over the century.[9] Table 2 also shows that the range of levels of income per capita increased substantially between 1890 and 1970 and declined in the following decade. In 1890 the level of income per capita of the richest region was slightly more than twice that of the poorest; in 1970 the leader region was more than four times richer than the bottom region and, in 1980 that gap fell to 2.8. Map 1 depicts in a very clear way the increase in the relative levels of income per capita in the coastal regions.[10]

[9] Rank size test shows stability during all the period, and among each subgroup. This stability is also observed in the Spanish case as Rosés et al (2011) pointed out.

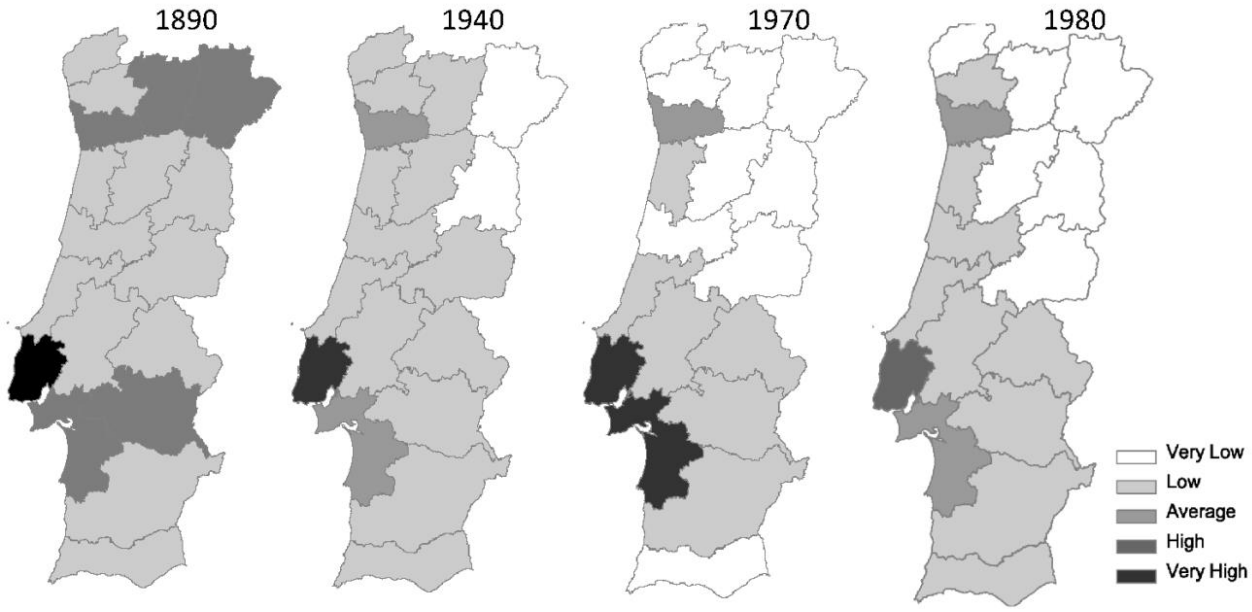
[10] For trends after 1980, see Soukiazis and Antunes (2006, 2011).

Table 2- Per capita GDP ranking of the Portuguese regions (1890-1980). Portugal=100

1890		1920		1930		1940		1953		1963		1970		1980	
Lisboa	158	Lisboa	190	Lisboa	163	Lisboa	190	Lisboa	175	Lisboa	177	Lisboa	180	Lisboa	147
Porto	117	Setúbal	146	Setúbal	131	Porto	118	Setúbal	135	Setúbal	145	Setúbal	157	Setúbal	121
Setúbal	113	Porto	135	Porto	122	Setúbal	100	Porto	110	Porto	109	Porto	101	Porto	102
Évora	108	Coimbra	86	Coimbra	93	Portalegre	86	Évora	109	Aveiro	96	Aveiro	87	Aveiro	96
Vila Real	106	Santarém	82	VC	91	Évora	86	Portalegre	106	Évora	96	Santarém	79	Évora	94
Bragança	106	Bragança	82	Santarém	88	Santarém	85	Santarém	100	Portalegre	92	Évora	77	Faro	91
Santarém	94	Aveiro	81	Aveiro	87	VC	84	Beja	95	Santarém	80	Leiria	77	Santarém	89
Portalegre	93	Braga	80	Évora	86	Coimbra	83	Aveiro	87	Leiria	79	Portalegre	74	Portalegre	86
Braga	90	Évora	80	Bragança	86	Aveiro	80	Leiria	83	Beja	78	Beja	72	Coimbra	86
VC	90	Portalegre	79	Leiria	85	Braga	78	CB	79	Coimbra	75	Coimbra	70	Leiria	85
Beja	89	Leiria	78	Portalegre	84	Beja	77	Coimbra	77	Faro	71	Braga	70	Braga	78
Guarda	89	Vila Real	76	Vila Real	81	Leiria	77	Faro	75	CB	71	CB	70	Beja	73
Aveiro	88	VC	74	Guarda	79	Faro	74	Braga	70	Braga	67	Faro	64	CB	68
Leiria	88	Guarda	72	Braga	79	Vila Real	72	Bragança	63	Bragança	63	Bragança	63	Viseu	57
Coimbra	87	Faro	70	Faro	74	CB	72	Vila Real	63	Vila Real	59	Guarda	53	Guarda	56
Viseu	78	CB	70	Beja	73	Viseu	72	Viseu	60	Guarda	58	Viseu	45	VC	55
CB	76	Beja	66	CB	72	Bragança	69	VC	59	Viseu	56	Vila Real	44	Bragança	55
Faro	71	Viseu	57	Viseu	66	Guarda	65	Guarda	53	VC	52	VC	43	Vila Real	53

Source: See text.
Note: VC is Viana do Castelo and CB Castelo Branco

Map 1 - Regional GDP per capita over country average, 1890 - 1980[11]

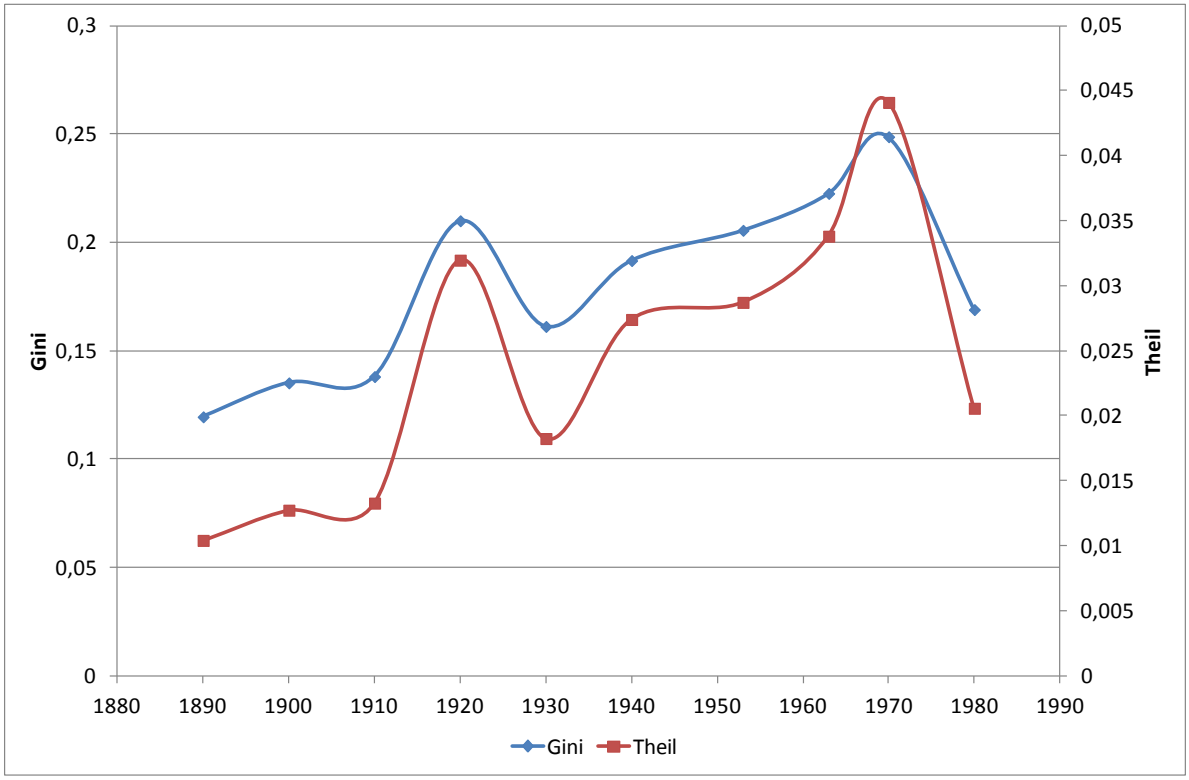


Source: GDP per capita from Badia-Miró et al. (2012).

Finally, Figure 2 shows the Gini and Theil coefficients for regional per capita GDP inequality. As may be seen in this Figure, both indexes evolve very closely, increasing until 1970 to decrease afterwards. The U-shaped evolution introduced by Williamson (1965) is also observed in other case studies[12], but significant differences are also observed: the highest value of spatial inequality in Portugal appears in the 1970s and a strong decline is observed thereafter, more than fifty years later than the peak reached in Spain, France or the USA. We also observe a lower degree of inequality in Portugal, at the beginning of the 20th century, due to the absence of economical structural changes and the delay in driving the industrial modernization.

[11] We have defined the categories considering five groups equally, distributed for the range for all the values. This is the reason because in 1980 any region had a very high value, and also is a sign of less inequality.
[12] For Spain see Rosés et al. (2010), for France see Combes et al. (2011) and Crafts and Mulatu (2005) among others,

Figure 1 - Per capita GDP Inequality



Source: See Badia-Miró, Guilera, and Lains (2012).

4. Patterns of specialization

Regional per capita GDP estimates show that inequality followed an inverted-U curve peaking high in 1970. This section aims to identify the underlying forces that drove regional inequality in Portugal. Income differences between regions could be due to divergences in the productive structures, in the sectoral productivity levels or to the interaction of both factors. All these variables are closely related to the process of structural change that was experimenting the Portuguese economy during the period studied. The identification of the leading forces in each Portuguese district is a key finding in order to characterize the regional pattern of development and its impact on overall regional income inequality. Besides, the interaction of both factors may provide some clues to the existence of agglomeration economies, which are a major inequality driver

of the left-hand side of the inverted-U curve according to the NEG models. Additionally, the identification of the causes of regional backwardness may provide some insights on the kind of policies that should be implemented in order to converge with the richer regions.

To this end, we present different descriptive indexes broadly used in regional economics to analyse the Portuguese case. In order to test the relation between regional per capita levels and regional productive structures we compute several measures of specialization. The first index, defined by Krugman, namely:

$$SI_{jk} = \sum_{i=1}^{n} \left| \frac{E_{ij}}{E_j} - \frac{E_{ik}}{E_k} \right| \qquad (5)$$

where E_{ij} is the level of employment industry i = 1,..., n for region j and E_j is the total industrial employment for region j and similarly for region k. The index value ranges between 0, when the two regions have similar economic structures, to 2, when they are complementary. The index is estimated for each pair of regions, and then regional specialization is given by the average of the 18-1 estimates for each region. Similarly, the national index is given by the average of the regional estimates.

According to our findings, the *SI* index for Portugal is relatively stable until 1930 and then increases significantly up to 1970 to decline in the decade to 1980 (see table 3). The trends in the specialization index from 1930 to 1970 follow closely that of regional inequality. In fact, as it may be seen in table 2 and table 3, the four regions at the top of the GDP per capita ranking (Lisbon, Setúbal, Porto and Aveiro) are also the regions with the highest values for the specialization index. This relation may be due to the fact that different economic sectors are associated with different productivity levels, and thus, an

increasing regional specialization would lead to increasing economic inequality. For similar reasons, the decline of the *SI* index from the 1970s onwards may be associated with the decline in regional inequality.

Our specialization index at the national level remained stable until the 1930s, but it changed significantly at the regional level before the 1920s, growing in some regions and decreasing in others. Therefore, it seems that the pattern of specialization may not be able to explain the variations on the evolution of regional inequality before the 1930s, which point to productivity changes between the different economic sectors as the main candidate to explain those variations.

In order to look deeper in the process of regional specialization it may be interesting to focus specifically on the industrial sector, given that the emergence of this sector is often related with modern economic growth. For that purpose we estimate two other indices, namely, the Location Quotients for Employment and for Gross Value Added that are defined as follows:

$$LQ_{EMP} = \frac{E_{ij} / E_j}{E_i / E} \tag{6}$$

$$LQ_{GVA} = \frac{GVA_{ij} / GVA_j}{GVA_i / GVA} \tag{7}$$

Where E_{ij} is the level of employment in industry i for region j and E_j is the total employment for region j. The LQ_{GVA} is defined in the same way. Location quotients above 1 imply a level of industrialization above the national average and vice versa. As it may

be seen in table 4 and table 5, the results for *LQ* for employment and *GVA* are very similar. Lisbon, Porto, Setúbal, Braga and Aveiro have *LQ* above the average. It is also interesting to see that Porto and Lisbon lost ground, while the other among the top, increased their *LQ*. Regarding the rest of the regions, although in some of them their *LQ* remained stable, in the vast majority, their *LQ* followed a U-shape, decreasing until 1970 and increasing thereafter, pointing to a process of deindustrialization at the regional level that would not reverse until the 1970s.

Besides the characterization of the productive structure of each region, these specialization indexes may have a clear relation with the regional levels of GDP per capita. In order to assess this hypothesis, table 6 presents the coefficients of correlation between GDP per capita of each region and the three different indexes. As it may be expected, there is a positive relation between the three different indexes and GDP per capita. What perhaps may be counter-intuitive, to a certain extent, is the fact that the intensity of this relation until 1970 is very strong in the case of the Krugman Index but is much less evident for the Location Quotients. This could be due to two different causes. On the one hand, there may be significant productivity differences in the industrial sector of the different regions, which may counterbalance the potential impact of industrialization on economic growth. On the other hand, the closer relation of the *SI* index with GDP per capita levels may suggest that the emergence of the service sector may have also played a decisive role in the expansion of economic activity in the more dynamic regions. The evidence presented in the next exercise suggests that both explanations were significant.

Table 6 also shows that the correlation of the three indexes with regional GDP per capita, decreases significantly during the last decade. This may be due to the convergence in the productive structure of the Portuguese regions during the last decades. The fading relation

between regional productive structures and GDP per capita may indicate that productivity changes are the main drivers of regional inequality during the 1970s.

Table 6 - Coefficient of correlation between GDP per capita and Location Quotients GVA

	1890	1900	1910	1920	1930	1940	1950	1960	1970	1980
SI index	0,872	0,796	0,854	0,876	0,840	0,913	0,702	0,750	0,733	0,494
LQ Emp	0,501	0,611	0,540	0,745	0,640	0,510	0,410	0,521	0,489	0,433
LQ GVA	0,477	0,593	0,529	0,433	0,538	0,690	0,368	0,529	0,501	0,367

Kim (1999) provides a useful exercise to see the causes that may explain income differences at the regional level. It consists in estimating two hypothetical GDP per worker estimates. The first one is based on the assumption that all regions have the same productivity levels for each sector, and also, that the distribution of the labour force among the different sectors (industry mix) is identical, which would provide an estimate of per worker GDP equal to the national average. The second hypothetical per worker GDP is estimated under the assumption that each region has the same productivity levels at the industry level but they have different industry mixes. The difference between the two hypothetical incomes provides a measure of income differences due to the divergence in regional industrial structures (*industry mix effect*). And the difference between the actual and the hypothetical industry mix per worker GDP provides a measure of regional per worker GDP differences due to the divergence in the productivity (*productivity effect*). Table 7 shows our estimates for 1890, 1930, 1970 and 1980.[13] We may note there, that there is a strong correlation between industry-mix effects and productivity effects, although the intensity of those effects varies in each region. This relation would imply that there may be economies of scale and agglomeration effects, because this exercise

[13] The estimates for the remaining years have also been calculated and are available from authors upon request.

shows that when the productive structure tends to be specialized in industry or services those sectors tend to have higher productivity levels.

Both industry-mix and productivity effects have a sizeable impact in the divergence of regional incomes and their relative importance is very similar. Another regularity that has to be mention is that the divergence of each region tends to be explained by the same force (productivity effects or industry mix) over time. The causes of success and failure of the different Portuguese regions, therefore, would be extremely stable in the long term, which may serve as a guide to the implementation of regional policies aimed to shrink regional inequality. In this sense, if regions diverge because of the industry mix, they should promote structural change, whereas if the divergence is due to its productivity levels, they should focus their attention increasing their productivity at the sector level.

This exercise may also be useful to analyse the process of economic growth in Portugal at the regional level. Not only there are remarkably differences among the different districts, but also the causes of their divergence differ significantly. It is interesting to focus on the case of Porto. Porto's relatively high per capita income is explained by the industry mix (with a large share of employment in the industrial sector) because productivity effects run in the opposite direction. This is due to the fact that Porto's industrial sector was very large but its productivity levels were below the national average. This situation shows that Porto is specialized in relatively backward industries, such as the textile industry. Porto, until 1980, was the largest industrial region of Portugal both in absolute and in relative terms. And it is particularly striking that scale economies and agglomeration effects did not appear precisely here.

The case of Lisbon is quite different, because during the period analysed, both industry mix and productivity effects contributed to its high per worker GDP. Setúbal is the third region with its GDP per worker above the average until 1980. The process of structural

change in this region advanced with a very similar timing than at the national level, whereas sector productivities were almost always above the national average. Contrarily to the case of Porto, then, Setúbal's success would be only explained by productivity effects.

The remaining regions are below the GDP per worker national average, and they can also be classified in three different groups according to their main driving divergence force. Aveiro, Braga, Coimbra and Faro's divergence is mainly explained by the productivity effects. Beja, Bragança, Leiria, Portalegre, Santarém and Vila Real's divergence is mainly due to their industry mix. And in the remaining regions: Castelo Branco, Évora, Guarda and Viana do Castelo and Viseu, both factors play a significant role.

5. Conclusions

Regional inequality in Portugal followed an inverted U-curve with a turning point in 1970. The ranking of regional per capita income was quite stable overtime, although the distance between the top and the bottom followed a similar trend than the evolution of regional inequality. In order to see the causes behind the evolution of regional inequality, some exercises have been performed. The evolution of the SI index showed that regional specialization increased until 1970 to decrease afterwards. That is, in 1970 the Portuguese regions achieved its maximum heterogeneity regarding their productive structure. From another perspective, Location Quotients pictured the same process, stating that the majority of Portuguese regions de-industrialized until 1970, when industrialization spread all over the country. The evolution of these indexes may be related with the inverted-U curve in the evolution of regional inequality.

There seems to be a high correlation among the size of industrial or services sectors and its productivity, pointing to the existence of strong scale economies. This relation holds in most of the Portuguese regions, in the sense that both regional productivity and

productive structure push the regions per capita GDP in the same direction (above or below the mean per capita income). In this context, the case of Porto is quite striking, because having the largest industrial sector among all the regions, its industrial productivity falls below the average, which suggest that it was specialized in relatively backward industries.

The evolution of economic inequality in Portugal, in the long term, showed a gradual increase of the regional inequality, which coincides with openness of the country to the international markets and with the process of industrial expansion. This is followed by a rough fall in inequality, showing a well-shaped Kuznets curve. The exceptionality of the Portuguese case in comparative perspective regarding the drivers and the turning point of regional inequality raise the interest in studying the case with more detail. Unlike what had happened in other European countries, when regional inequality peaked at the end of the 19th century or during the first third of the 20th century driven by home market integration, in Portugal this is not detected until 1970. Some of the reasons which explain the evolution of the regional inequality also explain this delay. First of all, a large part of the increase of the regional inequality is explained by the impact of agglomeration economies in the most developed regions, in a context of an intense productive specialization process accompanied by productivity gains, especially in the industry and the service sector. This process was favored by the home market effect during the internationalization of the Portuguese economy, as Buyst (2011) showed for Belgium. In that sense, in small countries, regional inequality increased during their openness to the international markets. The backwardness of the Portuguese economy, especially of the agrarian sector, overemphasized it. Secondly, some of the observed inequality, could be explained by the differences of the industrial productivity among provinces, and the difficulties that the traditional sectors had to modernize. Thirdly, the expansion of the

service sector leaded the reduction of the regional inequality during the 1970s and the 1980s. And lastly, the closeness of the Spanish frontier during most of the 20th century, avoid that the inner regions took advantage of being close to a market in fast expansion.[14] In that sense, the Portuguese case is not an exception of a country with large economic regional differences. However, this uneven distribution of the economic activity is not the result of a unique path of regional economic performance.

The high level of concentration of the economic activity in Lisbon already present at the end of the 19th century was reinforced from the 1940s till the 1970s to decline thereafter. The economic importance of Porto's province declined trapped in a low-productivity industrial sector. Other important facts were the movement of the economic activity from the hinterland to the coast, the industrial and also economic development of some regions, and the permanence of economic backwardness in other, which are phenomena that require further analysis. Some of them are the result of a long lasting process with deep historical roots that makes this study necessary. An example of that is the analysis of the economic response of the regions in late 19th century, when the country was predominantly agricultural, the industry was restricted to areas such as Lisbon, Porto and Braga and the country was suffering a strong process of internal market integration, with the construction of the railway and the expansion of coastal navigation.

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[14] The impact of being close to the Spanish frontier on the economic growth needs a deep analysis. The positive impact of being close to a big market, when the trade policy made it available, could be balanced by the fact the Spanish regions close to the frontier were the poorer ones, see Tirado and Badia-Miró (2012).

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Table 3 - Krugman Index

	1890	1900	1910	1920	1930	1940	1950	1960	1970	1980
Aveiro	0,218	0,201	0,255	0,239	0,261	0,283	0,382	0,492	0,556	0,474
Beja	0,199	0,206	0,207	0,210	0,218	0,252	0,329	0,383	0,456	0,373
Braga	0,210	0,230	0,241	0,251	0,264	0,286	0,396	0,447	0,527	0,517
Bragança	0,298	0,260	0,243	0,254	0,268	0,298	0,332	0,447	0,556	0,469
Castel Branco	0,236	0,206	0,210	0,213	0,218	0,244	0,271	0,303	0,357	0,320
Coimbra	0,203	0,194	0,208	0,203	0,208	0,230	0,288	0,338	0,387	0,338
Évora	0,239	0,227	0,244	0,231	0,224	0,235	0,271	0,319	0,370	0,323
Faro	0,214	0,207	0,230	0,207	0,200	0,230	0,249	0,292	0,368	0,383
Guarda	0,205	0,208	0,225	0,230	0,231	0,245	0,290	0,341	0,396	0,366
Leiria	0,203	0,197	0,207	0,204	0,208	0,223	0,253	0,300	0,376	0,349
Lisboa	0,834	0,851	0,861	0,865	0,875	0,882	0,883	0,904	0,884	0,675
Portalegre	0,246	0,205	0,216	0,207	0,215	0,233	0,275	0,329	0,403	0,347
Porto	0,513	0,578	0,614	0,645	0,681	0,718	0,763	0,789	0,768	0,544
Santarém	0,200	0,192	0,208	0,203	0,201	0,221	0,248	0,302	0,365	0,323
Setúbal	0,293	0,290	0,340	0,318	0,297	0,394	0,432	0,520	0,620	0,515
Viana do Castelo	0,326	0,456	0,276	0,274	0,273	0,284	0,250	0,301	0,445	0,398
Vila Real	0,404	0,310	0,310	0,306	0,299	0,305	0,321	0,442	0,501	0,482
Viseu	0,259	0,246	0,257	0,260	0,259	0,272	0,289	0,363	0,438	0,432
Portugal	0,294	0,293	0,297	0,296	0,300	0,324	0,362	0,423	0,487	0,424

Table 4 - Location Quotients Employment

	1890	1900	1910	1920	1930	1940	1950	1960	1970	1980
Aveiro	0,909	1,000	1,084	1,073	1,154	1,206	1,327	1,464	1,442	1,372
Beja	0,882	0,734	0,874	0,808	0,711	0,584	0,436	0,436	0,372	0,579
Braga	0,984	1,154	1,096	1,134	1,183	1,214	1,413	1,368	1,419	1,440
Bragança	0,566	0,577	0,599	0,553	0,490	0,468	0,397	0,373	0,284	0,488
Castel Branco	1,170	1,045	0,949	0,960	0,979	1,013	0,940	0,884	0,851	0,929
Coimbra	0,908	0,893	0,839	0,804	0,762	0,755	0,750	0,768	0,792	0,858
Évora	0,749	0,775	0,706	0,689	0,671	0,666	0,525	0,558	0,600	0,709
Faro	0,688	0,746	0,749	0,763	0,778	0,932	0,782	0,765	0,740	0,710
Guarda	0,962	0,816	0,742	0,729	0,715	0,665	0,592	0,533	0,617	0,762
Leiria	0,709	0,755	0,723	0,739	0,759	0,768	0,828	0,868	0,993	1,079
Lisboa	1,604	1,579	1,503	1,442	1,363	1,208	1,121	1,095	0,946	0,831
Portalegre	0,806	0,790	0,814	0,744	0,649	0,631	0,502	0,504	0,456	0,629
Porto	1,888	1,843	1,720	1,730	1,747	1,769	1,761	1,652	1,524	1,322
Santarém	0,745	0,841	0,722	0,718	0,721	0,763	0,715	0,784	0,835	0,925
Setúbal	0,918	0,957	1,106	1,116	1,113	1,379	1,338	1,311	1,216	1,135
Viana do Castelo	0,505	0,062	0,580	0,579	0,570	0,518	0,685	0,713	0,561	0,739
Vila Real	0,417	0,464	0,463	0,432	0,392	0,427	0,406	0,362	0,350	0,500
Viseu	0,707	0,637	0,613	0,575	0,528	0,514	0,516	0,472	0,465	0,616

Table 5 - Location Quotients GVA

	1890	1900	1910	1920	1930	1940	1950	1960	1970	1980
Aveiro	0,813	0,861	1,002	1,223	1,207	0,946	1,475	1,544	1,393	1,485
Beja	0,669	0,575	0,705	0,813	0,624	0,560	0,428	0,403	0,305	0,440
Braga	1,215	1,387	1,288	1,214	1,232	0,953	1,328	1,286	1,421	1,552
Bragança	0,605	0,607	0,628	0,767	0,600	0,434	0,489	0,290	0,996	0,734
Castel Branco	1,034	0,914	0,859	1,161	1,053	0,901	1,236	0,877	0,890	0,759
Coimbra	0,667	0,711	0,659	0,718	0,653	0,690	0,418	0,433	0,491	0,892
Évora	0,667	0,711	0,659	0,718	0,653	0,690	0,418	0,433	0,491	0,892
Faro	0,726	0,796	0,802	1,052	0,963	0,891	0,570	0,558	0,458	0,690
Guarda	0,856	0,750	0,705	0,875	0,786	0,637	0,489	0,406	0,697	0,689
Leiria	0,692	0,765	0,753	0,962	0,955	0,776	0,958	0,993	1,087	1,082
Lisboa	1,366	1,327	1,308	1,010	1,156	1,294	1,078	1,060	0,875	0,808
Portalegre	0,487	0,515	0,549	0,706	0,613	0,693	0,380	0,382	0,520	0,620
Porto	1,797	1,650	1,561	1,077	1,169	1,383	1,335	1,206	1,149	1,171
Santarém	0,677	0,799	0,723	0,869	0,783	0,712	0,664	0,872	0,830	0,865
Setúbal	0,995	1,054	1,207	1,530	1,597	1,101	1,519	1,425	1,598	1,295
Viana do Castelo	0,434	0,055	0,501	0,576	0,593	0,528	0,677	0,646	0,520	0,877
Vila Real	0,527	0,560	0,559	0,628	0,477	0,392	0,503	0,323	0,572	0,601
Viseu	0,666	0,597	0,586	0,783	0,623	0,531	0,574	0,515	0,422	0,734

Table 7 – Differences in regional incomes attributable to industry-mix and productivity

	Aveiro	Beja	Braga	Brnça	CB	Coim	Évora	Faro	Guard	Leiria	Lisboa	Portal	Porto	Santar	Set	VC	VR	Viseu	Port
									1890										
									Distribution of labour (percentage)										
Agriculture	70	67	68	78	65	64	62	65	67	67	25	60	43	67	56	80	84	75	62
Industry	17	16	18	10	21	17	14	13	18	13	29	15	35	14	17	9	8	13	18
Services	13	16	14	12	14	19	25	22	15	20	45	25	22	20	27	11	9	12	20
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
									GDP per worker (Milion PTE)										
Agriculture	4,47	4,34	3,70	4,72	3,32	4,21	4,72	3,57	4,21	4,34	5,10	4,08	3,83	4,08	4,08	3,70	4,59	3,96	4,13
Industry	5,73	5,17	7,93	7,76	4,88	5,98	7,43	6,69	6,06	6,80	10,42	4,43	7,91	6,81	9,56	4,86	8,08	5,27	7,36
Services	10,35	12,56	10,82	14,50	10,82	10,26	12,90	10,04	12,69	10,69	13,46	12,60	12,12	13,90	13,46	12,77	11,43	9,31	12,08
Total	5,46	5,82	5,48	6,19	4,71	5,67	7,11	5,41	5,81	5,94	10,44	6,25	7,09	6,39	7,53	4,83	5,45	4,77	6,27
Industry mix	**5,73**	**5,96**	**5,85**	**5,41**	**5,94**	**6,20**	**6,54**	**6,31**	**5,89**	**6,15**	**8,67**	**6,58**	**7,02**	**6,14**	**6,81**	**5,32**	**5,07**	**5,51**	**6,27**
									Percentage attributable to										
Industry-mix	-10,0	-5,5	-7,8	-14,0	-7,1	-1,4	3,7	0,6	-6,6	-2,1	22,9	5,0	10,5	-2,1	7,2	-19,7	-22,1	-16,1	0,0
Productivity-effect	-4,9	-2,3	-6,7	12,7	-26,2	-9,3	8,1	-16,7	-1,4	-3,6	17,0	-5,3	1,0	4,0	9,5	-10,3	7,1	-15,4	0,0

	Aveiro	Beja	Braga	Brnça	CB	Coim	Évora	Faro	Guard	Leiria	Lisboa	Portal	Porto	Santar	Set	VC	VR	Viseu	Port
									1930										
									Labour										
Agriculture	57	69	57	73	63	62	62	64	70	67	20	64	30	65	53	74	75	73	54
Industry	22	14	23	9	19	15	13	15	14	15	26	13	34	14	21	11	8	10	19
Services	21	17	21	17	18	23	25	21	16	18	54	24	36	21	25	15	18	17	27
	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
									GDP per worker (Milion PTE)										
Agriculture	8,23	7,48	6,18	8,29	7,07	8,04	7,88	6,91	7,67	8,10	8,93	7,20	7,38	7,68	9,51	7,89	7,96	7,17	7,69

Industry	12,11	8,93	10,12	14,51	11,33	13,52	10,71	13,26	12,90	15,87	17,44	10,58	10,54	13,03	25,37	11,00	13,50	10,80	13,32
Services	11,44	12,77	11,61	14,75	12,77	14,82	12,01	12,48	16,97	15,84	20,46	14,90	20,88	15,87	17,50	12,34	13,55	8,24	16,82
Total	9,77	8,59	8,20	9,99	8,89	10,40	9,28	9,04	9,89	10,64	17,35	9,45	13,29	10,12	14,92	8,92	9,36	7,73	11,24
Industry mix	**10,88**	**10,03**	**10,86**	**9,79**	**10,38**	**10,61**	**10,70**	**10,45**	**9,94**	**10,17**	**14,06**	**10,56**	**12,87**	**10,37**	**11,20**	**9,72**	**9,71**	**9,82**	**11,24**
								Percentage attributable to											
Industry-mix	-3,7	-14,1	-4,7	-14,5	-9,7	-6,1	-5,8	-8,7	-13,2	-10,1	16,3	-7,2	12,2	-8,6	-0,3	-17,0	-16,3	-18,4	0,0
Productivity-effect	-11,3	-16,8	-32,4	2,0	-16,7	-2,0	-15,3	-15,7	-0,5	4,4	18,9	-11,7	3,2	-2,4	25,0	-8,9	-3,8	-27,2	0,0

								1970											
	Aveiro	Beja	Braga	Brnça	CB	Coim	Évora	Faro	Guard	Leiria	Lisboa	Portal	Porto	Santar	Set	VC	VR	Viseu	Port
									Labour										
Agriculture	27	66	33	72	50	42	51	45	61	44	8	59	12	43	21	65	69	65	32
Industry	49	13	48	10	29	27	20	25	21	34	32	15	52	28	41	19	12	16	34
Services	24	21	19	18	22	32	28	30	19	23	60	26	37	28	38	16	19	19	34
	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
									GDP per worker (Milion PTE)										
Agriculture	47,44	46,40	32,08	29,61	35,92	34,98	50,28	28,69	31,36	39,44	63,49	45,94	49,80	50,32	49,79	20,84	26,31	31,77	39,00
Industry	82,83	54,14	69,62	247,93	72,36	79,68	54,45	36,20	63,69	84,93	145,65	73,04	71,72	77,34	174,65	35,63	84,20	43,97	94,90
Services	54,50	63,54	51,40	52,97	68,80	61,34	51,65	78,00	61,05	63,31	117,16	43,82	83,66	58,52	54,39	58,43	61,99	52,01	84,58
Total	66,37	51,04	53,81	54,79	53,50	55,29	51,52	45,30	43,64	60,09	121,97	49,58	73,60	60,28	102,88	29,73	39,84	37,53	73,45
Industry mix	**77,12**	**55,79**	**74,59**	**52,57**	**64,92**	**68,38**	**63,32**	**66,60**	**59,15**	**68,03**	**84,23**	**59,34**	**84,64**	**67,71**	**79,34**	**56,98**	**54,16**	**56,44**	**73,45**
									Percentage attributable to										
Industry-mix	5,5	-34,6	2,1	-38,1	-15,9	-9,2	-19,7	-15,1	-32,8	-9,0	8,8	-28,5	15,2	-9,5	5,7	-55,4	-48,4	-45,3	0,0
Productivity-effect	-16,2	-9,3	-38,6	4,1	-21,3	-23,7	-22,9	-47,0	-35,6	-13,2	30,9	-19,7	-15,0	-12,3	22,9	-91,6	-35,9	-50,4	0,0

	Aveiro	Beja	Braga	Brnça	CB	Coim	Évora	Faro	Guard	Leiria	Lisboa	Portal	Porto	Santar	Set	VC	VR	Viseu	Port
								1980											
								Labour											
Agriculture	19	42	19	52	32	25	35	25	44	27	4	36	8	27	10	47	53	50	19
Industry	54	23	56	19	36	34	28	28	30	42	33	25	52	36	45	29	20	24	39
Services	27	35	25	29	31	41	38	47	26	30	63	39	41	37	46	24	27	26	42
	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
								GDP per worker (Milion PTE)											
Agriculture	166,0	278,6	102,6	126,4	206,5	157,9	240,6	231,9	141,3	198,1	299,7	323,3	153,2	332,7	380,5	78,34	128,5	109,2	185,5
Industry	335,79	223,6	291,4	350,6	211,37	332,41	407,72	319,69	192,1	298,98	443,78	323,26	298,2	298,48	463,4	228,3	255,5	252,2	340,5
Services	408,55	390,6	391,6	375,1	398,05	397,83	371,41	412,67	385,89	424,14	500,49	366,53	451,9	361,78	389,5	399,1	375,0	405,5	442,5
Total	322,11	305,3	280,7	241,7	268,61	315,55	336,35	341,51	220,48	309,39	473,58	340,34	349,4	331,08	421,5	199,7	220,9	219,6	353,4
Industry mix	**337,5**	**310,6**	**336,7**	**290,0**	**323,0**	**343,7**	**325,5**	**349,8**	**299,1**	**329,1**	**398,5**	**325,1**	**370,0**	**336,9**	**372,7**	**292,9**	**286,4**	**288,8**	**353,5**
								Percentage attributable to											
Industry-mix	-4,9	-14,0	-6,0	-26,3	-11,4	-3,1	-8,3	-1,1	-24,7	-7,9	9,5	-8,3	4,7	-5,0	4,6	-30,3	-30,4	-29,4	0,0
Productivity-effect	-4,8	-1,7	-19,9	-20,0	-20,2	-8,9	3,2	-2,4	-35,7	-6,4	15,8	4,5	-5,9	-1,8	11,6	-46,7	-29,6	-31,5	0,0